Using P100	Backbone	(Total Params, Trainable Params, Non Trainable Params, time in min, test loss, validation loss) = Functional											
Models		Unet - batch size 16	FPN - Batch size of 8, otherwise Error in training - OOM GP	Linknet	PSPNet				Model				
	vgg16	**(23,751,411; 23,747,379, 4,032, 2.2, 0.1161, 0.1805)**	**(17,573,699, 17,571,395, 2,304, 3.2, 0.0012, 0.0024)**	**(20,324,275, 20,317,459, 6,816, 2.2, 0.0400, 0.0037)**	Not using at this time. Images would have to be resized from 512x512 to a size divisible by 6 caused by restrictions in this model. Not worth the time needed to invest into doing this rescaling.								
	vgg19	**(29,061,107; 29,057,075, 4,032, 2.5, 0.0703, 0.0361)**	(22,883,395, 22,881,091, 2,304, 3.4, 0.0013, 0.0030)	(25,633,971, 25,627,155, 6,816, 2.4, 0.047, 0.0083)									
	resnet18	(14,334,582; 14,324,660; 9,922, 1.7 0.0682, 0.2448)	(13,811,398, 13,801,156, 10,242, 2.6, 0.0011, 0.0030)	(11,515,702, 11,505,684, 10,018, 1.5, 0.0431, 0.00984)									
	seresnet18	(14,423,662; 14,413,740; 9,922, 1.5, 0.0446, 1.2595)	(13,900,478, 13,890,236, 10,242, 2.6, 0.0011, 0.0021)	(11,604,782, 11,594,764, 10,018, 1.7, 0.0632, 0.0058)									
	resnext50	(32,057,206; 31,566,966; 70,210; NA)	**(26,409,926, 26,339,396, 70,530, 5.1, 0.00099, 0.0017)**	(20,279,478; 20,203,604; 75,874; NA)									
	seresnext50	(34,568,195; 34,517,987; 70,208; NA)	(28,940,915; 28,870,387; 70,528; 5.4; 0.0012; 0.0020)	(22,610,407; 22,734,595; 75,872; NA)									
	senet154	(122,320,163; 122,070,627; 249,536; NA)	(116,670,835; 116,420,979; 249,856; NA)	(118,538,723; 118,283,331; 255,392; NA)									
	inceptionv3	(29,932,819; 29,896,403; 36,416; 2.5; 0.0692; 0.1924)	(25,031,011; 24,994,275; 36,724; 3.4; 0.0011; 0.0019)	(26,268,115; 26,227,667; 40,448; 2.4; 0.0584; 0.1265)									
	mobilenet	(8,336,051; 8,312,179; 23,872; 1.9; 0.0760; 0.2841)	(6,104,835; 6,080,643; 24,192; 2.7; 0.0011; 0.0075)	(4,545,779; 4,519,955; 25,824; 1.8; 0.0393; 0.1596)									
	efficientnetb0	**(10,115,215; 10,071,215; 44,000; 2.3; 0.0422; 0.0905)**	**(7,040,223; 6,995,903; 44,320; 3.2; 0.000937; 0.0016)**	(8,056,047; 8,049,263; 46,784; NA)									
	Function used to test												
	python3 train_segmentation_model.py --gcp-bucket gs://necstlab-sandbox --config-file configs/config_sandbox/train-small-3class.yaml												
Constants													
P100													
Batch size 16 unless noted (possible inherent memory increase from tf 2.1 to tf 2.3)													
	next steps: put together workplan for full scale testing, create configs, use 100 epochs												

```
Model: "model"
_________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
input_1 (InputLayer)            [(None, None, None,  0
__________________________________________________________________________________________________
stem_conv (Conv2D)              (None, None, None, 3 288         input_1[0][0]
__________________________________________________________________________________________________
stem_bn (BatchNormalization)    (None, None, None, 3 128         stem_conv[0][0]
__________________________________________________________________________________________________
stem_activation (Activation)    (None, None, None, 3 0           stem_bn[0][0]
__________________________________________________________________________________________________
block1a_dwconv (DepthwiseConv2D (None, None, None, 3 288         stem_activation[0][0]
__________________________________________________________________________________________________
block1a_bn (BatchNormalization) (None, None, None, 3 128         block1a_dwconv[0][0]
__________________________________________________________________________________________________
block1a_activation (Activation) (None, None, None, 3 0           block1a_bn[0][0]
__________________________________________________________________________________________________
block1a_se_squeeze (GlobalAvera (None, 32)          0           block1a_activation[0][0]
__________________________________________________________________________________________________
block1a_se_reshape (Reshape)    (None, 1, 1, 32)    0           block1a_se_squeeze[0][0]
__________________________________________________________________________________________________
block1a_se_reduce (Conv2D)      (None, 1, 1, 8)     264         block1a_se_reshape[0][0]
__________________________________________________________________________________________________
block1a_se_expand (Conv2D)      (None, 1, 1, 32)    288         block1a_se_reduce[0][0]
__________________________________________________________________________________________________
block1a_se_excite (Multiply)    (None, None, None, 3 0           block1a_activation[0][0]
                                                                 block1a_se_expand[0][0]
__________________________________________________________________________________________________
block1a_project_conv (Conv2D)   (None, None, None, 1 512         block1a_se_excite[0][0]
__________________________________________________________________________________________________
block1a_project_bn (BatchNormal (None, None, None, 1 64          block1a_project_conv[0][0]
__________________________________________________________________________________________________
block2a_expand_conv (Conv2D)    (None, None, None, 9 1536        block1a_project_bn[0][0]
__________________________________________________________________________________________________
block2a_expand_bn (BatchNormali (None, None, None, 9 384         block2a_expand_conv[0][0]
__________________________________________________________________________________________________
block2a_expand_activation (Acti (None, None, None, 9 0           block2a_expand_bn[0][0]
__________________________________________________________________________________________________
block2a_dwconv (DepthwiseConv2D (None, None, None, 9 864         block2a_expand_activation[0][0]
__________________________________________________________________________________________________
block2a_bn (BatchNormalization) (None, None, None, 9 384         block2a_dwconv[0][0]
__________________________________________________________________________________________________
block2a_activation (Activation) (None, None, None, 9 0           block2a_bn[0][0]
__________________________________________________________________________________________________
block2a_se_squeeze (GlobalAvera (None, 96)          0           block2a_activation[0][0]
__________________________________________________________________________________________________
block2a_se_reshape (Reshape)    (None, 1, 1, 96)    0           block2a_se_squeeze[0][0]
__________________________________________________________________________________________________
block2a_se_reduce (Conv2D)      (None, 1, 1, 4)     388         block2a_se_reshape[0][0]
__________________________________________________________________________________________________
block2a_se_expand (Conv2D)      (None, 1, 1, 96)    480         block2a_se_reduce[0][0]
__________________________________________________________________________________________________
block2a_se_excite (Multiply)    (None, None, None, 9 0           block2a_activation[0][0]
                                                                 block2a_se_expand[0][0]
__________________________________________________________________________________________________
block2a_project_conv (Conv2D)   (None, None, None, 2 2304        block2a_se_excite[0][0]
__________________________________________________________________________________________________
block2a_project_bn (BatchNormal (None, None, None, 2 96          block2a_project_conv[0][0]
__________________________________________________________________________________________________
block2b_expand_conv (Conv2D)    (None, None, None, 1 3456        block2a_project_bn[0][0]
__________________________________________________________________________________________________
block2b_expand_bn (BatchNormali (None, None, None, 1 576         block2b_expand_conv[0][0]
__________________________________________________________________________________________________
block2b_expand_activation (Acti (None, None, None, 1 0           block2b_expand_bn[0][0]
__________________________________________________________________________________________________
block2b_dwconv (DepthwiseConv2D (None, None, None, 1 1296        block2b_expand_activation[0][0]
__________________________________________________________________________________________________
block2b_bn (BatchNormalization) (None, None, None, 1 576         block2b_dwconv[0][0]
__________________________________________________________________________________________________
block2b_activation (Activation) (None, None, None, 1 0           block2b_bn[0][0]
__________________________________________________________________________________________________
block2b_se_squeeze (GlobalAvera (None, 144)         0           block2b_activation[0][0]
__________________________________________________________________________________________________
block2b_se_reshape (Reshape)    (None, 1, 1, 144)   0           block2b_se_squeeze[0][0]
__________________________________________________________________________________________________
block2b_se_reduce (Conv2D)      (None, 1, 1, 6)     870         block2b_se_reshape[0][0]
__________________________________________________________________________________________________
block2b_se_expand (Conv2D)      (None, 1, 1, 144)   1008        block2b_se_reduce[0][0]
__________________________________________________________________________________________________
block2b_se_excite (Multiply)    (None, None, None, 1 0           block2b_activation[0][0]
                                                                 block2b_se_expand[0][0]
__________________________________________________________________________________________________
block2b_project_conv (Conv2D)   (None, None, None, 2 3456        block2b_se_excite[0][0]
__________________________________________________________________________________________________
block2b_project_bn (BatchNormal (None, None, None, 2 96          block2b_project_conv[0][0]
__________________________________________________________________________________________________
block2b_drop (FixedDropout)     (None, None, None, 2 0           block2b_project_bn[0][0]
__________________________________________________________________________________________________
block2b_add (Add)               (None, None, None, 2 0           block2b_drop[0][0]
                                                                 block2a_project_bn[0][0]
__________________________________________________________________________________________________
block3a_expand_conv (Conv2D)    (None, None, None, 1 3456        block2b_add[0][0]
__________________________________________________________________________________________________
block3a_expand_bn (BatchNormali (None, None, None, 1 576         block3a_expand_conv[0][0]
__________________________________________________________________________________________________
block3a_expand_activation (Acti (None, None, None, 1 0           block3a_expand_bn[0][0]
__________________________________________________________________________________________________
block3a_dwconv (DepthwiseConv2D (None, None, None, 1 3600        block3a_expand_activation[0][0]
__________________________________________________________________________________________________
block3a_bn (BatchNormalization) (None, None, None, 1 576         block3a_dwconv[0][0]
__________________________________________________________________________________________________
block3a_activation (Activation) (None, None, None, 1 0           block3a_bn[0][0]
__________________________________________________________________________________________________
block3a_se_squeeze (GlobalAvera (None, 144)         0           block3a_activation[0][0]
__________________________________________________________________________________________________
block3a_se_reshape (Reshape)    (None, 1, 1, 144)   0           block3a_se_squeeze[0][0]
__________________________________________________________________________________________________
block3a_se_reduce (Conv2D)      (None, 1, 1, 6)     870         block3a_se_reshape[0][0]
__________________________________________________________________________________________________
block3a_se_expand (Conv2D)      (None, 1, 1, 144)   1008        block3a_se_reduce[0][0]
__________________________________________________________________________________________________
block3a_se_excite (Multiply)    (None, None, None, 1 0           block3a_activation[0][0]
                                                                 block3a_se_expand[0][0]
__________________________________________________________________________________________________
block3a_project_conv (Conv2D)   (None, None, None, 4 5760        block3a_se_excite[0][0]
__________________________________________________________________________________________________
block3a_project_bn (BatchNormal (None, None, None, 4 160         block3a_project_conv[0][0]
__________________________________________________________________________________________________
block3b_expand_conv (Conv2D)    (None, None, None, 2 9600        block3a_project_bn[0][0]
__________________________________________________________________________________________________
block3b_expand_bn (BatchNormali (None, None, None, 2 960         block3b_expand_conv[0][0]
__________________________________________________________________________________________________
block3b_expand_activation (Acti (None, None, None, 2 0           block3b_expand_bn[0][0]
__________________________________________________________________________________________________
block3b_dwconv (DepthwiseConv2D (None, None, None, 2 6000        block3b_expand_activation[0][0]
__________________________________________________________________________________________________
block3b_bn (BatchNormalization) (None, None, None, 2 960         block3b_dwconv[0][0]
__________________________________________________________________________________________________
block3b_activation (Activation) (None, None, None, 2 0           block3b_bn[0][0]
__________________________________________________________________________________________________
block3b_se_squeeze (GlobalAvera (None, 240)         0           block3b_activation[0][0]
__________________________________________________________________________________________________
block3b_se_reshape (Reshape)    (None, 1, 1, 240)   0           block3b_se_squeeze[0][0]
__________________________________________________________________________________________________
block3b_se_reduce (Conv2D)      (None, 1, 1, 10)    2410        block3b_se_reshape[0][0]
__________________________________________________________________________________________________
block3b_se_expand (Conv2D)      (None, 1, 1, 240)   2640        block3b_se_reduce[0][0]
__________________________________________________________________________________________________
block3b_se_excite (Multiply)    (None, None, None, 2 0           block3b_activation[0][0]
                                                                 block3b_se_expand[0][0]
__________________________________________________________________________________________________
block3b_project_conv (Conv2D)   (None, None, None, 4 9600        block3b_se_excite[0][0]
__________________________________________________________________________________________________
block3b_project_bn (BatchNormal (None, None, None, 4 160         block3b_project_conv[0][0]
__________________________________________________________________________________________________
block3b_drop (FixedDropout)     (None, None, None, 4 0           block3b_project_bn[0][0]
```

```
loss: 0.0010 - binary_ce_metric: 0.0010 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accur
acy: 0.7078 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - cl
ass0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_bi
nary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_ac
curacy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

block3b_add (Add) (None, None, None, 4 0 block3b_drop[0][0]
block3a_project_bn[0][0]

block4a_expand_conv (Conv2D) (None, None, None, 2 9600 block3b_add[0][0]

block4a_expand_bn (BatchNormali (None, None, None, 2 960 block4a_expand_conv[0][0]

block4a_expand_activation (Acti (None, None, None, 2 0 block4a_expand_bn[0][0]

block4a_dwconv (DepthwiseConv2D (None, None, None, 2 2160 block4a_expand_activation[0][0]

block4a_bn (BatchNormalization) (None, None, None, 2 960 block4a_dwconv[0][0]

block4a_activation (Activation) (None, None, None, 2 0 block4a_bn[0][0]

block4a_se_squeeze (GlobalAvera (None, 240) 0 block4a_activation[0][0]

block4a_se_reshape (Reshape) (None, 1, 1, 240) 0 block4a_se_squeeze[0][0]

block4a_se_reduce (Conv2D) (None, 1, 1, 10) 2410 block4a_se_reshape[0][0]

block4a_se_expand (Conv2D) (None, 1, 1, 240) 2640 block4a_se_reduce[0][0]

block4a_se_excite (Multiply) (None, None, None, 2 0 block4a_activation[0][0]
block4a_se_expand[0][0]

block4a_project_conv (Conv2D) (None, None, None, 8 19200 block4a_se_excite[0][0]

block4a_project_bn (BatchNormal (None, None, None, 8 320 block4a_project_conv[0][0]

block4b_expand_conv (Conv2D) (None, None, None, 4 38400 block4a_project_bn[0][0]

block4b_expand_bn (BatchNormali (None, None, None, 4 1920 block4b_expand_conv[0][0]

block4b_expand_activation (Acti (None, None, None, 4 0 block4b_expand_bn[0][0]

block4b_dwconv (DepthwiseConv2D (None, None, None, 4 4320 block4b_expand_activation[0][0]

block4b_bn (BatchNormalization) (None, None, None, 4 1920 block4b_dwconv[0][0]

block4b_activation (Activation) (None, None, None, 4 0 block4b_bn[0][0]

block4b_se_squeeze (GlobalAvera (None, 480) 0 block4b_activation[0][0]

block4b_se_reshape (Reshape) (None, 1, 1, 480) 0 block4b_se_squeeze[0][0]

block4b_se_reduce (Conv2D) (None, 1, 1, 20) 9620 block4b_se_reshape[0][0]

block4b_se_expand (Conv2D) (None, 1, 1, 480) 10080 block4b_se_reduce[0][0]

block4b_se_excite (Multiply) (None, None, None, 4 0 block4b_activation[0][0]
block4b_se_expand[0][0]

block4b_project_conv (Conv2D) (None, None, None, 8 38400 block4b_se_excite[0][0]

block4b_project_bn (BatchNormal (None, None, None, 8 320 block4b_project_conv[0][0]

block4b_drop (FixedDropout) (None, None, None, 8 0 block4b_project_bn[0][0]

block4b_add (Add) (None, None, None, 8 0 block4b_drop[0][0]
block4a_project_bn[0][0]

block4c_expand_conv (Conv2D) (None, None, None, 4 38400 block4b_add[0][0]

block4c_expand_bn (BatchNormali (None, None, None, 4 1920 block4c_expand_conv[0][0]

block4c_expand_activation (Acti (None, None, None, 4 0 block4c_expand_bn[0][0]

block4c_dwconv (DepthwiseConv2D (None, None, None, 4 4320 block4c_expand_activation[0][0]

block4c_bn (BatchNormalization) (None, None, None, 4 1920 block4c_dwconv[0][0]

block4c_activation (Activation) (None, None, None, 4 0 block4c_bn[0][0]

block4c_se_squeeze (GlobalAvera (None, 480) 0 block4c_activation[0][0]

block4c_se_reshape (Reshape) (None, 1, 1, 480) 0 block4c_se_squeeze[0][0]

block4c_se_reduce (Conv2D) (None, 1, 1, 20) 9620 block4c_se_reshape[0][0]

block4c_se_expand (Conv2D) (None, 1, 1, 480) 10080 block4c_se_reduce[0][0]

block4c_se_excite (Multiply) (None, None, None, 4 0 block4c_activation[0][0]
block4c_se_expand[0][0]

block4c_project_conv (Conv2D) (None, None, None, 8 38400 block4c_se_excite[0][0]

block4c_project_bn (BatchNormal (None, None, None, 8 320 block4c_project_conv[0][0]

block4c_drop (FixedDropout) (None, None, None, 8 0 block4c_project_bn[0][0]

block4c_add (Add) (None, None, None, 8 0 block4c_drop[0][0]
block4b_add[0][0]

block5a_expand_conv (Conv2D) (None, None, None, 4 38400 block4c_add[0][0]

block5a_expand_bn (BatchNormali (None, None, None, 4 1920 block5a_expand_conv[0][0]

block5a_expand_activation (Acti (None, None, None, 4 0 block5a_expand_bn[0][0]

block5a_dwconv (DepthwiseConv2D (None, None, None, 4 12000 block5a_expand_activation[0][0]

block5a_bn (BatchNormalization) (None, None, None, 4 1920 block5a_dwconv[0][0]

block5a_activation (Activation) (None, None, None, 4 0 block5a_bn[0][0]

block5a_se_squeeze (GlobalAvera (None, 480) 0 block5a_activation[0][0]

block5a_se_reshape (Reshape) (None, 1, 1, 480) 0 block5a_se_squeeze[0][0]

block5a_se_reduce (Conv2D) (None, 1, 1, 20) 9620 block5a_se_reshape[0][0]

block5a_se_expand (Conv2D) (None, 1, 1, 480) 10080 block5a_se_reduce[0][0]

block5a_se_excite (Multiply) (None, None, None, 4 0 block5a_activation[0][0]
block5a_se_expand[0][0]

block5a_project_conv (Conv2D) (None, None, None, 1 53760 block5a_se_excite[0][0]

block5a_project_bn (BatchNormal (None, None, None, 1 448 block5a_project_conv[0][0]

block5b_expand_conv (Conv2D) (None, None, None, 6 75264 block5a_project_bn[0][0]

block5b_expand_bn (BatchNormali (None, None, None, 6 2688 block5b_expand_conv[0][0]

block5b_expand_activation (Acti (None, None, None, 6 0 block5b_expand_bn[0][0]

block5b_dwconv (DepthwiseConv2D (None, None, None, 6 16800 block5b_expand_activation[0][0]

block5b_bn (BatchNormalization) (None, None, None, 6 2688 block5b_dwconv[0][0]

block5b_activation (Activation) (None, None, None, 6 0 block5b_bn[0][0]

block5b_se_squeeze (GlobalAvera (None, 672) 0 block5b_activation[0][0]

block5b_se_reshape (Reshape) (None, 1, 1, 672) 0 block5b_se_squeeze[0][0]

block5b_se_reduce (Conv2D) (None, 1, 1, 28) 18844 block5b_se_reshape[0][0]

block5b_se_expand (Conv2D) (None, 1, 1, 672) 19488 block5b_se_reduce[0][0]

block5b_se_excite (Multiply) (None, None, None, 6 0 block5b_activation[0][0]
block5b_se_expand[0][0]

block5b_project_conv (Conv2D) (None, None, None, 1 75264 block5b_se_excite[0][0]

block5b_project_bn (BatchNormal (None, None, None, 1 448 block5b_project_conv[0][0]

block5b_drop (FixedDropout) (None, None, None, 1 0 block5b_project_bn[0][0]

block5b_add (Add) (None, None, None, 1 0 block5b_drop[0][0]
block5a_project_bn[0][0]

block5c_expand_conv (Conv2D) (None, None, None, 6 75264 block5b_add[0][0]

block5c_expand_bn (BatchNormali (None, None, None, 6 2688 block5c_expand_conv[0][0]

block5c_expand_activation (Acti (None, None, None, 6 0 block5c_expand_bn[0][0]

block5c_dwconv (DepthwiseConv2D (None, None, None, 6 16800 block5c_expand_activation[0][0]

block5c_bn (BatchNormalization) (None, None, None, 6 2688 block5c_dwconv[0][0]

block5c_activation (Activation) (None, None, None, 6 0 block5c_bn[0][0]

block5c_se_squeeze (GlobalAvera (None, 672) 0 block5c_activation[0][0]

block5c_se_reshape (Reshape) (None, 1, 1, 672) 0 block5c_se_squeeze[0][0]

block5c_se_reduce (Conv2D) (None, 1, 1, 28) 18844 block5c_se_reshape[0][0]

block5c_se_expand (Conv2D) (None, 1, 1, 672) 19488 block5c_se_reduce[0][0]

block5c_se_excite (Multiply) (None, None, None, 6 0 block5c_activation[0][0]
block5c_se_expand[0][0]

block5c_project_conv (Conv2D) (None, None, None, 1 75264 block5c_se_excite[0][0]

block5c_project_bn (BatchNormal (None, None, None, 1 448 block5c_project_conv[0][0]

block5c_drop (FixedDropout) (None, None, None, 1 0 block5c_project_bn[0][0]

block5c_add (Add) (None, None, None, 1 0 block5c_drop[0][0]
block5b_add[0][0]

block6a_expand_conv (Conv2D) (None, None, None, 6 75264 block5c_add[0][0]

block6a_expand_bn (BatchNormali (None, None, None, 6 2688 block6a_expand_conv[0][0]

block6a_expand_activation (Acti (None, None, None, 6 0 block6a_expand_bn[0][0]

block6a_dwconv (DepthwiseConv2D (None, None, None, 6 16800 block6a_expand_activation[0][0]

block6a_bn (BatchNormalization) (None, None, None, 6 2688 block6a_dwconv[0][0]

block6a_activation (Activation) (None, None, None, 6 0 block6a_bn[0][0]

block6a_se_squeeze (GlobalAvera (None, 672) 0 block6a_activation[0][0]

block6a_se_reshape (Reshape) (None, 1, 1, 672) 0 block6a_se_squeeze[0][0]

block6a_se_reduce (Conv2D) (None, 1, 1, 28) 18844 block6a_se_reshape[0][0]

block6a_se_expand (Conv2D) (None, 1, 1, 672) 19488 block6a_se_reduce[0][0]

block6a_se_excite (Multiply) (None, None, None, 6 0 block6a_activation[0][0]
block6a_se_expand[0][0]

block6a_project_conv (Conv2D) (None, None, None, 1 129024 block6a_se_excite[0][0]

block6a_project_bn (BatchNormal (None, None, None, 1 768 block6a_project_conv[0][0]

block6b_expand_conv (Conv2D) (None, None, None, 1 221184 block6a_project_bn[0][0]

block6b_expand_bn (BatchNormali (None, None, None, 1 4608 block6b_expand_conv[0][0]

block6b_expand_activation (Acti (None, None, None, 1 0 block6b_expand_bn[0][0]

block6b_dwconv (DepthwiseConv2D (None, None, None, 1 28800 block6b_expand_activation[0][0]

block6b_bn (BatchNormalization) (None, None, None, 1 4608 block6b_dwconv[0][0]

block6b_activation (Activation) (None, None, None, 1 0 block6b_bn[0][0]

block6b_se_squeeze (GlobalAvera (None, 1152) 0 block6b_activation[0][0]

block6b_se_reshape (Reshape) (None, 1, 1, 1152) 0 block6b_se_squeeze[0][0]

block6b_se_reduce (Conv2D) (None, 1, 1, 48) 55344 block6b_se_reshape[0][0]

block6b_se_expand (Conv2D) (None, 1, 1, 1152) 56448 block6b_se_reduce[0][0]

block6b_se_excite (Multiply) (None, None, None, 1 0 block6b_activation[0][0]
block6b_se_expand[0][0]

block6b_project_conv (Conv2D) (None, None, None, 1 221184 block6b_se_excite[0][0]

block6b_project_bn (BatchNormal (None, None, None, 1 768 block6b_project_conv[0][0]

block6b_drop (FixedDropout) (None, None, None, 1 0 block6b_project_bn[0][0]

block6b_add (Add) (None, None, None, 1 0 block6b_drop[0][0]
block6a_project_bn[0][0]

block6c_expand_conv (Conv2D) (None, None, None, 1 221184 block6b_add[0][0]

block6c_expand_bn (BatchNormali (None, None, None, 1 4608 block6c_expand_conv[0][0]

block6c_expand_activation (Acti (None, None, None, 1 0 block6c_expand_bn[0][0]

block6c_dwconv (DepthwiseConv2D (None, None, None, 1 28800 block6c_expand_activation[0][0]

block6c_bn (BatchNormalization) (None, None, None, 1 4608 block6c_dwconv[0][0]

block6c_activation (Activation) (None, None, None, 1 0 block6c_bn[0][0]

block6c_se_squeeze (GlobalAvera (None, 1152) 0 block6c_activation[0][0]

block6c_se_reshape (Reshape) (None, 1, 1, 1152) 0 block6c_se_squeeze[0][0]

block6c_se_reduce (Conv2D) (None, 1, 1, 48) 55344 block6c_se_reshape[0][0]

block6c_se_expand (Conv2D) (None, 1, 1, 1152) 56448 block6c_se_reduce[0][0]

block6c_se_excite (Multiply) (None, None, None, 1 0 block6c_activation[0][0]
block6c_se_expand[0][0]

block6c_project_conv (Conv2D) (None, None, None, 1 221184 block6c_se_excite[0][0]

block6c_project_bn (BatchNormal (None, None, None, 1 768 block6c_project_conv[0][0]

block6c_drop (FixedDropout) (None, None, None, 1 0 block6c_project_bn[0][0]

block6c_add (Add) (None, None, None, 1 0 block6c_drop[0][0]
block6b_add[0][0]

block6d_expand_conv (Conv2D) (None, None, None, 1 221184 block6c_add[0][0]

block6d_expand_bn (BatchNormali (None, None, None, 1 4608 block6d_expand_conv[0][0]

block6d_expand_activation (Acti (None, None, None, 1 0 block6d_expand_bn[0][0]

block6d_dwconv (DepthwiseConv2D (None, None, None, 1 28800 block6d_expand_activation[0][0]

block6d_bn (BatchNormalization) (None, None, None, 1 4608 block6d_dwconv[0][0]

block6d_activation (Activation) (None, None, None, 1 0 block6d_bn[0][0]

block6d_se_squeeze (GlobalAvera (None, 1152) 0 block6d_activation[0][0]

block6d_se_reshape (Reshape) (None, 1, 1, 1152) 0 block6d_se_squeeze[0][0]

block6d_se_reduce (Conv2D) (None, 1, 1, 48) 55344 block6d_se_reshape[0][0]

block6d_se_expand (Conv2D) (None, 1, 1, 1152) 56448 block6d_se_reduce[0][0]

block6d_se_excite (Multiply) (None, None, None, 1 0 block6d_activation[0][0]
block6d_se_expand[0][0]

block6d_project_conv (Conv2D) (None, None, None, 1 221184 block6d_se_excite[0][0]

block6d_project_bn (BatchNormal (None, None, None, 1 768 block6d_project_conv[0][0]

block6d_drop (FixedDropout) (None, None, None, 1 0 block6d_project_bn[0][0]

block6d_add (Add) (None, None, None, 1 0 block6d_drop[0][0]
block6c_add[0][0]

block7a_expand_conv (Conv2D) (None, None, None, 1 221184 block6d_add[0][0]

block7a_expand_bn (BatchNormali (None, None, None, 1 4608 block7a_expand_conv[0][0]

block7a_expand_activation (Acti (None, None, None, 1 0 block7a_expand_bn[0][0]

block7a_dwconv (DepthwiseConv2D (None, None, None, 1 10368 block7a_expand_activation[0][0]

block7a_bn (BatchNormalization) (None, None, None, 1 4608 block7a_dwconv[0][0]

block7a_activation (Activation) (None, None, None, 1 0 block7a_bn[0][0]

block7a_se_squeeze (GlobalAvera (None, 1152) 0 block7a_activation[0][0]

block7a_se_reshape (Reshape) (None, 1, 1, 1152) 0 block7a_se_squeeze[0][0]

block7a_se_reduce (Conv2D) (None, 1, 1, 48) 55344 block7a_se_reshape[0][0]

block7a_se_expand (Conv2D) (None, 1, 1, 1152) 56448 block7a_se_reduce[0][0]

block7a_se_excite (Multiply) (None, None, None, 1 0 block7a_activation[0][0]
block7a_se_expand[0][0]

block7a_project_conv (Conv2D) (None, None, None, 3 368640 block7a_se_excite[0][0]

block7a_project_bn (BatchNormal (None, None, None, 3 1280 block7a_project_conv[0][0]

top_conv (Conv2D) (None, None, None, 1 409600 block7a_project_bn[0][0]

top_bn (BatchNormalization) (None, None, None, 1 5120 top_conv[0][0]

top_activation (Activation) (None, None, None, 1 0 top_bn[0][0]

decoder_stage0a_conv (Conv2D) (None, None, None, 3 409600 top_activation[0][0]

decoder_stage0a_bn (BatchNormal (None, None, None, 3 1280 decoder_stage0a_conv[0][0]

decoder_stage0a_relu (Activatio (None, None, None, 3 0 decoder_stage0a_bn[0][0]

decoder_stage0_upsampling (UpSa (None, None, None, 3 0 decoder_stage0a_relu[0][0]

decoder_stage0b_conv (Conv2D) (None, None, None, 3 921600 decoder_stage0_upsampling[0][0]

decoder_stage0b_bn (BatchNormal (None, None, None, 3 1280 decoder_stage0b_conv[0][0]

decoder_stage0b_relu (Activatio (None, None, None, 3 0 decoder_stage0b_bn[0][0]

decoder_stage0c_conv (Conv2D) (None, None, None, 6 215040 decoder_stage0b_relu[0][0]

decoder_stage0c_bn (BatchNormal (None, None, None, 6 2688 decoder_stage0c_conv[0][0]

decoder_stage0c_relu (Activatio (None, None, None, 6 0 decoder_stage0c_bn[0][0]

decoder_stage0_add (Add) (None, None, None, 6 0 decoder_stage0c_relu[0][0]
block6a_expand_activation[0][0]

decoder_stage1a_conv (Conv2D) (None, None, None, 1 112896 decoder_stage0_add[0][0]

decoder_stage1a_bn (BatchNormal (None, None, None, 1 672 decoder_stage1a_conv[0][0]

decoder_stage1a_relu (Activatio (None, None, None, 1 0 decoder_stage1a_bn[0][0]

decoder_stage1_upsampling (UpSa (None, None, None, 1 0 decoder_stage1a_relu[0][0]

decoder_stage1b_conv (Conv2D) (None, None, None, 1 254016 decoder_stage1_upsampling[0][0]

decoder_stage1b_bn (BatchNormal (None, None, None, 1 672 decoder_stage1b_conv[0][0]

decoder_stage1b_relu (Activatio (None, None, None, 1 0 decoder_stage1b_bn[0][0]

decoder_stage1c_conv (Conv2D) (None, None, None, 2 40320 decoder_stage1b_relu[0][0]

decoder_stage1c_bn (BatchNormal (None, None, None, 2 960 decoder_stage1c_conv[0][0]

decoder_stage1c_relu (Activatio (None, None, None, 2 0 decoder_stage1c_bn[0][0]

decoder_stage1_add (Add) (None, None, None, 2 0 decoder_stage1c_relu[0][0]
block4a_expand_activation[0][0]

decoder_stage2a_conv (Conv2D) (None, None, None, 6 14400 decoder_stage1_add[0][0]

decoder_stage2a_bn (BatchNormal (None, None, None, 6 240 decoder_stage2a_conv[0][0]

decoder_stage2a_relu (Activatio (None, None, None, 6 0 decoder_stage2a_bn[0][0]

decoder_stage2_upsampling (UpSa (None, None, None, 6 0 decoder_stage2a_relu[0][0]

decoder_stage2b_conv (Conv2D) (None, None, None, 6 32400 decoder_stage2_upsampling[0][0]

decoder_stage2b_bn (BatchNormal (None, None, None, 6 240 decoder_stage2b_conv[0][0]

decoder_stage2b_relu (Activatio (None, None, None, 6 0 decoder_stage2b_bn[0][0]

decoder_stage2c_conv (Conv2D) (None, None, None, 1 8640 decoder_stage2b_relu[0][0]

decoder_stage2c_bn (BatchNormal (None, None, None, 1 576 decoder_stage2c_conv[0][0]

decoder_stage2c_relu (Activatio (None, None, None, 1 0 decoder_stage2c_bn[0][0]

decoder_stage2_add (Add) (None, None, None, 1 0 decoder_stage2c_relu[0][0]
block3a_expand_activation[0][0]

decoder_stage3a_conv (Conv2D) (None, None, None, 3 5184 decoder_stage2_add[0][0]

decoder_stage3a_bn (BatchNormal (None, None, None, 3 144 decoder_stage3a_conv[0][0]

decoder_stage3a_relu (Activatio (None, None, None, 3 0 decoder_stage3a_bn[0][0]

decoder_stage3_upsampling (UpSa (None, None, None, 3 0 decoder_stage3a_relu[0][0]

decoder_stage3b_conv (Conv2D) (None, None, None, 3 11664 decoder_stage3_upsampling[0][0]

decoder_stage3b_bn (BatchNormal (None, None, None, 3 144 decoder_stage3b_conv[0][0]

decoder_stage3b_relu (Activatio (None, None, None, 3 0 decoder_stage3b_bn[0][0]

decoder_stage3c_conv (Conv2D) (None, None, None, 9 3456 decoder_stage3b_relu[0][0]

decoder_stage3c_bn (BatchNormal (None, None, None, 9 384 decoder_stage3c_conv[0][0]

decoder_stage3c_relu (Activatio (None, None, None, 9 0 decoder_stage3c_bn[0][0]

decoder_stage3_add (Add) (None, None, None, 9 0 decoder_stage3c_relu[0][0]
block2a_expand_activation[0][0]

decoder_stage4a_conv (Conv2D) (None, None, None, 2 2304 decoder_stage3_add[0][0]

decoder_stage4a_bn (BatchNormal (None, None, None, 2 96 decoder_stage4a_conv[0][0]

decoder_stage4a_relu (Activatio (None, None, None, 2 0 decoder_stage4a_bn[0][0]

decoder_stage4_upsampling (UpSa (None, None, None, 2 0 decoder_stage4a_relu[0][0]

```
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 2 5184        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 2 96          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 2 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 384         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d[0][0]
==================================================================================================
Total params: 7,040,223
Trainable params: 6,995,903
Non-trainable params: 44,320
__________________________________________________________________________________________________
```

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, None, None,	0	
conv1_pad (ZeroPadding2D)	(None, None, None, 1	0	input_1[0][0]
conv1 (Conv2D)	(None, None, None, 3	288	conv1_pad[0][0]
conv1_bn (BatchNormalization)	(None, None, None, 3	128	conv1[0][0]
conv1_relu (ReLU)	(None, None, None, 3	0	conv1_bn[0][0]
conv_dw_1 (DepthwiseConv2D)	(None, None, None, 3	288	conv1_relu[0][0]
conv_dw_1_bn (BatchNormalizatio	(None, None, None, 3	128	conv_dw_1[0][0]
conv_dw_1_relu (ReLU)	(None, None, None, 3	0	conv_dw_1_bn[0][0]
conv_pw_1 (Conv2D)	(None, None, None, 6	2048	conv_dw_1_relu[0][0]
conv_pw_1_bn (BatchNormalizatio	(None, None, None, 6	256	conv_pw_1[0][0]
conv_pw_1_relu (ReLU)	(None, None, None, 6	0	conv_pw_1_bn[0][0]
conv_pad_2 (ZeroPadding2D)	(None, None, None, 6	0	conv_pw_1_relu[0][0]
conv_dw_2 (DepthwiseConv2D)	(None, None, None, 6	576	conv_pad_2[0][0]
conv_dw_2_bn (BatchNormalizatio	(None, None, None, 6	256	conv_dw_2[0][0]
conv_dw_2_relu (ReLU)	(None, None, None, 6	0	conv_dw_2_bn[0][0]
conv_pw_2 (Conv2D)	(None, None, None, 1	8192	conv_dw_2_relu[0][0]
conv_pw_2_bn (BatchNormalizatio	(None, None, None, 1	512	conv_pw_2[0][0]
conv_pw_2_relu (ReLU)	(None, None, None, 1	0	conv_pw_2_bn[0][0]
conv_dw_3 (DepthwiseConv2D)	(None, None, None, 1	1152	conv_pw_2_relu[0][0]
conv_dw_3_bn (BatchNormalizatio	(None, None, None, 1	512	conv_dw_3[0][0]
conv_dw_3_relu (ReLU)	(None, None, None, 1	0	conv_dw_3_bn[0][0]
conv_pw_3 (Conv2D)	(None, None, None, 1	16384	conv_dw_3_relu[0][0]
conv_pw_3_bn (BatchNormalizatio	(None, None, None, 1	512	conv_pw_3[0][0]
conv_pw_3_relu (ReLU)	(None, None, None, 1	0	conv_pw_3_bn[0][0]
conv_pad_4 (ZeroPadding2D)	(None, None, None, 1	0	conv_pw_3_relu[0][0]
conv_dw_4 (DepthwiseConv2D)	(None, None, None, 1	1152	conv_pad_4[0][0]
conv_dw_4_bn (BatchNormalizatio	(None, None, None, 1	512	conv_dw_4[0][0]
conv_dw_4_relu (ReLU)	(None, None, None, 1	0	conv_dw_4_bn[0][0]
conv_pw_4 (Conv2D)	(None, None, None, 2	32768	conv_dw_4_relu[0][0]
conv_pw_4_bn (BatchNormalizatio	(None, None, None, 2	1024	conv_pw_4[0][0]
conv_pw_4_relu (ReLU)	(None, None, None, 2	0	conv_pw_4_bn[0][0]
conv_dw_5 (DepthwiseConv2D)	(None, None, None, 2	2304	conv_pw_4_relu[0][0]
conv_dw_5_bn (BatchNormalizatio	(None, None, None, 2	1024	conv_dw_5[0][0]
conv_dw_5_relu (ReLU)	(None, None, None, 2	0	conv_dw_5_bn[0][0]
conv_pw_5 (Conv2D)	(None, None, None, 2	65536	conv_dw_5_relu[0][0]
conv_pw_5_bn (BatchNormalizatio	(None, None, None, 2	1024	conv_pw_5[0][0]
conv_pw_5_relu (ReLU)	(None, None, None, 2	0	conv_pw_5_bn[0][0]
conv_pad_6 (ZeroPadding2D)	(None, None, None, 2	0	conv_pw_5_relu[0][0]
conv_dw_6 (DepthwiseConv2D)	(None, None, None, 2	2304	conv_pad_6[0][0]
conv_dw_6_bn (BatchNormalizatio	(None, None, None, 2	1024	conv_dw_6[0][0]
conv_dw_6_relu (ReLU)	(None, None, None, 2	0	conv_dw_6_bn[0][0]
conv_pw_6 (Conv2D)	(None, None, None, 5	131072	conv_dw_6_relu[0][0]
conv_pw_6_bn (BatchNormalizatio	(None, None, None, 5	2048	conv_pw_6[0][0]
conv_pw_6_relu (ReLU)	(None, None, None, 5	0	conv_pw_6_bn[0][0]
conv_dw_7 (DepthwiseConv2D)	(None, None, None, 5	4608	conv_pw_6_relu[0][0]
conv_dw_7_bn (BatchNormalizatio	(None, None, None, 5	2048	conv_dw_7[0][0]
conv_dw_7_relu (ReLU)	(None, None, None, 5	0	conv_dw_7_bn[0][0]
conv_pw_7 (Conv2D)	(None, None, None, 5	262144	conv_dw_7_relu[0][0]
conv_pw_7_bn (BatchNormalizatio	(None, None, None, 5	2048	conv_pw_7[0][0]
conv_pw_7_relu (ReLU)	(None, None, None, 5	0	conv_pw_7_bn[0][0]
conv_dw_8 (DepthwiseConv2D)	(None, None, None, 5	4608	conv_pw_7_relu[0][0]
conv_dw_8_bn (BatchNormalizatio	(None, None, None, 5	2048	conv_dw_8[0][0]
conv_dw_8_relu (ReLU)	(None, None, None, 5	0	conv_dw_8_bn[0][0]
conv_pw_8 (Conv2D)	(None, None, None, 5	262144	conv_dw_8_relu[0][0]
conv_pw_8_bn (BatchNormalizatio	(None, None, None, 5	2048	conv_pw_8[0][0]
conv_pw_8_relu (ReLU)	(None, None, None, 5	0	conv_pw_8_bn[0][0]
conv_dw_9 (DepthwiseConv2D)	(None, None, None, 5	4608	conv_pw_8_relu[0][0]
conv_dw_9_bn (BatchNormalizatio	(None, None, None, 5	2048	conv_dw_9[0][0]
conv_dw_9_relu (ReLU)	(None, None, None, 5	0	conv_dw_9_bn[0][0]
conv_pw_9 (Conv2D)	(None, None, None, 5	262144	conv_dw_9_relu[0][0]
conv_pw_9_bn (BatchNormalizatio	(None, None, None, 5	2048	conv_pw_9[0][0]
conv_pw_9_relu (ReLU)	(None, None, None, 5	0	conv_pw_9_bn[0][0]
conv_dw_10 (DepthwiseConv2D)	(None, None, None, 5	4608	conv_pw_9_relu[0][0]
conv_dw_10_bn (BatchNormalizati	(None, None, None, 5	2048	conv_dw_10[0][0]
conv_dw_10_relu (ReLU)	(None, None, None, 5	0	conv_dw_10_bn[0][0]
conv_pw_10 (Conv2D)	(None, None, None, 5	262144	conv_dw_10_relu[0][0]
conv_pw_10_bn (BatchNormalizati	(None, None, None, 5	2048	conv_pw_10[0][0]
conv_pw_10_relu (ReLU)	(None, None, None, 5	0	conv_pw_10_bn[0][0]
conv_dw_11 (DepthwiseConv2D)	(None, None, None, 5	4608	conv_pw_10_relu[0][0]
conv_dw_11_bn (BatchNormalizati	(None, None, None, 5	2048	conv_dw_11[0][0]
conv_dw_11_relu (ReLU)	(None, None, None, 5	0	conv_dw_11_bn[0][0]
conv_pw_11 (Conv2D)	(None, None, None, 5	262144	conv_dw_11_relu[0][0]

loss: 8.2011e-04 - binary_ce_metric: 8.2011e-04 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - catego
rical_accuracy: 0.4413 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.10
37e-11 - class0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11
- class1_binary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class
2_binary_accuracy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00

```
conv_pw_11_bn (BatchNormalizati (None, None, None, 5 2048        conv_pw_11[0][0]
__________________________________________________________________________________________________
conv_pw_11_relu (ReLU)          (None, None, None, 5 0           conv_pw_11_bn[0][0]
__________________________________________________________________________________________________
conv_pad_12 (ZeroPadding2D)     (None, None, None, 5 0           conv_pw_11_relu[0][0]
__________________________________________________________________________________________________
conv_dw_12 (DepthwiseConv2D)    (None, None, None, 5 4608        conv_pad_12[0][0]
__________________________________________________________________________________________________
conv_dw_12_bn (BatchNormalizati (None, None, None, 5 2048        conv_dw_12[0][0]
__________________________________________________________________________________________________
conv_dw_12_relu (ReLU)          (None, None, None, 5 0           conv_dw_12_bn[0][0]
__________________________________________________________________________________________________
conv_pw_12 (Conv2D)             (None, None, None, 1 524288      conv_dw_12_relu[0][0]
__________________________________________________________________________________________________
conv_pw_12_bn (BatchNormalizati (None, None, None, 1 4096        conv_pw_12[0][0]
__________________________________________________________________________________________________
conv_pw_12_relu (ReLU)          (None, None, None, 1 0           conv_pw_12_bn[0][0]
__________________________________________________________________________________________________
conv_dw_13 (DepthwiseConv2D)    (None, None, None, 1 9216        conv_pw_12_relu[0][0]
__________________________________________________________________________________________________
conv_dw_13_bn (BatchNormalizati (None, None, None, 1 4096        conv_dw_13[0][0]
__________________________________________________________________________________________________
conv_dw_13_relu (ReLU)          (None, None, None, 1 0           conv_dw_13_bn[0][0]
__________________________________________________________________________________________________
conv_pw_13 (Conv2D)             (None, None, None, 1 1048576     conv_dw_13_relu[0][0]
__________________________________________________________________________________________________
conv_pw_13_bn (BatchNormalizati (None, None, None, 1 4096        conv_pw_13[0][0]
__________________________________________________________________________________________________
conv_pw_13_relu (ReLU)          (None, None, None, 1 0           conv_pw_13_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 262144      conv_pw_13_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 2 0           decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0c_conv (Conv2D)   (None, None, None, 5 131072      decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0c_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0c_relu (Activatio (None, None, None, 5 0           decoder_stage0c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_add (Add)        (None, None, None, 5 0           decoder_stage0c_relu[0][0]
conv_pw_11_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 65536       decoder_stage0_add[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 1 0           decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 2 32768       decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 2 1024        decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 2 0           decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 2 0           decoder_stage1c_relu[0][0]
conv_pw_5_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 16384       decoder_stage1_add[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 6 0           decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 1 8192        decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 1 512         decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 1 0           decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 1 0           decoder_stage2c_relu[0][0]
conv_pw_3_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 4096        decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 3 0           decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3c_conv (Conv2D)   (None, None, None, 6 2048        decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3c_bn (BatchNormal (None, None, None, 6 256         decoder_stage3c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3c_relu (Activatio (None, None, None, 6 0           decoder_stage3c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 6 0           decoder_stage3c_relu[0][0]
conv_pw_1_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 1024        decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 1 0           decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 256         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d[0][0]
==================================================================================================
```

Total params: 6,104,835
Trainable params: 6,080,643
Non-trainable params: 24,192

```
mixed10 (Concatenate)          (None, None, None, 2 0          activation_85[0][0]
mixed9_1[0][0]
concatenate_1[0][0]
activation_93[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 2 0          mixed10[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 2 0          decoder_stage0_upsampling[0][0]
mixed7[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 6488064     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 5 0           decoder_stage1_upsampling[0][0]
mixed2[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 626688      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 3 0           decoder_stage2_upsampling[0][0]
activation_4[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 184320      decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
activation_2[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 36864       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
==================================================================================================
Total params: 25,031,011
Trainable params: 24,994,275
Non-trainable params: 36,724
__________________________________________________________________________________________________
```

```
loss: 8.1765e-04 - binary_ce_metric: 8.1765e-04 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categoric
al_accuracy: 0.0259 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e
-11 - class0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - c
lass1_binary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_b
inary_accuracy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

```
concatenate_49 (Concatenate)    (None, None, None, 2 0          conv2d_3340[0][0]
conv2d_3341[0][0]
conv2d_3342[0][0]
conv2d_3343[0][0]
conv2d_3344[0][0]
conv2d_3345[0][0]
conv2d_3346[0][0]
conv2d_3347[0][0]
conv2d_3348[0][0]
conv2d_3349[0][0]
conv2d_3350[0][0]
conv2d_3351[0][0]
conv2d_3352[0][0]
conv2d_3353[0][0]
conv2d_3354[0][0]
conv2d_3355[0][0]
conv2d_3356[0][0]
conv2d_3357[0][0]
conv2d_3358[0][0]
conv2d_3359[0][0]
conv2d_3360[0][0]
conv2d_3361[0][0]
conv2d_3362[0][0]
conv2d_3363[0][0]
conv2d_3364[0][0]
conv2d_3365[0][0]
conv2d_3366[0][0]
conv2d_3367[0][0]
conv2d_3368[0][0]
conv2d_3369[0][0]
conv2d_3370[0][0]
conv2d_3371[0][0]
conv2d_3372[0][0]
conv2d_3373[0][0]
conv2d_3374[0][0]
conv2d_3375[0][0]
conv2d_3376[0][0]
conv2d_3377[0][0]
conv2d_3378[0][0]
conv2d_3379[0][0]
conv2d_3380[0][0]
conv2d_3381[0][0]
conv2d_3382[0][0]
conv2d_3383[0][0]
conv2d_3384[0][0]
conv2d_3385[0][0]
conv2d_3386[0][0]
conv2d_3387[0][0]
conv2d_3388[0][0]
conv2d_3389[0][0]
conv2d_3390[0][0]
conv2d_3391[0][0]
conv2d_3392[0][0]
conv2d_3393[0][0]
conv2d_3394[0][0]
conv2d_3395[0][0]
conv2d_3396[0][0]
conv2d_3397[0][0]
conv2d_3398[0][0]
conv2d_3399[0][0]
conv2d_3400[0][0]
conv2d_3401[0][0]
conv2d_3402[0][0]
conv2d_3403[0][0]
__________________________________________________________________________________________________
batch_normalization_155 (BatchN (None, None, None, 2 8192        concatenate_49[0][0]
__________________________________________________________________________________________________
activation_249 (Activation)     (None, None, None, 2 0           batch_normalization_155[0][0]
__________________________________________________________________________________________________
conv2d_3404 (Conv2D)            (None, None, None, 2 4194304     activation_249[0][0]
__________________________________________________________________________________________________
batch_normalization_156 (BatchN (None, None, None, 2 8192        conv2d_3404[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_49 (Gl (None, 2048)         0           batch_normalization_156[0][0]
__________________________________________________________________________________________________
lambda_3249 (Lambda)            (None, 1, 1, 2048)   0           global_average_pooling2d_49[0][0]
__________________________________________________________________________________________________
conv2d_3405 (Conv2D)            (None, 1, 1, 128)    262272      lambda_3249[0][0]
__________________________________________________________________________________________________
activation_250 (Activation)     (None, 1, 1, 128)    0           conv2d_3405[0][0]
__________________________________________________________________________________________________
conv2d_3406 (Conv2D)            (None, 1, 1, 2048)   264192      activation_250[0][0]
__________________________________________________________________________________________________
activation_251 (Activation)     (None, 1, 1, 2048)   0           conv2d_3406[0][0]
__________________________________________________________________________________________________
multiply_49 (Multiply)          (None, None, None, 2 0           batch_normalization_156[0][0]
activation_251[0][0]
__________________________________________________________________________________________________
add_49 (Add)                    (None, None, None, 2 0           multiply_49[0][0]
activation_247[0][0]
__________________________________________________________________________________________________
activation_252 (Activation)     (None, None, None, 2 0           add_49[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 5 1048576     activation_252[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 5 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 5 0           decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 5 2359296     decoder_stage0_upsampling[0][0]
```

```
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

1/12 [=>.............................] - ETA: 1:22:27WARNING:tensorflow:Can save best model only with loss available, skipping.
Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in execution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 632, in _call
    return self._stateless_fn(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function._filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError: 2 root error(s) found.
  (0) Resource exhausted:  OOM when allocating tensor with shape[8,1024,32,32] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
    [[node model_1/batch_normalization_103/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
    Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

    [[metrics/f1_score/PartitionedFunctionCall/assert_less_equal/Assert/AssertGuard/pivot_f/_645/_459]]
    Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

  (1) Resource exhausted:  OOM when allocating tensor with shape[8,1024,32,32] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
    [[node model_1/batch_normalization_103/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
    Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

0 successful operations.
0 derived errors ignored. [Op:__inference_distributed_function_306992]

Function call stack:
distributed_function -> distributed_function
```

```
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 5 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0c_conv (Conv2D)   (None, None, None, 1 524288      decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0c_bn (BatchNormal (None, None, None, 1 4096        decoder_stage0c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0c_relu (Activatio (None, None, None, 1 0           decoder_stage0c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_add (Add)        (None, None, None, 1 0           decoder_stage0c_relu[0][0]
activation_237[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 2 262144      decoder_stage0_add[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 2 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 2 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 5 131072      decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 5 2048        decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 5 0           decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 5 0           decoder_stage1c_relu[0][0]
activation_57[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 1 65536       decoder_stage1_add[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 1 512         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 1 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 1 512         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 1 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 2 32768       decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 2 1024        decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 2 0           decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 2 0           decoder_stage2c_relu[0][0]
activation_17[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 6 16384       decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 6 256         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 6 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 6 256         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 6 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 1 0           decoder_stage3c_relu[0][0]
activation_2[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 3 4096        decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 3 128         decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 3 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 3 128         decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 3 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 512         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d_3407 (Conv2D)            (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d_3407[0][0]
~==================================================================================================
Total params: 116,670,835
```

Trainable params: 116,420,979
Non-trainable params: 249,856

concatenate_15 (Concatenate) (None, None, None, 1 0 conv2d_546[0][0]
conv2d_547[0][0]
conv2d_548[0][0]
conv2d_549[0][0]
conv2d_550[0][0]
conv2d_551[0][0]
conv2d_552[0][0]
conv2d_553[0][0]
conv2d_554[0][0]
conv2d_555[0][0]
conv2d_556[0][0]
conv2d_557[0][0]
conv2d_558[0][0]
conv2d_559[0][0]
conv2d_560[0][0]
conv2d_561[0][0]
conv2d_562[0][0]
conv2d_563[0][0]
conv2d_564[0][0]
conv2d_565[0][0]
conv2d_566[0][0]
conv2d_567[0][0]
conv2d_568[0][0]
conv2d_569[0][0]
conv2d_570[0][0]
conv2d_571[0][0]
conv2d_572[0][0]
conv2d_573[0][0]
conv2d_574[0][0]
conv2d_575[0][0]
conv2d_576[0][0]
conv2d_577[0][0]

loss: 0.0010 - binary_ce_metric: 0.0010 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.0123 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - pre

---

batch_normalization_51 (BatchNo (None, None, None, 1 4096 concatenate_15[0][0]

---

activation_77 (Activation) (None, None, None, 1 0 batch_normalization_51[0][0]

---

conv2d_578 (Conv2D) (None, None, None, 2 2097152 activation_77[0][0]

---

batch_normalization_52 (BatchNo (None, None, None, 2 8192 conv2d_578[0][0]

---

global_average_pooling2d_15 (Gl (None, 2048) 0 batch_normalization_52[0][0]

---

lambda_527 (Lambda) (None, 1, 1, 2048) 0 global_average_pooling2d_15[0][0]

---

conv2d_579 (Conv2D) (None, 1, 1, 128) 262272 lambda_527[0][0]

---

activation_78 (Activation) (None, 1, 1, 128) 0 conv2d_579[0][0]

---

conv2d_578 (Conv2D) (None, None, None, 2 2097152 activation_77[0][0]

---

batch_normalization_52 (BatchNo (None, None, None, 2 8192 conv2d_578[0][0]

---

global_average_pooling2d_15 (Gl (None, 2048) 0 batch_normalization_52[0][0]

---

lambda_527 (Lambda) (None, 1, 1, 2048) 0 global_average_pooling2d_15[0][0]

---

conv2d_579 (Conv2D) (None, 1, 1, 128) 262272 lambda_527[0][0]

---

activation_78 (Activation) (None, 1, 1, 128) 0 conv2d_579[0][0]

---

conv2d_580 (Conv2D) (None, 1, 1, 2048) 264192 activation_78[0][0]

---

activation_79 (Activation) (None, 1, 1, 2048) 0 conv2d_580[0][0]

---

multiply_15 (Multiply) (None, None, None, 2 0 batch_normalization_52[0][0]
activation_79[0][0]

---

add_15 (Add) (None, None, None, 2 0 multiply_15[0][0]
activation_75[0][0]

---

activation_80 (Activation) (None, None, None, 2 0 add_15[0][0]

---

decoder_stage0a_conv (Conv2D) (None, None, None, 5 1048576 activation_80[0][0]

---

decoder_stage0a_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0a_conv[0][0]

---

decoder_stage0a_relu (Activatio (None, None, None, 5 0 decoder_stage0a_bn[0][0]

---

decoder_stage0_upsampling (UpSa (None, None, None, 5 0 decoder_stage0a_relu[0][0]

---

decoder_stage0b_conv (Conv2D) (None, None, None, 5 2359296 decoder_stage0_upsampling[0][0]

---

decoder_stage0b_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0b_conv[0][0]

---

decoder_stage0b_relu (Activatio (None, None, None, 5 0 decoder_stage0b_bn[0][0]

---

decoder_stage0c_conv (Conv2D) (None, None, None, 1 524288 decoder_stage0b_relu[0][0]

---

decoder_stage0c_bn (BatchNormal (None, None, None, 1 4096 decoder_stage0c_conv[0][0]

---

decoder_stage0c_relu (Activatio (None, None, None, 1 0 decoder_stage0c_bn[0][0]

---

decoder_stage0_add (Add) (None, None, None, 1 0 decoder_stage0c_relu[0][0]
activation_65[0][0]

---

decoder_stage1a_conv (Conv2D) (None, None, None, 2 262144 decoder_stage0_add[0][0]

---

decoder_stage1a_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1a_conv[0][0]

---

decoder_stage1a_relu (Activatio (None, None, None, 2 0 decoder_stage1a_bn[0][0]

---

decoder_stage1_upsampling (UpSa (None, None, None, 2 0 decoder_stage1a_relu[0][0]

---

decoder_stage1b_conv (Conv2D) (None, None, None, 2 589824 decoder_stage1_upsampling[0][0]

---

decoder_stage1b_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1b_conv[0][0]

---

decoder_stage1b_relu (Activatio (None, None, None, 2 0 decoder_stage1b_bn[0][0]

---

decoder_stage1c_conv (Conv2D) (None, None, None, 5 131072 decoder_stage1b_relu[0][0]

---

decoder_stage1c_bn (BatchNormal (None, None, None, 5 2048 decoder_stage1c_conv[0][0]

---

decoder_stage1c_relu (Activatio (None, None, None, 5 0 decoder_stage1c_bn[0][0]

---

decoder_stage1_add (Add) (None, None, None, 5 0 decoder_stage1c_relu[0][0]
activation_35[0][0]

---

decoder_stage2a_conv (Conv2D) (None, None, None, 1 65536 decoder_stage1_add[0][0]

---

decoder_stage2a_bn (BatchNormal (None, None, None, 1 512 decoder_stage2a_conv[0][0]

---

decoder_stage2a_relu (Activatio (None, None, None, 1 0 decoder_stage2a_bn[0][0]

---

decoder_stage2_upsampling (UpSa (None, None, None, 1 0 decoder_stage2a_relu[0][0]

---

decoder_stage2b_conv (Conv2D) (None, None, None, 1 147456 decoder_stage2_upsampling[0][0]

---

decoder_stage2b_bn (BatchNormal (None, None, None, 1 512 decoder_stage2b_conv[0][0]

---

decoder_stage2b_relu (Activatio (None, None, None, 1 0 decoder_stage2b_bn[0][0]

---

decoder_stage2c_conv (Conv2D) (None, None, None, 2 32768 decoder_stage2b_relu[0][0]

---

decoder_stage2c_bn (BatchNormal (None, None, None, 2 1024 decoder_stage2c_conv[0][0]

---

decoder_stage2c_relu (Activatio (None, None, None, 2 0 decoder_stage2c_bn[0][0]

---

decoder_stage2_add (Add) (None, None, None, 2 0 decoder_stage2c_relu[0][0]
activation_15[0][0]

---

decoder_stage3a_conv (Conv2D) (None, None, None, 6 16384 decoder_stage2_add[0][0]

---

decoder_stage3a_bn (BatchNormal (None, None, None, 6 256 decoder_stage3a_conv[0][0]

---

decoder_stage3a_relu (Activatio (None, None, None, 6 0 decoder_stage3a_bn[0][0]

---

decoder_stage3_upsampling (UpSa (None, None, None, 6 0 decoder_stage3a_relu[0][0]

---

decoder_stage3b_conv (Conv2D) (None, None, None, 6 36864 decoder_stage3_upsampling[0][0]

---

decoder_stage3b_bn (BatchNormal (None, None, None, 6 256 decoder_stage3b_conv[0][0]

---

decoder_stage3b_relu (Activatio (None, None, None, 6 0 decoder_stage3b_bn[0][0]

---

decoder_stage3c_conv (Conv2D) (None, None, None, 6 4096 decoder_stage3b_relu[0][0]

---

decoder_stage3c_bn (BatchNormal (None, None, None, 6 256 decoder_stage3c_conv[0][0]

---

decoder_stage3c_relu (Activatio (None, None, None, 6 0 decoder_stage3c_bn[0][0]

---

decoder_stage3_add (Add) (None, None, None, 6 0 decoder_stage3c_relu[0][0]
activation[0][0]

---

decoder_stage4a_conv (Conv2D) (None, None, None, 1 1024 decoder_stage3_add[0][0]

```
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 1 0           decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 256         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d_581 (Conv2D)             (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d_581[0][0]
==================================================================================================
Total params: 28,940,915
Trainable params: 28,870,387
Non-trainable params: 70,528
__________________________________________________________________________________________________
```

concatenate_15 (Concatenate) (None, None, None, 1 0 conv2d_480[0][0]
conv2d_481[0][0]
conv2d_482[0][0]
conv2d_483[0][0]
conv2d_484[0][0]
conv2d_485[0][0]
conv2d_486[0][0]
conv2d_487[0][0]
conv2d_488[0][0]
conv2d_489[0][0]
conv2d_490[0][0]
conv2d_491[0][0]
conv2d_492[0][0]
conv2d_493[0][0]
conv2d_494[0][0]
conv2d_495[0][0]
conv2d_496[0][0]
conv2d_497[0][0]
conv2d_498[0][0]
conv2d_499[0][0]
conv2d_500[0][0]
conv2d_501[0][0]
conv2d_502[0][0]
conv2d_503[0][0]
conv2d_504[0][0]
conv2d_505[0][0]
conv2d_506[0][0]
conv2d_507[0][0]
conv2d_508[0][0]
conv2d_509[0][0]
conv2d_510[0][0]
conv2d_511[0][0]

---

stage4_unit3_bn2 (BatchNormaliz (None, None, None, 1 4096 concatenate_15[0][0]

---

stage4_unit3_relu2 (Activation) (None, None, None, 1 0 stage4_unit3_bn2[0][0]

---

stage4_unit3_conv3 (Conv2D) (None, None, None, 2 2097152 stage4_unit3_relu2[0][0]

---

stage4_unit3_bn3 (BatchNormaliz (None, None, None, 2 8192 stage4_unit3_conv3[0][0]

---

add_15 (Add) (None, None, None, 2 0 stage4_unit3_bn3[0][0]
stage4_unit2_relu[0][0]

---

stage4_unit3_relu (Activation) (None, None, None, 2 0 add_15[0][0]

---

decoder_stage0a_conv (Conv2D) (None, None, None, 5 1048576 stage4_unit3_relu[0][0]

---

decoder_stage0a_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0a_conv[0][0]

---

decoder_stage0a_relu (Activatio (None, None, None, 5 0 decoder_stage0a_bn[0][0]

---

decoder_stage0_upsampling (UpSa (None, None, None, 5 0 decoder_stage0a_relu[0][0]

---

decoder_stage0b_conv (Conv2D) (None, None, None, 5 2359296 decoder_stage0_upsampling[0][0]

---

decoder_stage0b_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0b_conv[0][0]

---

decoder_stage0b_relu (Activatio (None, None, None, 5 0 decoder_stage0b_bn[0][0]

---

decoder_stage0c_conv (Conv2D) (None, None, None, 1 524288 decoder_stage0b_relu[0][0]

---

decoder_stage0c_bn (BatchNormal (None, None, None, 1 4096 decoder_stage0c_conv[0][0]

---

decoder_stage0c_relu (Activatio (None, None, None, 1 0 decoder_stage0c_bn[0][0]

---

decoder_stage0_add (Add) (None, None, None, 1 0 decoder_stage0c_relu[0][0]
stage4_unit1_relu1[0][0]

---

decoder_stage1a_conv (Conv2D) (None, None, None, 2 262144 decoder_stage0_add[0][0]

---

decoder_stage1a_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1a_conv[0][0]

---

decoder_stage1a_relu (Activatio (None, None, None, 2 0 decoder_stage1a_bn[0][0]

---

decoder_stage1_upsampling (UpSa (None, None, None, 2 0 decoder_stage1a_relu[0][0]

---

decoder_stage1b_conv (Conv2D) (None, None, None, 2 589824 decoder_stage1_upsampling[0][0]

---

decoder_stage1b_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1b_conv[0][0]

---

decoder_stage1b_relu (Activatio (None, None, None, 2 0 decoder_stage1b_bn[0][0]

---

decoder_stage1c_conv (Conv2D) (None, None, None, 5 131072 decoder_stage1b_relu[0][0]

---

decoder_stage1c_bn (BatchNormal (None, None, None, 5 2048 decoder_stage1c_conv[0][0]

---

decoder_stage1c_relu (Activatio (None, None, None, 5 0 decoder_stage1c_bn[0][0]

---

decoder_stage1_add (Add) (None, None, None, 5 0 decoder_stage1c_relu[0][0]
stage3_unit1_relu1[0][0]

---

decoder_stage2a_conv (Conv2D) (None, None, None, 1 65536 decoder_stage1_add[0][0]

---

decoder_stage2a_bn (BatchNormal (None, None, None, 1 512 decoder_stage2a_conv[0][0]

---

decoder_stage2a_relu (Activatio (None, None, None, 1 0 decoder_stage2a_bn[0][0]

---

decoder_stage2_upsampling (UpSa (None, None, None, 1 0 decoder_stage2a_relu[0][0]

---

decoder_stage2b_conv (Conv2D) (None, None, None, 1 147456 decoder_stage2_upsampling[0][0]

---

decoder_stage2b_bn (BatchNormal (None, None, None, 1 512 decoder_stage2b_conv[0][0]

---

decoder_stage2b_relu (Activatio (None, None, None, 1 0 decoder_stage2b_bn[0][0]

---

decoder_stage2c_conv (Conv2D) (None, None, None, 2 32768 decoder_stage2b_relu[0][0]

---

decoder_stage2c_bn (BatchNormal (None, None, None, 2 1024 decoder_stage2c_conv[0][0]

---

decoder_stage2c_relu (Activatio (None, None, None, 2 0 decoder_stage2c_bn[0][0]

---

decoder_stage2_add (Add) (None, None, None, 2 0 decoder_stage2c_relu[0][0]
stage2_unit1_relu1[0][0]

---

decoder_stage3a_conv (Conv2D) (None, None, None, 6 16384 decoder_stage2_add[0][0]

---

decoder_stage3a_bn (BatchNormal (None, None, None, 6 256 decoder_stage3a_conv[0][0]

---

decoder_stage3a_relu (Activatio (None, None, None, 6 0 decoder_stage3a_bn[0][0]

---

decoder_stage3_upsampling (UpSa (None, None, None, 6 0 decoder_stage3a_relu[0][0]

---

decoder_stage3b_conv (Conv2D) (None, None, None, 6 36864 decoder_stage3_upsampling[0][0]

---

decoder_stage3b_bn (BatchNormal (None, None, None, 6 256 decoder_stage3b_conv[0][0]

---

decoder_stage3b_relu (Activatio (None, None, None, 6 0 decoder_stage3b_bn[0][0]

---

decoder_stage3c_conv (Conv2D) (None, None, None, 6 4096 decoder_stage3b_relu[0][0]

---

decoder_stage3c_bn (BatchNormal (None, None, None, 6 256 decoder_stage3c_conv[0][0]

---

decoder_stage3c_relu (Activatio (None, None, None, 6 0 decoder_stage3c_bn[0][0]

---

decoder_stage3_add (Add) (None, None, None, 6 0 decoder_stage3c_relu[0][0]
relu0[0][0]

---

decoder_stage4a_conv (Conv2D) (None, None, None, 1 1024 decoder_stage3_add[0][0]

---

decoder_stage4a_bn (BatchNormal (None, None, None, 1 64 decoder_stage4a_conv[0][0]

---

decoder_stage4a_relu (Activatio (None, None, None, 1 0 decoder_stage4a_bn[0][0]

---

decoder_stage4_upsampling (UpSa (None, None, None, 1 0 decoder_stage4a_relu[0][0]

---

decoder_stage4b_conv (Conv2D) (None, None, None, 1 2304 decoder_stage4_upsampling[0][0]

---

decoder_stage4b_bn (BatchNormal (None, None, None, 1 64 decoder_stage4b_conv[0][0]

---

decoder_stage4b_relu (Activatio (None, None, None, 1 0 decoder_stage4b_bn[0][0]

---

decoder_stage4c_conv (Conv2D) (None, None, None, 1 256 decoder_stage4b_relu[0][0]

---

loss: 0.0011 - binary_ce_metric: 0.0011 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accur
acy: 0.1557 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - cl
ass0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_bi
nary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_ac
curacy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00

```
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d_512 (Conv2D)             (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d_512[0][0]
==================================================================================================
Total params: 26,409,926
Trainable params: 26,339,396
Non-trainable params: 70,530
__________________________________________________________________________________________________
```

Model: "model_1"

loss: 8.7072e-04 - binary_ce_metric: 8.7072e-04 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.6949 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - tru

Layer (type)	Output Shape	Param #	Connected to
data (InputLayer)	[(None, None, None, 3)	0	
bn_data (BatchNormalization)	(None, None, None, 3)	9	data[0][0]
zero_padding2d (ZeroPadding2D)	(None, None, None, 3)	0	bn_data[0][0]
conv0 (Conv2D)	(None, None, None, 64)	9408	zero_padding2d[0][0]
bn0 (BatchNormalization)	(None, None, None, 64)	256	conv0[0][0]
relu0 (Activation)	(None, None, None, 64)	0	bn0[0][0]
zero_padding2d_1 (ZeroPadding2D	(None, None, None, 64)	0	relu0[0][0]
pooling0 (MaxPooling2D)	(None, None, None, 64)	0	zero_padding2d_1[0][0]
stage1_unit1_bn1 (BatchNormaliz	(None, None, None, 64)	256	pooling0[0][0]
stage1_unit1_relu1 (Activation)	(None, None, None, 64)	0	stage1_unit1_bn1[0][0]
zero_padding2d_2 (ZeroPadding2D	(None, None, None, 64)	0	stage1_unit1_relu1[0][0]
stage1_unit1_conv1 (Conv2D)	(None, None, None, 64)	36864	zero_padding2d_2[0][0]
stage1_unit1_bn2 (BatchNormaliz	(None, None, None, 64)	256	stage1_unit1_conv1[0][0]
stage1_unit1_relu2 (Activation)	(None, None, None, 64)	0	stage1_unit1_bn2[0][0]
zero_padding2d_3 (ZeroPadding2D	(None, None, None, 64)	0	stage1_unit1_relu2[0][0]
stage1_unit1_conv2 (Conv2D)	(None, None, None, 64)	36864	zero_padding2d_3[0][0]
global_average_pooling2d (Globa	(None, 64)	0	stage1_unit1_conv2[0][0]
lambda (Lambda)	(None, 1, 1, 64)	0	global_average_pooling2d[0][0]
conv2d (Conv2D)	(None, 1, 1, 4)	260	lambda[0][0]
activation (Activation)	(None, 1, 1, 4)	0	conv2d[0][0]
conv2d_1 (Conv2D)	(None, 1, 1, 64)	320	activation[0][0]
activation_1 (Activation)	(None, 1, 1, 64)	0	conv2d_1[0][0]
multiply (Multiply)	(None, None, None, 64)	0	stage1_unit1_conv2[0][0] activation_1[0][0]
stage1_unit1_sc (Conv2D)	(None, None, None, 64)	4096	stage1_unit1_relu1[0][0]
add (Add)	(None, None, None, 64)	0	multiply[0][0] stage1_unit1_sc[0][0]
stage1_unit2_bn1 (BatchNormaliz	(None, None, None, 64)	256	add[0][0]
stage1_unit2_relu1 (Activation)	(None, None, None, 64)	0	stage1_unit2_bn1[0][0]
zero_padding2d_4 (ZeroPadding2D	(None, None, None, 64)	0	stage1_unit2_relu1[0][0]
stage1_unit2_conv1 (Conv2D)	(None, None, None, 64)	36864	zero_padding2d_4[0][0]
stage1_unit2_bn2 (BatchNormaliz	(None, None, None, 64)	256	stage1_unit2_conv1[0][0]
stage1_unit2_relu2 (Activation)	(None, None, None, 64)	0	stage1_unit2_bn2[0][0]
zero_padding2d_5 (ZeroPadding2D	(None, None, None, 64)	0	stage1_unit2_relu2[0][0]
stage1_unit2_conv2 (Conv2D)	(None, None, None, 64)	36864	zero_padding2d_5[0][0]
global_average_pooling2d_1 (Glo	(None, 64)	0	stage1_unit2_conv2[0][0]
lambda_1 (Lambda)	(None, 1, 1, 64)	0	global_average_pooling2d_1[0][0]
conv2d_2 (Conv2D)	(None, 1, 1, 4)	260	lambda_1[0][0]
activation_2 (Activation)	(None, 1, 1, 4)	0	conv2d_2[0][0]
conv2d_3 (Conv2D)	(None, 1, 1, 64)	320	activation_2[0][0]
activation_3 (Activation)	(None, 1, 1, 64)	0	conv2d_3[0][0]
multiply_1 (Multiply)	(None, None, None, 64)	0	stage1_unit2_conv2[0][0] activation_3[0][0]
add_1 (Add)	(None, None, None, 64)	0	multiply_1[0][0] add[0][0]
stage2_unit1_bn1 (BatchNormaliz	(None, None, None, 64)	256	add_1[0][0]
stage2_unit1_relu1 (Activation)	(None, None, None, 64)	0	stage2_unit1_bn1[0][0]
zero_padding2d_6 (ZeroPadding2D	(None, None, None, 64)	0	stage2_unit1_relu1[0][0]
stage2_unit1_conv1 (Conv2D)	(None, None, None, 128)	73728	zero_padding2d_6[0][0]
stage2_unit1_bn2 (BatchNormaliz	(None, None, None, 128)	512	stage2_unit1_conv1[0][0]
stage2_unit1_relu2 (Activation)	(None, None, None, 128)	0	stage2_unit1_bn2[0][0]
zero_padding2d_7 (ZeroPadding2D	(None, None, None, 128)	0	stage2_unit1_relu2[0][0]
stage2_unit1_conv2 (Conv2D)	(None, None, None, 128)	147456	zero_padding2d_7[0][0]
global_average_pooling2d_2 (Glo	(None, 128)	0	stage2_unit1_conv2[0][0]
lambda_2 (Lambda)	(None, 1, 1, 128)	0	global_average_pooling2d_2[0][0]
conv2d_4 (Conv2D)	(None, 1, 1, 8)	1032	lambda_2[0][0]
activation_4 (Activation)	(None, 1, 1, 8)	0	conv2d_4[0][0]
conv2d_5 (Conv2D)	(None, 1, 1, 128)	1152	activation_4[0][0]
activation_5 (Activation)	(None, 1, 1, 128)	0	conv2d_5[0][0]
multiply_2 (Multiply)	(None, None, None, 128)	0	stage2_unit1_conv2[0][0] activation_5[0][0]
stage2_unit1_sc (Conv2D)	(None, None, None, 128)	8192	stage2_unit1_relu1[0][0]
add_2 (Add)	(None, None, None, 128)	0	multiply_2[0][0] stage2_unit1_sc[0][0]
stage2_unit2_bn1 (BatchNormaliz	(None, None, None, 128)	512	add_2[0][0]
stage2_unit2_relu1 (Activation)	(None, None, None, 128)	0	stage2_unit2_bn1[0][0]
zero_padding2d_8 (ZeroPadding2D	(None, None, None, 128)	0	stage2_unit2_relu1[0][0]
stage2_unit2_conv1 (Conv2D)	(None, None, None, 128)	147456	zero_padding2d_8[0][0]
stage2_unit2_bn2 (BatchNormaliz	(None, None, None, 128)	512	stage2_unit2_conv1[0][0]
stage2_unit2_relu2 (Activation)	(None, None, None, 128)	0	stage2_unit2_bn2[0][0]
zero_padding2d_9 (ZeroPadding2D	(None, None, None, 128)	0	stage2_unit2_relu2[0][0]
stage2_unit2_conv2 (Conv2D)	(None, None, None, 128)	147456	zero_padding2d_9[0][0]
global_average_pooling2d_3 (Glo	(None, 128)	0	stage2_unit2_conv2[0][0]
lambda_3 (Lambda)	(None, 1, 1, 128)	0	global_average_pooling2d_3[0][0]
conv2d_6 (Conv2D)	(None, 1, 1, 8)	1032	lambda_3[0][0]
activation_6 (Activation)	(None, 1, 1, 8)	0	conv2d_6[0][0]
conv2d_7 (Conv2D)	(None, 1, 1, 128)	1152	activation_6[0][0]
activation_7 (Activation)	(None, 1, 1, 128)	0	conv2d_7[0][0]
multiply_3 (Multiply)	(None, None, None, 128)	0	stage2_unit2_conv2[0][0] activation_7[0][0]
add_3 (Add)	(None, None, None, 128)	0	multiply_3[0][0] add_2[0][0]
stage3_unit1_bn1 (BatchNormaliz	(None, None, None, 128)	512	add_3[0][0]
stage3_unit1_relu1 (Activation)	(None, None, None, 128)	0	stage3_unit1_bn1[0][0]
zero_padding2d_10 (ZeroPadding2	(None, None, None, 128)	0	stage3_unit1_relu1[0][0]
stage3_unit1_conv1 (Conv2D)	(None, None, None, 256)	294912	zero_padding2d_10[0][0]

stage3_unit1_bn2 (BatchNormaliz	(None, None, None, 2	1024	stage3_unit1_conv1[0][0]		
stage3_unit1_relu2 (Activation)	(None, None, None, 2	0	stage3_unit1_bn2[0][0]		
zero_padding2d_11 (ZeroPadding2	(None, None, None, 2	0	stage3_unit1_relu2[0][0]		
stage3_unit1_conv2 (Conv2D)	(None, None, None, 2	589824	zero_padding2d_11[0][0]		
global_average_pooling2d_4 (Glo	(None, 256)	0	stage3_unit1_conv2[0][0]		
lambda_4 (Lambda)	(None, 1, 1, 256)	0	global_average_pooling2d_4[0][0]		
conv2d_8 (Conv2D)	(None, 1, 1, 16)	4112	lambda_4[0][0]		
activation_8 (Activation)	(None, 1, 1, 16)	0	conv2d_8[0][0]		
conv2d_9 (Conv2D)	(None, 1, 1, 256)	4352	activation_8[0][0]		
activation_9 (Activation)	(None, 1, 1, 256)	0	conv2d_9[0][0]		
multiply_4 (Multiply)	(None, None, None, 2	0	stage3_unit1_conv2[0][0]		
activation_9[0][0]					
stage3_unit1_sc (Conv2D)	(None, None, None, 2	32768	stage3_unit1_relu1[0][0]		
add_4 (Add)	(None, None, None, 2	0	multiply_4[0][0]		
stage3_unit1_sc[0][0]					
stage3_unit2_bn1 (BatchNormaliz	(None, None, None, 2	1024	add_4[0][0]		
stage3_unit2_relu1 (Activation)	(None, None, None, 2	0	stage3_unit2_bn1[0][0]		
zero_padding2d_12 (ZeroPadding2	(None, None, None, 2	0	stage3_unit2_relu1[0][0]		
stage3_unit2_conv1 (Conv2D)	(None, None, None, 2	589824	zero_padding2d_12[0][0]		
stage3_unit2_bn2 (BatchNormaliz	(None, None, None, 2	1024	stage3_unit2_conv1[0][0]		
stage3_unit2_relu2 (Activation)	(None, None, None, 2	0	stage3_unit2_bn2[0][0]		
zero_padding2d_13 (ZeroPadding2	(None, None, None, 2	0	stage3_unit2_relu2[0][0]		
stage3_unit2_conv2 (Conv2D)	(None, None, None, 2	589824	zero_padding2d_13[0][0]		
global_average_pooling2d_5 (Glo	(None, 256)	0	stage3_unit2_conv2[0][0]		
lambda_5 (Lambda)	(None, 1, 1, 256)	0	global_average_pooling2d_5[0][0]		
conv2d_10 (Conv2D)	(None, 1, 1, 16)	4112	lambda_5[0][0]		
activation_10 (Activation)	(None, 1, 1, 16)	0	conv2d_10[0][0]		
conv2d_11 (Conv2D)	(None, 1, 1, 256)	4352	activation_10[0][0]		
activation_11 (Activation)	(None, 1, 1, 256)	0	conv2d_11[0][0]		
multiply_5 (Multiply)	(None, None, None, 2	0	stage3_unit2_conv2[0][0]		
activation_11[0][0]					
add_5 (Add)	(None, None, None, 2	0	multiply_5[0][0]		
add_4[0][0]					
stage4_unit1_bn1 (BatchNormaliz	(None, None, None, 2	1024	add_5[0][0]		
stage4_unit1_relu1 (Activation)	(None, None, None, 2	0	stage4_unit1_bn1[0][0]		
zero_padding2d_14 (ZeroPadding2	(None, None, None, 2	0	stage4_unit1_relu1[0][0]		
stage4_unit1_conv1 (Conv2D)	(None, None, None, 5	1179648	zero_padding2d_14[0][0]		
stage4_unit1_bn2 (BatchNormaliz	(None, None, None, 5	2048	stage4_unit1_conv1[0][0]		
stage4_unit1_relu2 (Activation)	(None, None, None, 5	0	stage4_unit1_bn2[0][0]		
zero_padding2d_15 (ZeroPadding2	(None, None, None, 5	0	stage4_unit1_relu2[0][0]		
stage4_unit1_conv2 (Conv2D)	(None, None, None, 5	2359296	zero_padding2d_15[0][0]		
global_average_pooling2d_6 (Glo	(None, 512)	0	stage4_unit1_conv2[0][0]		
lambda_6 (Lambda)	(None, 1, 1, 512)	0	global_average_pooling2d_6[0][0]		
conv2d_12 (Conv2D)	(None, 1, 1, 32)	16416	lambda_6[0][0]		
activation_12 (Activation)	(None, 1, 1, 32)	0	conv2d_12[0][0]		
conv2d_13 (Conv2D)	(None, 1, 1, 512)	16896	activation_12[0][0]		
activation_13 (Activation)	(None, 1, 1, 512)	0	conv2d_13[0][0]		
multiply_6 (Multiply)	(None, None, None, 5	0	stage4_unit1_conv2[0][0]		
activation_13[0][0]					
stage4_unit1_sc (Conv2D)	(None, None, None, 5	131072	stage4_unit1_relu1[0][0]		
add_6 (Add)	(None, None, None, 5	0	multiply_6[0][0]		
stage4_unit1_sc[0][0]					
stage4_unit2_bn1 (BatchNormaliz	(None, None, None, 5	2048	add_6[0][0]		
stage4_unit2_relu1 (Activation)	(None, None, None, 5	0	stage4_unit2_bn1[0][0]		
zero_padding2d_16 (ZeroPadding2	(None, None, None, 5	0	stage4_unit2_relu1[0][0]		
stage4_unit2_conv1 (Conv2D)	(None, None, None, 5	2359296	zero_padding2d_16[0][0]		
stage4_unit2_bn2 (BatchNormaliz	(None, None, None, 5	2048	stage4_unit2_conv1[0][0]		
stage4_unit2_relu2 (Activation)	(None, None, None, 5	0	stage4_unit2_bn2[0][0]		
zero_padding2d_17 (ZeroPadding2	(None, None, None, 5	0	stage4_unit2_relu2[0][0]		
stage4_unit2_conv2 (Conv2D)	(None, None, None, 5	2359296	zero_padding2d_17[0][0]		
global_average_pooling2d_7 (Glo	(None, 512)	0	stage4_unit2_conv2[0][0]		
lambda_7 (Lambda)	(None, 1, 1, 512)	0	global_average_pooling2d_7[0][0]		
conv2d_14 (Conv2D)	(None, 1, 1, 32)	16416	lambda_7[0][0]		
activation_14 (Activation)	(None, 1, 1, 32)	0	conv2d_14[0][0]		
conv2d_15 (Conv2D)	(None, 1, 1, 512)	16896	activation_14[0][0]		
activation_15 (Activation)	(None, 1, 1, 512)	0	conv2d_15[0][0]		
multiply_7 (Multiply)	(None, None, None, 5	0	stage4_unit2_conv2[0][0]		
activation_15[0][0]					
add_7 (Add)	(None, None, None, 5	0	multiply_7[0][0]		
add_6[0][0]					
bn1 (BatchNormalization)	(None, None, None, 5	2048	add_7[0][0]		
relu1 (Activation)	(None, None, None, 5	0	bn1[0][0]		
decoder_stage0a_conv (Conv2D)	(None, None, None, 1	65536	relu1[0][0]		
decoder_stage0a_bn (BatchNormal	(None, None, None, 1	512	decoder_stage0a_conv[0][0]		
decoder_stage0a_relu (Activatio	(None, None, None, 1	0	decoder_stage0a_bn[0][0]		
decoder_stage0_upsampling (UpSa	(None, None, None, 1	0	decoder_stage0a_relu[0][0]		
decoder_stage0b_conv (Conv2D)	(None, None, None, 1	147456	decoder_stage0_upsampling[0][0]		
decoder_stage0b_bn (BatchNormal	(None, None, None, 1	512	decoder_stage0b_conv[0][0]		
decoder_stage0b_relu (Activatio	(None, None, None, 1	0	decoder_stage0b_bn[0][0]		
decoder_stage0c_conv (Conv2D)	(None, None, None, 2	32768	decoder_stage0b_relu[0][0]		
decoder_stage0c_bn (BatchNormal	(None, None, None, 2	1024	decoder_stage0c_conv[0][0]		
decoder_stage0c_relu (Activatio	(None, None, None, 2	0	decoder_stage0c_bn[0][0]		
decoder_stage0_add (Add)	(None, None, None, 2	0	decoder_stage0c_relu[0][0]		
stage4_unit1_relu1[0][0]					
decoder_stage1a_conv (Conv2D)	(None, None, None, 6	16384	decoder_stage0_add[0][0]		
decoder_stage1a_bn (BatchNormal	(None, None, None, 6	256	decoder_stage1a_conv[0][0]		
decoder_stage1a_relu (Activatio	(None, None, None, 6	0	decoder_stage1a_bn[0][0]		
decoder_stage1_upsampling (UpSa	(None, None, None, 6	0	decoder_stage1a_relu[0][0]		

decoder_stage1b_conv (Conv2D) (None, None, None, 6 36864 decoder_stage1_upsampling[0][0]

decoder_stage1b_bn (BatchNormal (None, None, None, 6 256 decoder_stage1b_conv[0][0]

decoder_stage1a_relu (Activatio (None, None, None, 6 0 decoder_stage1a_bn[0][0]

decoder_stage1_upsampling (UpSa (None, None, None, 6 0 decoder_stage1a_relu[0][0]

decoder_stage1b_conv (Conv2D) (None, None, None, 6 36864 decoder_stage1_upsampling[0][0]

decoder_stage1b_bn (BatchNormal (None, None, None, 6 256 decoder_stage1b_conv[0][0]

decoder_stage1b_relu (Activatio (None, None, None, 6 0 decoder_stage1b_bn[0][0]

decoder_stage1c_conv (Conv2D) (None, None, None, 1 8192 decoder_stage1b_relu[0][0]

decoder_stage1c_bn (BatchNormal (None, None, None, 1 512 decoder_stage1c_conv[0][0]

decoder_stage1c_relu (Activatio (None, None, None, 1 0 decoder_stage1c_bn[0][0]

decoder_stage1_add (Add) (None, None, None, 1 0 decoder_stage1c_relu[0][0]
stage3_unit1_relu1[0][0]

decoder_stage2a_conv (Conv2D) (None, None, None, 3 4096 decoder_stage1_add[0][0]

decoder_stage2a_bn (BatchNormal (None, None, None, 3 128 decoder_stage2a_conv[0][0]

decoder_stage2a_relu (Activatio (None, None, None, 3 0 decoder_stage2a_bn[0][0]

decoder_stage2_upsampling (UpSa (None, None, None, 3 0 decoder_stage2a_relu[0][0]

decoder_stage2b_conv (Conv2D) (None, None, None, 3 9216 decoder_stage2_upsampling[0][0]

decoder_stage2b_bn (BatchNormal (None, None, None, 3 128 decoder_stage2b_conv[0][0]

decoder_stage2b_relu (Activatio (None, None, None, 3 0 decoder_stage2b_bn[0][0]

decoder_stage2c_conv (Conv2D) (None, None, None, 6 2048 decoder_stage2b_relu[0][0]

decoder_stage2c_bn (BatchNormal (None, None, None, 6 256 decoder_stage2c_conv[0][0]

decoder_stage2c_relu (Activatio (None, None, None, 6 0 decoder_stage2c_bn[0][0]

decoder_stage2_add (Add) (None, None, None, 6 0 decoder_stage2c_relu[0][0]
stage2_unit1_relu1[0][0]

decoder_stage3a_conv (Conv2D) (None, None, None, 1 1024 decoder_stage2_add[0][0]

decoder_stage3a_bn (BatchNormal (None, None, None, 1 64 decoder_stage3a_conv[0][0]

decoder_stage3a_relu (Activatio (None, None, None, 1 0 decoder_stage3a_bn[0][0]

decoder_stage3_upsampling (UpSa (None, None, None, 1 0 decoder_stage3a_relu[0][0]

decoder_stage3b_conv (Conv2D) (None, None, None, 1 2304 decoder_stage3_upsampling[0][0]

decoder_stage3b_bn (BatchNormal (None, None, None, 1 64 decoder_stage3b_conv[0][0]

decoder_stage3b_relu (Activatio (None, None, None, 1 0 decoder_stage3b_bn[0][0]

decoder_stage3c_conv (Conv2D) (None, None, None, 6 1024 decoder_stage3b_relu[0][0]

decoder_stage3c_bn (BatchNormal (None, None, None, 6 256 decoder_stage3c_conv[0][0]

decoder_stage3c_relu (Activatio (None, None, None, 6 0 decoder_stage3c_bn[0][0]

decoder_stage3_add (Add) (None, None, None, 6 0 decoder_stage3c_relu[0][0]
relu0[0][0]

decoder_stage4a_conv (Conv2D) (None, None, None, 1 1024 decoder_stage3_add[0][0]

decoder_stage4a_bn (BatchNormal (None, None, None, 1 64 decoder_stage4a_conv[0][0]

decoder_stage4a_relu (Activatio (None, None, None, 1 0 decoder_stage4a_bn[0][0]

decoder_stage4_upsampling (UpSa (None, None, None, 1 0 decoder_stage4a_relu[0][0]

decoder_stage4b_conv (Conv2D) (None, None, None, 1 2304 decoder_stage4_upsampling[0][0]

decoder_stage4b_bn (BatchNormal (None, None, None, 1 64 decoder_stage4b_conv[0][0]

decoder_stage4b_relu (Activatio (None, None, None, 1 0 decoder_stage4b_bn[0][0]

decoder_stage4c_conv (Conv2D) (None, None, None, 1 256 decoder_stage4b_relu[0][0]

decoder_stage4c_bn (BatchNormal (None, None, None, 1 64 decoder_stage4c_conv[0][0]

decoder_stage4c_relu (Activatio (None, None, None, 1 0 decoder_stage4c_bn[0][0]

conv2d_16 (Conv2D) (None, None, None, 3 435 decoder_stage4c_relu[0][0]

sigmoid (Activation) (None, None, None, 3 0 conv2d_16[0][0]

==========

Total params: 13,900,478
Trainable params: 13,890,236
Non-trainable params: 10,242

```
Model: "model_1"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
data (InputLayer)               [(None, None, None,  0
__________________________________________________________________________________________________
bn_data (BatchNormalization)    (None, None, None, 1 3           data[0][0]
__________________________________________________________________________________________________
zero_padding2d (ZeroPadding2D)  (None, None, None, 1 0           bn_data[0][0]
__________________________________________________________________________________________________
conv0 (Conv2D)                  (None, None, None, 6 3136        zero_padding2d[0][0]
__________________________________________________________________________________________________
bn0 (BatchNormalization)        (None, None, None, 6 256         conv0[0][0]
__________________________________________________________________________________________________
relu0 (Activation)              (None, None, None, 6 0           bn0[0][0]
__________________________________________________________________________________________________
zero_padding2d_1 (ZeroPadding2D (None, None, None, 6 0           relu0[0][0]
__________________________________________________________________________________________________
pooling0 (MaxPooling2D)         (None, None, None, 6 0           zero_padding2d_1[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         pooling0[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu1 (Activation) (None, None, None, 6 0           stage1_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_2 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_2[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu2 (Activation) (None, None, None, 6 0           stage1_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_3 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_3[0][0]
__________________________________________________________________________________________________
stage1_unit1_sc (Conv2D)        (None, None, None, 6 4096        stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
add (Add)                       (None, None, None, 6 0           stage1_unit1_conv2[0][0]
                                                                 stage1_unit1_sc[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn1 (BatchNormaliz (None, None, None, 6 256         add[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu1 (Activation) (None, None, None, 6 0           stage1_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_4 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_4[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu2 (Activation) (None, None, None, 6 0           stage1_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_5 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_5[0][0]
__________________________________________________________________________________________________
add_1 (Add)                     (None, None, None, 6 0           stage1_unit2_conv2[0][0]
                                                                 add[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         add_1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu1 (Activation) (None, None, None, 6 0           stage2_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_6 (ZeroPadding2D (None, None, None, 6 0           stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv1 (Conv2D)     (None, None, None, 1 73728       zero_padding2d_6[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn2 (BatchNormaliz (None, None, None, 1 512         stage2_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu2 (Activation) (None, None, None, 1 0           stage2_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_7 (ZeroPadding2D (None, None, None, 1 0           stage2_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv2 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_7[0][0]
__________________________________________________________________________________________________
stage2_unit1_sc (Conv2D)        (None, None, None, 1 8192        stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_2 (Add)                     (None, None, None, 1 0           stage2_unit1_conv2[0][0]
                                                                 stage2_unit1_sc[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn1 (BatchNormaliz (None, None, None, 1 512         add_2[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu1 (Activation) (None, None, None, 1 0           stage2_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_8 (ZeroPadding2D (None, None, None, 1 0           stage2_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv1 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_8[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn2 (BatchNormaliz (None, None, None, 1 512         stage2_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu2 (Activation) (None, None, None, 1 0           stage2_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_9 (ZeroPadding2D (None, None, None, 1 0           stage2_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv2 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_9[0][0]
__________________________________________________________________________________________________
add_3 (Add)                     (None, None, None, 1 0           stage2_unit2_conv2[0][0]
                                                                 add_2[0][0]
__________________________________________________________________________________________________
stage3_unit1_bn1 (BatchNormaliz (None, None, None, 1 512         add_3[0][0]
__________________________________________________________________________________________________
stage3_unit1_relu1 (Activation) (None, None, None, 1 0           stage3_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_10 (ZeroPadding2 (None, None, None, 1 0           stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage3_unit1_conv1 (Conv2D)     (None, None, None, 2 294912      zero_padding2d_10[0][0]
__________________________________________________________________________________________________
stage3_unit1_bn2 (BatchNormaliz (None, None, None, 2 1024        stage3_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage3_unit1_relu2 (Activation) (None, None, None, 2 0           stage3_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_11 (ZeroPadding2 (None, None, None, 2 0           stage3_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage3_unit1_conv2 (Conv2D)     (None, None, None, 2 589824      zero_padding2d_11[0][0]
__________________________________________________________________________________________________
stage3_unit1_sc (Conv2D)        (None, None, None, 2 32768       stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_4 (Add)                     (None, None, None, 2 0           stage3_unit1_conv2[0][0]
                                                                 stage3_unit1_sc[0][0]
__________________________________________________________________________________________________
stage3_unit2_bn1 (BatchNormaliz (None, None, None, 2 1024        add_4[0][0]
__________________________________________________________________________________________________
stage3_unit2_relu1 (Activation) (None, None, None, 2 0           stage3_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_12 (ZeroPadding2 (None, None, None, 2 0           stage3_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage3_unit2_conv1 (Conv2D)     (None, None, None, 2 589824      zero_padding2d_12[0][0]
__________________________________________________________________________________________________
stage3_unit2_bn2 (BatchNormaliz (None, None, None, 2 1024        stage3_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage3_unit2_relu2 (Activation) (None, None, None, 2 0           stage3_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_13 (ZeroPadding2 (None, None, None, 2 0           stage3_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage3_unit2_conv2 (Conv2D)     (None, None, None, 2 589824      zero_padding2d_13[0][0]
__________________________________________________________________________________________________
add_5 (Add)                     (None, None, None, 2 0           stage3_unit2_conv2[0][0]
                                                                 add_4[0][0]
__________________________________________________________________________________________________
stage4_unit1_bn1 (BatchNormaliz (None, None, None, 2 1024        add_5[0][0]
__________________________________________________________________________________________________
stage4_unit1_relu1 (Activation) (None, None, None, 2 0           stage4_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_14 (ZeroPadding2 (None, None, None, 2 0           stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage4_unit1_conv1 (Conv2D)     (None, None, None, 5 1179648     zero_padding2d_14[0][0]
__________________________________________________________________________________________________
stage4_unit1_bn2 (BatchNormaliz (None, None, None, 5 2048        stage4_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage4_unit1_relu2 (Activation) (None, None, None, 5 0           stage4_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_14 (ZeroPadding2 (None, None, None, 2 0           stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
```

```
loss: 0.0012 - binary_ce_metric: 0.0012 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_ac
curacy: 0.6691 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 -
class0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1
_binary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary
_accuracy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

```
stage4_unit1_conv1 (Conv2D)     (None, None, None, 5 1179648     zero_padding2d_14[0][0]
__________________________________________________________________________________________________
stage4_unit1_bn2 (BatchNormaliz (None, None, None, 5 2048        stage4_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage4_unit1_relu2 (Activation) (None, None, None, 5 0           stage4_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_15 (ZeroPadding2 (None, None, None, 5 0           stage4_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage4_unit1_conv2 (Conv2D)     (None, None, None, 5 2359296     zero_padding2d_15[0][0]
__________________________________________________________________________________________________
stage4_unit1_sc (Conv2D)        (None, None, None, 5 131072      stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_6 (Add)                     (None, None, None, 5 0           stage4_unit1_conv2[0][0]
                                                                 stage4_unit1_sc[0][0]
__________________________________________________________________________________________________
stage4_unit2_bn1 (BatchNormaliz (None, None, None, 5 2048        add_6[0][0]
__________________________________________________________________________________________________
stage4_unit2_relu1 (Activation) (None, None, None, 5 0           stage4_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_16 (ZeroPadding2 (None, None, None, 5 0           stage4_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage4_unit2_conv1 (Conv2D)     (None, None, None, 5 2359296     zero_padding2d_16[0][0]
__________________________________________________________________________________________________
stage4_unit2_bn2 (BatchNormaliz (None, None, None, 5 2048        stage4_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage4_unit2_relu2 (Activation) (None, None, None, 5 0           stage4_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_17 (ZeroPadding2 (None, None, None, 5 0           stage4_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage4_unit2_conv2 (Conv2D)     (None, None, None, 5 2359296     zero_padding2d_17[0][0]
__________________________________________________________________________________________________
add_7 (Add)                     (None, None, None, 5 0           stage4_unit2_conv2[0][0]
                                                                 add_6[0][0]
__________________________________________________________________________________________________
bn1 (BatchNormalization)        (None, None, None, 5 2048        add_7[0][0]
__________________________________________________________________________________________________
relu1 (Activation)              (None, None, None, 5 0           bn1[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 1 65536       relu1[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 1 512         decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 1 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 1 0           decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage0_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 1 512         decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 1 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0c_conv (Conv2D)   (None, None, None, 2 32768       decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0c_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0c_relu (Activatio (None, None, None, 2 0           decoder_stage0c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_add (Add)        (None, None, None, 2 0           decoder_stage0c_relu[0][0]
                                                                 stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 6 16384       decoder_stage0_add[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 6 256         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 6 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 6 0           decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 6 256         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 6 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 1 8192        decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 1 512         decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 1 0           decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 1 0           decoder_stage1c_relu[0][0]
                                                                 stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 3 4096        decoder_stage1_add[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 3 128         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 3 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 3 0           decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 3 128         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 3 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 6 2048        decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 6 256         decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 6 0           decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 6 0           decoder_stage2c_relu[0][0]
                                                                 stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 1 1024        decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 1 64          decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 1 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 1 0           decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 1 64          decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 1 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3c_conv (Conv2D)   (None, None, None, 6 1024        decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3c_bn (BatchNormal (None, None, None, 6 256         decoder_stage3c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3c_relu (Activatio (None, None, None, 6 0           decoder_stage3c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 6 0           decoder_stage3c_relu[0][0]
                                                                 relu0[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 1024        decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 1 0           decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 256         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d[0][0]
==================================================================================================
```

Total params: 13,811,398
Trainable params: 13,801,156
Non-trainable params: 10,242

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, None, None,	0	
block1_conv1 (Conv2D)	(None, None, None, 6	640	input_1[0][0]
block1_conv2 (Conv2D)	(None, None, None, 6	36928	block1_conv1[0][0]
block1_pool (MaxPooling2D)	(None, None, None, 6	0	block1_conv2[0][0]
block2_conv1 (Conv2D)	(None, None, None, 1	73856	block1_pool[0][0]
block2_conv2 (Conv2D)	(None, None, None, 1	147584	block2_conv1[0][0]
block2_pool (MaxPooling2D)	(None, None, None, 1	0	block2_conv2[0][0]
block3_conv1 (Conv2D)	(None, None, None, 2	295168	block2_pool[0][0]
block3_conv2 (Conv2D)	(None, None, None, 2	590080	block3_conv1[0][0]
block3_conv3 (Conv2D)	(None, None, None, 2	590080	block3_conv2[0][0]
block3_conv4 (Conv2D)	(None, None, None, 2	590080	block3_conv3[0][0]
block3_pool (MaxPooling2D)	(None, None, None, 2	0	block3_conv4[0][0]
block4_conv1 (Conv2D)	(None, None, None, 5	1180160	block3_pool[0][0]
block4_conv2 (Conv2D)	(None, None, None, 5	2359808	block4_conv1[0][0]
block4_conv3 (Conv2D)	(None, None, None, 5	2359808	block4_conv2[0][0]
block4_conv4 (Conv2D)	(None, None, None, 5	2359808	block4_conv3[0][0]
block4_pool (MaxPooling2D)	(None, None, None, 5	0	block4_conv4[0][0]
block5_conv1 (Conv2D)	(None, None, None, 5	2359808	block4_pool[0][0]
block5_conv2 (Conv2D)	(None, None, None, 5	2359808	block5_conv1[0][0]
block5_conv3 (Conv2D)	(None, None, None, 5	2359808	block5_conv2[0][0]
block5_conv4 (Conv2D)	(None, None, None, 5	2359808	block5_conv3[0][0]
block5_pool (MaxPooling2D)	(None, None, None, 5	0	block5_conv4[0][0]
fpn_stage_p5_pre_conv (Conv2D)	(None, None, None, 2	131328	block5_pool[0][0]
fpn_stage_p5_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p5_pre_conv[0][0]
fpn_stage_p5_conv (Conv2D)	(None, None, None, 2	131328	block5_conv4[0][0]
fpn_stage_p5_add (Add)	(None, None, None, 2	0	fpn_stage_p5_upsampling[0][0] fpn_stage_p5_conv[0][0]
fpn_stage_p4_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p5_add[0][0]
fpn_stage_p4_conv (Conv2D)	(None, None, None, 2	131328	block4_conv4[0][0]
fpn_stage_p4_add (Add)	(None, None, None, 2	0	fpn_stage_p4_upsampling[0][0] fpn_stage_p4_conv[0][0]
fpn_stage_p3_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p4_add[0][0]
fpn_stage_p3_conv (Conv2D)	(None, None, None, 2	65792	block3_conv4[0][0]
fpn_stage_p3_add (Add)	(None, None, None, 2	0	fpn_stage_p3_upsampling[0][0] fpn_stage_p3_conv[0][0]
fpn_stage_p2_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p3_add[0][0]
fpn_stage_p2_conv (Conv2D)	(None, None, None, 2	33024	block2_conv2[0][0]
fpn_stage_p2_add (Add)	(None, None, None, 2	0	fpn_stage_p2_upsampling[0][0] fpn_stage_p2_conv[0][0]
segm_stage3a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p3_add[0][0]
segm_stage4a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p4_add[0][0]
segm_stage5a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p5_add[0][0]
segm_stage2a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p2_add[0][0]
segm_stage3a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage3a_conv[0][0]
segm_stage4a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage4a_conv[0][0]
segm_stage5a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage5a_conv[0][0]
segm_stage2a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage2a_conv[0][0]
segm_stage3a_relu (Activation)	(None, None, None, 1	0	segm_stage3a_bn[0][0]
segm_stage4a_relu (Activation)	(None, None, None, 1	0	segm_stage4a_bn[0][0]
segm_stage5a_relu (Activation)	(None, None, None, 1	0	segm_stage5a_bn[0][0]
segm_stage2a_relu (Activation)	(None, None, None, 1	0	segm_stage2a_bn[0][0]
segm_stage3b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage3a_relu[0][0]
segm_stage4b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage4a_relu[0][0]
segm_stage5b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage5a_relu[0][0]
segm_stage2b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage2a_relu[0][0]
segm_stage3b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage3b_conv[0][0]
segm_stage4b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage4b_conv[0][0]
segm_stage5b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage5b_conv[0][0]
segm_stage2b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage2b_conv[0][0]
segm_stage3b_relu (Activation)	(None, None, None, 1	0	segm_stage3b_bn[0][0]
segm_stage4b_relu (Activation)	(None, None, None, 1	0	segm_stage4b_bn[0][0]
segm_stage5b_relu (Activation)	(None, None, None, 1	0	segm_stage5b_bn[0][0]
segm_stage2b_relu (Activation)	(None, None, None, 1	0	segm_stage2b_bn[0][0]
upsampling_stage3 (UpSampling2D	(None, None, None, 1	0	segm_stage3b_relu[0][0]
upsampling_stage4 (UpSampling2D	(None, None, None, 1	0	segm_stage4b_relu[0][0]
upsampling_stage5 (UpSampling2D	(None, None, None, 1	0	segm_stage5b_relu[0][0]
aggregation_concat (Concatenate	(None, None, None, 5	0	segm_stage2b_relu[0][0] upsampling_stage3[0][0] upsampling_stage4[0][0] upsampling_stage5[0][0]
final_stage_conv (Conv2D)	(None, None, None, 1	589824	aggregation_concat[0][0]
final_stage_bn (BatchNormalizat	(None, None, None, 1	512	final_stage_conv[0][0]
final_stage_relu (Activation)	(None, None, None, 1	0	final_stage_bn[0][0]
final_upsampling (UpSampling2D)	(None, None, None, 1	0	final_stage_relu[0][0]
head_conv (Conv2D)	(None, None, None, 3	3459	final_upsampling[0][0]
sigmoid (Activation)	(None, None, None, 3	0	head_conv[0][0]

Total params: 22,883,395
Trainable params: 22,881,091
Non-trainable params: 2,304

loss: 0.0013 - binary_ce_metric: 0.0013 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.7308 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accuracy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00

Model: "model" Batch Size: 8

10 epoch results

loss: 0.0013 - binary_ce_metric: 0.0013 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.2450 - false_neg: 8324.0000 - true_neg: 754891520000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, None, None, 0		
block1_conv1 (Conv2D)	(None, None, None, 6	640	input_1[0][0]
block1_conv2 (Conv2D)	(None, None, None, 6	36928	block1_conv1[0][0]
block1_pool (MaxPooling2D)	(None, None, None, 6	0	block1_conv2[0][0]
block2_conv1 (Conv2D)	(None, None, None, 1	73856	block1_pool[0][0]
block2_conv2 (Conv2D)	(None, None, None, 1	147584	block2_conv1[0][0]
block2_pool (MaxPooling2D)	(None, None, None, 1	0	block2_conv2[0][0]
block3_conv1 (Conv2D)	(None, None, None, 2	295168	block2_pool[0][0]
block3_conv2 (Conv2D)	(None, None, None, 2	590080	block3_conv1[0][0]
block3_conv3 (Conv2D)	(None, None, None, 2	590080	block3_conv2[0][0]
block3_pool (MaxPooling2D)	(None, None, None, 2	0	block3_conv3[0][0]
block4_conv1 (Conv2D)	(None, None, None, 5	1180160	block3_pool[0][0]
block4_conv2 (Conv2D)	(None, None, None, 5	2359808	block4_conv1[0][0]
block4_conv3 (Conv2D)	(None, None, None, 5	2359808	block4_conv2[0][0]
block4_pool (MaxPooling2D)	(None, None, None, 5	0	block4_conv3[0][0]
block5_conv1 (Conv2D)	(None, None, None, 5	2359808	block4_pool[0][0]
block5_conv2 (Conv2D)	(None, None, None, 5	2359808	block5_conv1[0][0]
block5_conv3 (Conv2D)	(None, None, None, 5	2359808	block5_conv2[0][0]
block5_pool (MaxPooling2D)	(None, None, None, 5	0	block5_conv3[0][0]
fpn_stage_p5_pre_conv (Conv2D)	(None, None, None, 2	131328	block5_pool[0][0]
fpn_stage_p5_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p5_pre_conv[0][0]
fpn_stage_p5_conv (Conv2D)	(None, None, None, 2	131328	block5_conv3[0][0]
fpn_stage_p5_add (Add)	(None, None, None, 2	0	fpn_stage_p5_upsampling[0][0] fpn_stage_p5_conv[0][0]
fpn_stage_p4_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p5_add[0][0]
fpn_stage_p4_conv (Conv2D)	(None, None, None, 2	131328	block4_conv3[0][0]
fpn_stage_p4_add (Add)	(None, None, None, 2	0	fpn_stage_p4_upsampling[0][0] fpn_stage_p4_conv[0][0]
fpn_stage_p3_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p4_add[0][0]
fpn_stage_p3_conv (Conv2D)	(None, None, None, 2	65792	block3_conv3[0][0]
fpn_stage_p3_add (Add)	(None, None, None, 2	0	fpn_stage_p3_upsampling[0][0] fpn_stage_p3_conv[0][0]
fpn_stage_p2_upsampling (UpSamp	(None, None, None, 2	0	fpn_stage_p3_add[0][0]
fpn_stage_p2_conv (Conv2D)	(None, None, None, 2	33024	block2_conv2[0][0]
fpn_stage_p2_add (Add)	(None, None, None, 2	0	fpn_stage_p2_upsampling[0][0] fpn_stage_p2_conv[0][0]
segm_stage3a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p3_add[0][0]
segm_stage4a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p4_add[0][0]
segm_stage5a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p5_add[0][0]
segm_stage5a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p5_add[0][0]
segm_stage2a_conv (Conv2D)	(None, None, None, 1	294912	fpn_stage_p2_add[0][0]
segm_stage3a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage3a_conv[0][0]
segm_stage4a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage4a_conv[0][0]
segm_stage5a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage5a_conv[0][0]
segm_stage2a_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage2a_conv[0][0]
segm_stage3a_relu (Activation)	(None, None, None, 1	0	segm_stage3a_bn[0][0]
segm_stage4a_relu (Activation)	(None, None, None, 1	0	segm_stage4a_bn[0][0]
segm_stage5a_relu (Activation)	(None, None, None, 1	0	segm_stage5a_bn[0][0]
segm_stage2a_relu (Activation)	(None, None, None, 1	0	segm_stage2a_bn[0][0]
segm_stage3b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage3a_relu[0][0]
segm_stage4b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage4a_relu[0][0]
segm_stage5b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage5a_relu[0][0]
segm_stage2b_conv (Conv2D)	(None, None, None, 1	147456	segm_stage2a_relu[0][0]
segm_stage3b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage3b_conv[0][0]
segm_stage4b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage4b_conv[0][0]
segm_stage5b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage5b_conv[0][0]
segm_stage2b_bn (BatchNormaliza	(None, None, None, 1	512	segm_stage2b_conv[0][0]
segm_stage3b_relu (Activation)	(None, None, None, 1	0	segm_stage3b_bn[0][0]
segm_stage4b_relu (Activation)	(None, None, None, 1	0	segm_stage4b_bn[0][0]
segm_stage5b_relu (Activation)	(None, None, None, 1	0	segm_stage5b_bn[0][0]
segm_stage2b_relu (Activation)	(None, None, None, 1	0	segm_stage2b_bn[0][0]
upsampling_stage3 (UpSampling2D	(None, None, None, 1	0	segm_stage3b_relu[0][0]
upsampling_stage4 (UpSampling2D	(None, None, None, 1	0	segm_stage4b_relu[0][0]
upsampling_stage5 (UpSampling2D	(None, None, None, 1	0	segm_stage5b_relu[0][0]
aggregation_concat (Concatenate	(None, None, None, 5	0	segm_stage2b_relu[0][0] upsampling_stage3[0][0] upsampling_stage4[0][0] upsampling_stage5[0][0]
final_stage_conv (Conv2D)	(None, None, None, 1	589824	aggregation_concat[0][0]
final_stage_bn (BatchNormalizat	(None, None, None, 1	512	final_stage_conv[0][0]
final_stage_relu (Activation)	(None, None, None, 1	0	final_stage_bn[0][0]
final_upsampling (UpSampling2D)	(None, None, None, 1	0	final_stage_relu[0][0]
head_conv (Conv2D)	(None, None, None, 3	3459	final_upsampling[0][0]
sigmoid (Activation)	(None, None, None, 3	0	head_conv[0][0]

Total params: 17,573,699
Trainable params: 17,571,395
Non-trainable params: 2,304

Model: "model"

```
Error: Traceback (most recent call last):
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 767, in on_epoch
    yield epoch_logs
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in execution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 599, in _call
    return self._stateless_fn(*args, **kwds)  # pylint: disable=not-callable
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function._filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError:  OOM when allocating tensor with shape[16,24,512,512] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
         [[node Conv2DBackpropInput_1 (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.
 [Op:__inference_distributed_function_35363]

Function call stack:
distributed_function


During handling of the above exception, another exception occurred:

Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 397, in fit
    prefix='val_')
  File "/usr/lib/python3.5/contextlib.py", line 77, in __exit__
    self.gen.throw(type, value, traceback)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 771, in on_epoch
    self.callbacks.on_epoch_end(epoch, epoch_logs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/callbacks.py", line 302, in on_epoch_end
    callback.on_epoch_end(epoch, logs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/callbacks.py", line 2046, in on_epoch_end
    row_dict.update((key, handle_value(logs[key])) for key in self.keys)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/callbacks.py", line 2046, in <genexpr>
    row_dict.update((key, handle_value(logs[key])) for key in self.keys)
KeyError: 'val_accuracy'
```

```
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
input_1 (InputLayer)            [(None, None, None,  0
__________________________________________________________________________________________________
stem_conv (Conv2D)              (None, None, None, 3 288         input_1[0][0]
__________________________________________________________________________________________________
stem_bn (BatchNormalization)    (None, None, None, 3 128         stem_conv[0][0]
__________________________________________________________________________________________________
stem_activation (Activation)    (None, None, None, 3 0           stem_bn[0][0]
__________________________________________________________________________________________________
block1a_dwconv (DepthwiseConv2D (None, None, None, 3 288         stem_activation[0][0]
__________________________________________________________________________________________________
block1a_bn (BatchNormalization) (None, None, None, 3 128         block1a_dwconv[0][0]
__________________________________________________________________________________________________
block1a_activation (Activation) (None, None, None, 3 0           block1a_bn[0][0]
__________________________________________________________________________________________________
block1a_se_squeeze (GlobalAvera (None, 32)           0           block1a_activation[0][0]
__________________________________________________________________________________________________
block1a_se_reshape (Reshape)    (None, 1, 1, 32)     0           block1a_se_squeeze[0][0]
__________________________________________________________________________________________________
block1a_se_reduce (Conv2D)      (None, 1, 1, 8)      264         block1a_se_reshape[0][0]
__________________________________________________________________________________________________
block1a_se_expand (Conv2D)      (None, 1, 1, 32)     288         block1a_se_reduce[0][0]
__________________________________________________________________________________________________
block1a_se_excite (Multiply)    (None, None, None, 3 0           block1a_activation[0][0]
                                                                 block1a_se_expand[0][0]
__________________________________________________________________________________________________
block1a_project_conv (Conv2D)   (None, None, None, 1 512         block1a_se_excite[0][0]
__________________________________________________________________________________________________
block1a_project_bn (BatchNormal (None, None, None, 1 64          block1a_project_conv[0][0]
__________________________________________________________________________________________________
block2a_expand_conv (Conv2D)    (None, None, None, 9 1536        block1a_project_bn[0][0]
__________________________________________________________________________________________________
block2a_expand_bn (BatchNormali (None, None, None, 9 384         block2a_expand_conv[0][0]
__________________________________________________________________________________________________
block2a_expand_activation (Acti (None, None, None, 9 0           block2a_expand_bn[0][0]
__________________________________________________________________________________________________
block2a_dwconv (DepthwiseConv2D (None, None, None, 9 864         block2a_expand_activation[0][0]
__________________________________________________________________________________________________
block2a_bn (BatchNormalization) (None, None, None, 9 384         block2a_dwconv[0][0]
__________________________________________________________________________________________________
block2a_activation (Activation) (None, None, None, 9 0           block2a_bn[0][0]
__________________________________________________________________________________________________
block2a_se_squeeze (GlobalAvera (None, 96)           0           block2a_activation[0][0]
__________________________________________________________________________________________________
block2a_se_reshape (Reshape)    (None, 1, 1, 96)     0           block2a_se_squeeze[0][0]
__________________________________________________________________________________________________
block2a_se_reduce (Conv2D)      (None, 1, 1, 4)      388         block2a_se_reshape[0][0]
__________________________________________________________________________________________________
block2a_se_expand (Conv2D)      (None, 1, 1, 96)     480         block2a_se_reduce[0][0]
__________________________________________________________________________________________________
block2a_se_excite (Multiply)    (None, None, None, 9 0           block2a_activation[0][0]
                                                                 block2a_se_expand[0][0]
__________________________________________________________________________________________________
block2a_project_conv (Conv2D)   (None, None, None, 2 2304        block2a_se_excite[0][0]
__________________________________________________________________________________________________
block2a_project_bn (BatchNormal (None, None, None, 2 96          block2a_project_conv[0][0]
__________________________________________________________________________________________________
block2b_expand_conv (Conv2D)    (None, None, None, 1 3456        block2a_project_bn[0][0]
__________________________________________________________________________________________________
block2b_expand_bn (BatchNormali (None, None, None, 1 576         block2b_expand_conv[0][0]
__________________________________________________________________________________________________
block2b_expand_activation (Acti (None, None, None, 1 0           block2b_expand_bn[0][0]
__________________________________________________________________________________________________
block2b_dwconv (DepthwiseConv2D (None, None, None, 1 1296        block2b_expand_activation[0][0]
__________________________________________________________________________________________________
block2b_bn (BatchNormalization) (None, None, None, 1 576         block2b_dwconv[0][0]
__________________________________________________________________________________________________
block2b_activation (Activation) (None, None, None, 1 0           block2b_bn[0][0]
__________________________________________________________________________________________________
block2b_se_squeeze (GlobalAvera (None, 144)          0           block2b_activation[0][0]
__________________________________________________________________________________________________
block2b_se_reshape (Reshape)    (None, 1, 1, 144)    0           block2b_se_squeeze[0][0]
__________________________________________________________________________________________________
block2b_se_reduce (Conv2D)      (None, 1, 1, 6)      870         block2b_se_reshape[0][0]
__________________________________________________________________________________________________
block2b_se_expand (Conv2D)      (None, 1, 1, 144)    1008        block2b_se_reduce[0][0]
__________________________________________________________________________________________________
block2b_se_excite (Multiply)    (None, None, None, 1 0           block2b_activation[0][0]
                                                                 block2b_se_expand[0][0]
__________________________________________________________________________________________________
block2b_project_conv (Conv2D)   (None, None, None, 2 3456        block2b_se_excite[0][0]
__________________________________________________________________________________________________
block2b_project_bn (BatchNormal (None, None, None, 2 96          block2b_project_conv[0][0]
__________________________________________________________________________________________________
block2b_drop (FixedDropout)     (None, None, None, 2 0           block2b_project_bn[0][0]
__________________________________________________________________________________________________
block2b_add (Add)               (None, None, None, 2 0           block2b_drop[0][0]
                                                                 block2a_project_bn[0][0]
__________________________________________________________________________________________________
block3a_expand_conv (Conv2D)    (None, None, None, 1 3456        block2b_add[0][0]
__________________________________________________________________________________________________
block3a_expand_bn (BatchNormali (None, None, None, 1 576         block3a_expand_conv[0][0]
__________________________________________________________________________________________________
```

block3a_expand_activation (Acti	(None, None, None, 1	0	block3a_expand_bn[0][0]	
block3a_dwconv (DepthwiseConv2D	(None, None, None, 1	3600	block3a_expand_activation[0][0]	
block3a_bn (BatchNormalization)	(None, None, None, 1	576	block3a_dwconv[0][0]	
block3a_activation (Activation)	(None, None, None, 1	0	block3a_bn[0][0]	
block3a_se_squeeze (GlobalAvera	(None, 144)	0	block3a_activation[0][0]	
block3a_se_reshape (Reshape)	(None, 1, 1, 144)	0	block3a_se_squeeze[0][0]	
block3a_se_reduce (Conv2D)	(None, 1, 1, 6)	870	block3a_se_reshape[0][0]	
block3a_se_expand (Conv2D)	(None, 1, 1, 144)	1008	block3a_se_reduce[0][0]	
block3a_se_excite (Multiply)	(None, None, None, 1	0	block3a_activation[0][0] block3a_se_expand[0][0]	
block3a_project_conv (Conv2D)	(None, None, None, 4	5760	block3a_se_excite[0][0]	
block3a_project_bn (BatchNormal	(None, None, None, 4	160	block3a_project_conv[0][0]	
block3b_expand_conv (Conv2D)	(None, None, None, 2	9600	block3a_project_bn[0][0]	
block3b_expand_bn (BatchNormali	(None, None, None, 2	960	block3b_expand_conv[0][0]	
block3b_expand_activation (Acti	(None, None, None, 2	0	block3b_expand_bn[0][0]	
block3b_dwconv (DepthwiseConv2D	(None, None, None, 2	6000	block3b_expand_activation[0][0]	
block3b_bn (BatchNormalization)	(None, None, None, 2	960	block3b_dwconv[0][0]	
block3b_activation (Activation)	(None, None, None, 2	0	block3b_bn[0][0]	
block3b_se_squeeze (GlobalAvera	(None, 240)	0	block3b_activation[0][0]	
block3b_se_reshape (Reshape)	(None, 1, 1, 240)	0	block3b_se_squeeze[0][0]	
block3b_se_reduce (Conv2D)	(None, 1, 1, 10)	2410	block3b_se_reshape[0][0]	
block3b_se_expand (Conv2D)	(None, 1, 1, 240)	2640	block3b_se_reduce[0][0]	
block3b_se_excite (Multiply)	(None, None, None, 2	0	block3b_activation[0][0] block3b_se_expand[0][0]	
block3b_project_conv (Conv2D)	(None, None, None, 4	9600	block3b_se_excite[0][0]	
block3b_project_bn (BatchNormal	(None, None, None, 4	160	block3b_project_conv[0][0]	
block3b_drop (FixedDropout)	(None, None, None, 4	0	block3b_project_bn[0][0]	
block3b_add (Add)	(None, None, None, 4	0	block3b_drop[0][0] block3a_project_bn[0][0]	
block4a_expand_conv (Conv2D)	(None, None, None, 2	9600	block3b_add[0][0]	
block4a_expand_bn (BatchNormali	(None, None, None, 2	960	block4a_expand_conv[0][0]	
block4a_expand_activation (Acti	(None, None, None, 2	0	block4a_expand_bn[0][0]	
block4a_dwconv (DepthwiseConv2D	(None, None, None, 2	2160	block4a_expand_activation[0][0]	
block4a_bn (BatchNormalization)	(None, None, None, 2	960	block4a_dwconv[0][0]	
block4a_activation (Activation)	(None, None, None, 2	0	block4a_bn[0][0]	
block4a_se_squeeze (GlobalAvera	(None, 240)	0	block4a_activation[0][0]	
block4a_se_reshape (Reshape)	(None, 1, 1, 240)	0	block4a_se_squeeze[0][0]	
block4a_se_reduce (Conv2D)	(None, 1, 1, 10)	2410	block4a_se_reshape[0][0]	
block4a_se_expand (Conv2D)	(None, 1, 1, 240)	2640	block4a_se_reduce[0][0]	
block4a_se_excite (Multiply)	(None, None, None, 2	0	block4a_activation[0][0] block4a_se_expand[0][0]	
block4a_project_conv (Conv2D)	(None, None, None, 8	19200	block4a_se_excite[0][0]	
block4a_project_bn (BatchNormal	(None, None, None, 8	320	block4a_project_conv[0][0]	
block4b_expand_conv (Conv2D)	(None, None, None, 4	38400	block4a_project_bn[0][0]	
block4b_expand_bn (BatchNormali	(None, None, None, 4	1920	block4b_expand_conv[0][0]	
block4b_expand_activation (Acti	(None, None, None, 4	0	block4b_expand_bn[0][0]	
block4b_dwconv (DepthwiseConv2D	(None, None, None, 4	4320	block4b_expand_activation[0][0]	
block4b_bn (BatchNormalization)	(None, None, None, 4	1920	block4b_dwconv[0][0]	
block4b_activation (Activation)	(None, None, None, 4	0	block4b_bn[0][0]	
block4b_se_squeeze (GlobalAvera	(None, 480)	0	block4b_activation[0][0]	
block4b_se_reshape (Reshape)	(None, 1, 1, 480)	0	block4b_se_squeeze[0][0]	
block4b_se_reduce (Conv2D)	(None, 1, 1, 20)	9620	block4b_se_reshape[0][0]	
block4b_se_expand (Conv2D)	(None, 1, 1, 480)	10080	block4b_se_reduce[0][0]	
block4b_se_excite (Multiply)	(None, None, None, 4	0	block4b_activation[0][0] block4b_se_expand[0][0]	
block4b_project_conv (Conv2D)	(None, None, None, 8	38400	block4b_se_excite[0][0]	
block4b_project_bn (BatchNormal	(None, None, None, 8	320	block4b_project_conv[0][0]	
block4b_drop (FixedDropout)	(None, None, None, 8	0	block4b_project_bn[0][0]	
block4b_add (Add)	(None, None, None, 8	0	block4b_drop[0][0] block4a_project_bn[0][0]	
block4c_expand_conv (Conv2D)	(None, None, None, 4	38400	block4b_add[0][0]	
block4c_expand_bn (BatchNormali	(None, None, None, 4	1920	block4c_expand_conv[0][0]	
block4c_expand_activation (Acti	(None, None, None, 4	0	block4c_expand_bn[0][0]	
block4c_dwconv (DepthwiseConv2D	(None, None, None, 4	4320	block4c_expand_activation[0][0]	
block4c_bn (BatchNormalization)	(None, None, None, 4	1920	block4c_dwconv[0][0]	
block4c_activation (Activation)	(None, None, None, 4	0	block4c_bn[0][0]	
block4c_se_squeeze (GlobalAvera	(None, 480)	0	block4c_activation[0][0]	
block4c_se_reshape (Reshape)	(None, 1, 1, 480)	0	block4c_se_squeeze[0][0]	
block4c_se_reduce (Conv2D)	(None, 1, 1, 20)	9620	block4c_se_reshape[0][0]	
block4c_se_expand (Conv2D)	(None, 1, 1, 480)	10080	block4c_se_reduce[0][0]	
block4c_se_excite (Multiply)	(None, None, None, 4	0	block4c_activation[0][0]	

block4c_se_expand[0][0]					
block4c_project_conv (Conv2D)	(None, None, None, 8	38400	block4c_se_excite[0][0]		
block4c_project_bn (BatchNormal	(None, None, None, 8	320	block4c_project_conv[0][0]		
block4c_drop (FixedDropout)	(None, None, None, 8	0	block4c_project_bn[0][0]		
block4c_add (Add)	(None, None, None, 8	0	block4c_drop[0][0] block4b_add[0][0]		
block5a_expand_conv (Conv2D)	(None, None, None, 4	38400	block4c_add[0][0]		
block5a_expand_bn (BatchNormali	(None, None, None, 4	1920	block5a_expand_conv[0][0]		
block5a_expand_activation (Acti	(None, None, None, 4	0	block5a_expand_bn[0][0]		
block5a_dwconv (DepthwiseConv2D	(None, None, None, 4	12000	block5a_expand_activation[0][0]		
block5a_bn (BatchNormalization)	(None, None, None, 4	1920	block5a_dwconv[0][0]		
block5a_activation (Activation)	(None, None, None, 4	0	block5a_bn[0][0]		
block5a_se_squeeze (GlobalAvera	(None, 480)	0	block5a_activation[0][0]		
block5a_se_reshape (Reshape)	(None, 1, 1, 480)	0	block5a_se_squeeze[0][0]		
block5a_se_reduce (Conv2D)	(None, 1, 1, 20)	9620	block5a_se_reshape[0][0]		
block5a_se_expand (Conv2D)	(None, 1, 1, 480)	10080	block5a_se_reduce[0][0]		
block5a_se_excite (Multiply)	(None, None, None, 4	0	block5a_activation[0][0] block5a_se_expand[0][0]		
block5a_project_conv (Conv2D)	(None, None, None, 1	53760	block5a_se_excite[0][0]		
block5a_project_bn (BatchNormal	(None, None, None, 1	448	block5a_project_conv[0][0]		
block5b_expand_conv (Conv2D)	(None, None, None, 6	75264	block5a_project_bn[0][0]		
block5b_expand_bn (BatchNormali	(None, None, None, 6	2688	block5b_expand_conv[0][0]		
block5b_expand_activation (Acti	(None, None, None, 6	0	block5b_expand_bn[0][0]		
block5b_dwconv (DepthwiseConv2D	(None, None, None, 6	16800	block5b_expand_activation[0][0]		
block5b_bn (BatchNormalization)	(None, None, None, 6	2688	block5b_dwconv[0][0]		
block5b_activation (Activation)	(None, None, None, 6	0	block5b_bn[0][0]		
block5b_se_squeeze (GlobalAvera	(None, 672)	0	block5b_activation[0][0]		
block5b_se_reshape (Reshape)	(None, 1, 1, 672)	0	block5b_se_squeeze[0][0]		
block5b_se_reduce (Conv2D)	(None, 1, 1, 28)	18844	block5b_se_reshape[0][0]		
block5b_se_expand (Conv2D)	(None, 1, 1, 672)	19488	block5b_se_reduce[0][0]		
block5b_se_excite (Multiply)	(None, None, None, 6	0	block5b_activation[0][0] block5b_se_expand[0][0]		
block5b_project_conv (Conv2D)	(None, None, None, 1	75264	block5b_se_excite[0][0]		
block5b_project_bn (BatchNormal	(None, None, None, 1	448	block5b_project_conv[0][0]		
block5b_drop (FixedDropout)	(None, None, None, 1	0	block5b_project_bn[0][0]		
block5b_add (Add)	(None, None, None, 1	0	block5b_drop[0][0] block5a_project_bn[0][0]		
block5c_expand_conv (Conv2D)	(None, None, None, 6	75264	block5b_add[0][0]		
block5c_expand_bn (BatchNormali	(None, None, None, 6	2688	block5c_expand_conv[0][0]		
block5c_expand_activation (Acti	(None, None, None, 6	0	block5c_expand_bn[0][0]		
block5c_dwconv (DepthwiseConv2D	(None, None, None, 6	16800	block5c_expand_activation[0][0]		
block5c_bn (BatchNormalization)	(None, None, None, 6	2688	block5c_dwconv[0][0]		
block5c_activation (Activation)	(None, None, None, 6	0	block5c_bn[0][0]		
block5c_se_squeeze (GlobalAvera	(None, 672)	0	block5c_activation[0][0]		
block5c_se_reshape (Reshape)	(None, 1, 1, 672)	0	block5c_se_squeeze[0][0]		
block5c_se_reduce (Conv2D)	(None, 1, 1, 28)	18844	block5c_se_reshape[0][0]		
block5c_se_expand (Conv2D)	(None, 1, 1, 672)	19488	block5c_se_reduce[0][0]		
block5c_se_excite (Multiply)	(None, None, None, 6	0	block5c_activation[0][0] block5c_se_expand[0][0]		
block5c_project_conv (Conv2D)	(None, None, None, 1	75264	block5c_se_excite[0][0]		
block5c_project_bn (BatchNormal	(None, None, None, 1	448	block5c_project_conv[0][0]		
block5c_drop (FixedDropout)	(None, None, None, 1	0	block5c_project_bn[0][0]		
block5c_add (Add)	(None, None, None, 1	0	block5c_drop[0][0] block5b_add[0][0]		
block6a_expand_conv (Conv2D)	(None, None, None, 6	75264	block5c_add[0][0]		
block6a_expand_bn (BatchNormali	(None, None, None, 6	2688	block6a_expand_conv[0][0]		
block6a_expand_activation (Acti	(None, None, None, 6	0	block6a_expand_bn[0][0]		
block6a_dwconv (DepthwiseConv2D	(None, None, None, 6	16800	block6a_expand_activation[0][0]		
block6a_bn (BatchNormalization)	(None, None, None, 6	2688	block6a_dwconv[0][0]		
block6a_activation (Activation)	(None, None, None, 6	0	block6a_bn[0][0]		
block6a_se_squeeze (GlobalAvera	(None, 672)	0	block6a_activation[0][0]		
block6a_se_reshape (Reshape)	(None, 1, 1, 672)	0	block6a_se_squeeze[0][0]		
block6a_se_reduce (Conv2D)	(None, 1, 1, 28)	18844	block6a_se_reshape[0][0]		
block6a_se_expand (Conv2D)	(None, 1, 1, 672)	19488	block6a_se_reduce[0][0]		
block6a_se_excite (Multiply)	(None, None, None, 6	0	block6a_activation[0][0] block6a_se_expand[0][0]		
block6a_project_conv (Conv2D)	(None, None, None, 1	129024	block6a_se_excite[0][0]		
block6a_project_bn (BatchNormal	(None, None, None, 1	768	block6a_project_conv[0][0]		
block6b_expand_conv (Conv2D)	(None, None, None, 1	221184	block6a_project_bn[0][0]		
block6b_expand_bn (BatchNormali	(None, None, None, 1	4608	block6b_expand_conv[0][0]		
block6b_expand_activation (Acti	(None, None, None, 1	0	block6b_expand_bn[0][0]		

block6b_dwconv (DepthwiseConv2D	(None, None, None, 1	28800	block6b_expand_activation[0][0]		
block6b_bn (BatchNormalization)	(None, None, None, 1	4608	block6b_dwconv[0][0]		
block6b_activation (Activation)	(None, None, None, 1	0	block6b_bn[0][0]		
block6b_se_squeeze (GlobalAvera	(None, 1152)	0	block6b_activation[0][0]		
block6b_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block6b_se_squeeze[0][0]		
block6b_se_reduce (Conv2D)	(None, 1, 1, 48)	55344	block6b_se_reshape[0][0]		
block6b_se_expand (Conv2D)	(None, 1, 1, 1152)	56448	block6b_se_reduce[0][0]		
block6b_se_excite (Multiply)	(None, None, None, 1	0	block6b_activation[0][0] block6b_se_expand[0][0]		
block6b_project_conv (Conv2D)	(None, None, None, 1	221184	block6b_se_excite[0][0]		
block6b_project_bn (BatchNormal	(None, None, None, 1	768	block6b_project_conv[0][0]		
block6b_drop (FixedDropout)	(None, None, None, 1	0	block6b_project_bn[0][0]		
block6b_add (Add)	(None, None, None, 1	0	block6b_drop[0][0] block6a_project_bn[0][0]		
block6c_expand_conv (Conv2D)	(None, None, None, 1	221184	block6b_add[0][0]		
block6c_expand_bn (BatchNormali	(None, None, None, 1	4608	block6c_expand_conv[0][0]		
block6c_expand_activation (Acti	(None, None, None, 1	0	block6c_expand_bn[0][0]		
block6c_dwconv (DepthwiseConv2D	(None, None, None, 1	28800	block6c_expand_activation[0][0]		
block6c_bn (BatchNormalization)	(None, None, None, 1	4608	block6c_dwconv[0][0]		
block6c_activation (Activation)	(None, None, None, 1	0	block6c_bn[0][0]		
block6c_se_squeeze (GlobalAvera	(None, 1152)	0	block6c_activation[0][0]		
block6c_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block6c_se_squeeze[0][0]		
block6c_se_reduce (Conv2D)	(None, 1, 1, 48)	55344	block6c_se_reshape[0][0]		
block6c_se_expand (Conv2D)	(None, 1, 1, 1152)	56448	block6c_se_reduce[0][0]		
block6c_se_excite (Multiply)	(None, None, None, 1	0	block6c_activation[0][0] block6c_se_expand[0][0]		
block6c_project_conv (Conv2D)	(None, None, None, 1	221184	block6c_se_excite[0][0]		
block6c_project_bn (BatchNormal	(None, None, None, 1	768	block6c_project_conv[0][0]		
block6c_drop (FixedDropout)	(None, None, None, 1	0	block6c_project_bn[0][0]		
block6c_add (Add)	(None, None, None, 1	0	block6c_drop[0][0] block6b_add[0][0]		
block6d_expand_conv (Conv2D)	(None, None, None, 1	221184	block6c_add[0][0]		
block6d_expand_bn (BatchNormali	(None, None, None, 1	4608	block6d_expand_conv[0][0]		
block6d_expand_activation (Acti	(None, None, None, 1	0	block6d_expand_bn[0][0]		
block6d_dwconv (DepthwiseConv2D	(None, None, None, 1	28800	block6d_expand_activation[0][0]		
block6d_bn (BatchNormalization)	(None, None, None, 1	4608	block6d_dwconv[0][0]		
block6d_activation (Activation)	(None, None, None, 1	0	block6d_bn[0][0]		
block6d_se_squeeze (GlobalAvera	(None, 1152)	0	block6d_activation[0][0]		
block6d_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block6d_se_squeeze[0][0]		
block6d_se_reduce (Conv2D)	(None, 1, 1, 48)	55344	block6d_se_reshape[0][0]		
block6d_se_expand (Conv2D)	(None, 1, 1, 1152)	56448	block6d_se_reduce[0][0]		
block6d_se_excite (Multiply)	(None, None, None, 1	0	block6d_activation[0][0] block6d_se_expand[0][0]		
block6d_project_conv (Conv2D)	(None, None, None, 1	221184	block6d_se_excite[0][0]		
block6d_project_bn (BatchNormal	(None, None, None, 1	768	block6d_project_conv[0][0]		
block6d_drop (FixedDropout)	(None, None, None, 1	0	block6d_project_bn[0][0]		
block6d_add (Add)	(None, None, None, 1	0	block6d_drop[0][0] block6c_add[0][0]		
block7a_expand_conv (Conv2D)	(None, None, None, 1	221184	block6d_add[0][0]		
block7a_expand_bn (BatchNormali	(None, None, None, 1	4608	block7a_expand_conv[0][0]		
block7a_expand_activation (Acti	(None, None, None, 1	0	block7a_expand_bn[0][0]		
block7a_dwconv (DepthwiseConv2D	(None, None, None, 1	10368	block7a_expand_activation[0][0]		
block7a_bn (BatchNormalization)	(None, None, None, 1	4608	block7a_dwconv[0][0]		
block7a_activation (Activation)	(None, None, None, 1	0	block7a_bn[0][0]		
block7a_se_squeeze (GlobalAvera	(None, 1152)	0	block7a_activation[0][0]		
block7a_se_reshape (Reshape)	(None, 1, 1, 1152)	0	block7a_se_squeeze[0][0]		
block7a_se_reduce (Conv2D)	(None, 1, 1, 48)	55344	block7a_se_reshape[0][0]		
block7a_se_expand (Conv2D)	(None, 1, 1, 1152)	56448	block7a_se_reduce[0][0]		
block7a_se_excite (Multiply)	(None, None, None, 1	0	block7a_activation[0][0] block7a_se_expand[0][0]		
block7a_project_conv (Conv2D)	(None, None, None, 3	368640	block7a_se_excite[0][0]		
block7a_project_bn (BatchNormal	(None, None, None, 3	1280	block7a_project_conv[0][0]		
top_conv (Conv2D)	(None, None, None, 1	409600	block7a_project_bn[0][0]		
top_bn (BatchNormalization)	(None, None, None, 1	5120	top_conv[0][0]		
top_activation (Activation)	(None, None, None, 1	0	top_bn[0][0]		
decoder_stage0a_conv (Conv2D)	(None, None, None, 3	409600	top_activation[0][0]		
decoder_stage0a_bn (BatchNormal	(None, None, None, 3	1280	decoder_stage0a_conv[0][0]		
decoder_stage0a_relu (Activatio	(None, None, None, 3	0	decoder_stage0a_bn[0][0]		
decoder_stage0_upsampling (UpSa	(None, None, None, 3	0	decoder_stage0a_relu[0][0]		
decoder_stage0b_conv (Conv2D)	(None, None, None, 3	921600	decoder_stage0_upsampling[0][0]		
decoder_stage0b_bn (BatchNormal	(None, None, None, 3	1280	decoder_stage0b_conv[0][0]		

decoder_stage0b_relu (Activatio (None, None, None, 3 0 decoder_stage0b_bn[0][0]

decoder_stage0c_conv (Conv2D) (None, None, None, 6 215040 decoder_stage0b_relu[0][0]

decoder_stage0c_bn (BatchNormal (None, None, None, 6 2688 decoder_stage0c_conv[0][0]

decoder_stage0c_relu (Activatio (None, None, None, 6 0 decoder_stage0c_bn[0][0]

decoder_stage0_add (Add) (None, None, None, 6 0 decoder_stage0c_relu[0][0]
block6a_expand_activation[0][0]

decoder_stage1a_conv (Conv2D) (None, None, None, 1 112896 decoder_stage0_add[0][0]

decoder_stage1a_bn (BatchNormal (None, None, None, 1 672 decoder_stage1a_conv[0][0]

decoder_stage1a_relu (Activatio (None, None, None, 1 0 decoder_stage1a_bn[0][0]

decoder_stage1_upsampling (UpSa (None, None, None, 1 0 decoder_stage1a_relu[0][0]

decoder_stage1b_conv (Conv2D) (None, None, None, 1 254016 decoder_stage1_upsampling[0][0]

decoder_stage1b_bn (BatchNormal (None, None, None, 1 672 decoder_stage1b_conv[0][0]

decoder_stage1b_relu (Activatio (None, None, None, 1 0 decoder_stage1b_bn[0][0]

decoder_stage1c_conv (Conv2D) (None, None, None, 2 40320 decoder_stage1b_relu[0][0]

decoder_stage1c_bn (BatchNormal (None, None, None, 2 960 decoder_stage1c_conv[0][0]

decoder_stage1c_relu (Activatio (None, None, None, 2 0 decoder_stage1c_bn[0][0]

decoder_stage1_add (Add) (None, None, None, 2 0 decoder_stage1c_relu[0][0]
block4a_expand_activation[0][0]

decoder_stage2a_conv (Conv2D) (None, None, None, 6 14400 decoder_stage1_add[0][0]

decoder_stage2a_bn (BatchNormal (None, None, None, 6 240 decoder_stage2a_conv[0][0]

decoder_stage2a_relu (Activatio (None, None, None, 6 0 decoder_stage2a_bn[0][0]

decoder_stage2_upsampling (UpSa (None, None, None, 6 0 decoder_stage2a_relu[0][0]

decoder_stage2b_conv (Conv2D) (None, None, None, 6 32400 decoder_stage2_upsampling[0][0]

decoder_stage2b_bn (BatchNormal (None, None, None, 6 240 decoder_stage2b_conv[0][0]

decoder_stage2b_relu (Activatio (None, None, None, 6 0 decoder_stage2b_bn[0][0]

decoder_stage2c_conv (Conv2D) (None, None, None, 1 8640 decoder_stage2b_relu[0][0]

decoder_stage2c_bn (BatchNormal (None, None, None, 1 576 decoder_stage2c_conv[0][0]

decoder_stage2c_relu (Activatio (None, None, None, 1 0 decoder_stage2c_bn[0][0]

decoder_stage2_add (Add) (None, None, None, 1 0 decoder_stage2c_relu[0][0]
block3a_expand_activation[0][0]

decoder_stage3a_conv (Conv2D) (None, None, None, 3 5184 decoder_stage2_add[0][0]

decoder_stage3a_bn (BatchNormal (None, None, None, 3 144 decoder_stage3a_conv[0][0]

decoder_stage3a_relu (Activatio (None, None, None, 3 0 decoder_stage3a_bn[0][0]

decoder_stage3_upsampling (UpSa (None, None, None, 3 0 decoder_stage3a_relu[0][0]

decoder_stage3b_conv (Conv2D) (None, None, None, 3 11664 decoder_stage3_upsampling[0][0]

decoder_stage3b_bn (BatchNormal (None, None, None, 3 144 decoder_stage3b_conv[0][0]

decoder_stage3b_relu (Activatio (None, None, None, 3 0 decoder_stage3b_bn[0][0]

decoder_stage3c_conv (Conv2D) (None, None, None, 9 3456 decoder_stage3b_relu[0][0]

decoder_stage3c_bn (BatchNormal (None, None, None, 9 384 decoder_stage3c_conv[0][0]

decoder_stage3c_relu (Activatio (None, None, None, 9 0 decoder_stage3c_bn[0][0]

decoder_stage3_add (Add) (None, None, None, 9 0 decoder_stage3c_relu[0][0]
block2a_expand_activation[0][0]

decoder_stage4a_conv (Conv2D) (None, None, None, 2 2304 decoder_stage3_add[0][0]

decoder_stage4a_bn (BatchNormal (None, None, None, 2 96 decoder_stage4a_conv[0][0]

decoder_stage4a_relu (Activatio (None, None, None, 2 0 decoder_stage4a_bn[0][0]

decoder_stage4_upsampling (UpSa (None, None, None, 2 0 decoder_stage4a_relu[0][0]

decoder_stage4b_conv (Conv2D) (None, None, None, 2 5184 decoder_stage4_upsampling[0][0]

decoder_stage4b_bn (BatchNormal (None, None, None, 2 96 decoder_stage4b_conv[0][0]

decoder_stage4b_relu (Activatio (None, None, None, 2 0 decoder_stage4b_bn[0][0]

decoder_stage4c_conv (Conv2D) (None, None, None, 1 384 decoder_stage4b_relu[0][0]

decoder_stage4c_bn (BatchNormal (None, None, None, 1 64 decoder_stage4c_conv[0][0]

decoder_stage4c_relu (Activatio (None, None, None, 1 0 decoder_stage4c_bn[0][0]

conv2d (Conv2D) (None, None, None, 3 435 decoder_stage4c_relu[0][0]

sigmoid (Activation) (None, None, None, 3 0 conv2d[0][0]

==========

Total params: 6,096,047
Trainable params: 6,049,263
Non-trainable params: 46,784

Model: "model"

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, None, None,	0	
conv1_pad (ZeroPadding2D)	(None, None, None,	1 0	input_1[0][0]
conv1 (Conv2D)	(None, None, None,	3 288	conv1_pad[0][0]
conv1_bn (BatchNormalization)	(None, None, None,	3 128	conv1[0][0]
conv1_relu (ReLU)	(None, None, None,	3 0	conv1_bn[0][0]
conv_dw_1 (DepthwiseConv2D)	(None, None, None,	3 288	conv1_relu[0][0]
conv_dw_1_bn (BatchNormalizatio	(None, None, None,	3 128	conv_dw_1[0][0]
conv_dw_1_relu (ReLU)	(None, None, None,	3 0	conv_dw_1_bn[0][0]
conv_pw_1 (Conv2D)	(None, None, None,	6 2048	conv_dw_1_relu[0][0]
conv_pw_1_bn (BatchNormalizatio	(None, None, None,	6 256	conv_pw_1[0][0]
conv_pw_1_relu (ReLU)	(None, None, None,	6 0	conv_pw_1_bn[0][0]
conv_pad_2 (ZeroPadding2D)	(None, None, None,	6 0	conv_pw_1_relu[0][0]
conv_dw_2 (DepthwiseConv2D)	(None, None, None,	6 576	conv_pad_2[0][0]
conv_dw_2_bn (BatchNormalizatio	(None, None, None,	6 256	conv_dw_2[0][0]
conv_dw_2_relu (ReLU)	(None, None, None,	6 0	conv_dw_2_bn[0][0]
conv_pw_2 (Conv2D)	(None, None, None,	1 8192	conv_dw_2_relu[0][0]
conv_pw_2_bn (BatchNormalizatio	(None, None, None,	1 512	conv_pw_2[0][0]
conv_pw_2_relu (ReLU)	(None, None, None,	1 0	conv_pw_2_bn[0][0]
conv_dw_3 (DepthwiseConv2D)	(None, None, None,	1 1152	conv_pw_2_relu[0][0]
conv_dw_3_bn (BatchNormalizatio	(None, None, None,	1 512	conv_dw_3[0][0]
conv_dw_3_relu (ReLU)	(None, None, None,	1 0	conv_dw_3_bn[0][0]
conv_pw_3 (Conv2D)	(None, None, None,	1 16384	conv_dw_3_relu[0][0]
conv_pw_3_bn (BatchNormalizatio	(None, None, None,	1 512	conv_pw_3[0][0]
conv_pw_3_relu (ReLU)	(None, None, None,	1 0	conv_pw_3_bn[0][0]
conv_pad_4 (ZeroPadding2D)	(None, None, None,	1 0	conv_pw_3_relu[0][0]
conv_dw_4 (DepthwiseConv2D)	(None, None, None,	1 1152	conv_pad_4[0][0]
conv_dw_4_bn (BatchNormalizatio	(None, None, None,	1 512	conv_dw_4[0][0]
conv_dw_4_relu (ReLU)	(None, None, None,	1 0	conv_dw_4_bn[0][0]
conv_pw_4 (Conv2D)	(None, None, None,	2 32768	conv_dw_4_relu[0][0]
conv_pw_4_bn (BatchNormalizatio	(None, None, None,	2 1024	conv_pw_4[0][0]
conv_pw_4_relu (ReLU)	(None, None, None,	2 0	conv_pw_4_bn[0][0]
conv_dw_5 (DepthwiseConv2D)	(None, None, None,	2 2304	conv_pw_4_relu[0][0]
conv_dw_5_bn (BatchNormalizatio	(None, None, None,	2 1024	conv_dw_5[0][0]
conv_dw_5_relu (ReLU)	(None, None, None,	2 0	conv_dw_5_bn[0][0]
conv_pw_5 (Conv2D)	(None, None, None,	2 65536	conv_dw_5_relu[0][0]
conv_pw_5_bn (BatchNormalizatio	(None, None, None,	2 1024	conv_pw_5[0][0]
conv_pw_5_relu (ReLU)	(None, None, None,	2 0	conv_pw_5_bn[0][0]
conv_pad_6 (ZeroPadding2D)	(None, None, None,	2 0	conv_pw_5_relu[0][0]
conv_dw_6 (DepthwiseConv2D)	(None, None, None,	2 2304	conv_pad_6[0][0]
conv_dw_6_bn (BatchNormalizatio	(None, None, None,	2 1024	conv_dw_6[0][0]
conv_dw_6_relu (ReLU)	(None, None, None,	2 0	conv_dw_6_bn[0][0]
conv_pw_6 (Conv2D)	(None, None, None,	5 131072	conv_dw_6_relu[0][0]
conv_pw_6_bn (BatchNormalizatio	(None, None, None,	5 2048	conv_pw_6[0][0]
conv_pw_6_relu (ReLU)	(None, None, None,	5 0	conv_pw_6_bn[0][0]
conv_dw_7 (DepthwiseConv2D)	(None, None, None,	5 4608	conv_pw_6_relu[0][0]
conv_dw_7_bn (BatchNormalizatio	(None, None, None,	5 2048	conv_dw_7[0][0]
conv_dw_7_relu (ReLU)	(None, None, None,	5 0	conv_dw_7_bn[0][0]
conv_pw_7 (Conv2D)	(None, None, None,	5 262144	conv_dw_7_relu[0][0]
conv_pw_7_bn (BatchNormalizatio	(None, None, None,	5 2048	conv_pw_7[0][0]
conv_pw_7_relu (ReLU)	(None, None, None,	5 0	conv_pw_7_bn[0][0]
conv_dw_8 (DepthwiseConv2D)	(None, None, None,	5 4608	conv_pw_7_relu[0][0]
conv_dw_8_bn (BatchNormalizatio	(None, None, None,	5 2048	conv_dw_8[0][0]
conv_dw_8_relu (ReLU)	(None, None, None,	5 0	conv_dw_8_bn[0][0]
conv_pw_8 (Conv2D)	(None, None, None,	5 262144	conv_dw_8_relu[0][0]
conv_pw_8_bn (BatchNormalizatio	(None, None, None,	5 2048	conv_pw_8[0][0]
conv_pw_8_relu (ReLU)	(None, None, None,	5 0	conv_pw_8_bn[0][0]
conv_dw_9 (DepthwiseConv2D)	(None, None, None,	5 4608	conv_pw_8_relu[0][0]
conv_dw_9_bn (BatchNormalizatio	(None, None, None,	5 2048	conv_dw_9[0][0]
conv_dw_9_relu (ReLU)	(None, None, None,	5 0	conv_dw_9_bn[0][0]
conv_pw_9 (Conv2D)	(None, None, None,	5 262144	conv_dw_9_relu[0][0]
conv_pw_9_bn (BatchNormalizatio	(None, None, None,	5 2048	conv_pw_9[0][0]
conv_pw_9_relu (ReLU)	(None, None, None,	5 0	conv_pw_9_bn[0][0]
conv_dw_10 (DepthwiseConv2D)	(None, None, None,	5 4608	conv_pw_9_relu[0][0]
conv_dw_10_bn (BatchNormalizati	(None, None, None,	5 2048	conv_dw_10[0][0]
conv_dw_10_relu (ReLU)	(None, None, None,	5 0	conv_dw_10_bn[0][0]
conv_pw_10 (Conv2D)	(None, None, None,	5 262144	conv_dw_10_relu[0][0]
conv_pw_10_bn (BatchNormalizati	(None, None, None,	5 2048	conv_pw_10[0][0]
conv_pw_10_relu (ReLU)	(None, None, None,	5 0	conv_pw_10_bn[0][0]
conv_dw_11 (DepthwiseConv2D)	(None, None, None,	5 4608	conv_pw_10_relu[0][0]
conv_dw_11_bn (BatchNormalizati	(None, None, None,	5 2048	conv_dw_11[0][0]
conv_dw_11_relu (ReLU)	(None, None, None,	5 0	conv_dw_11_bn[0][0]
conv_pw_11 (Conv2D)	(None, None, None,	5 262144	conv_dw_11_relu[0][0]

loss: 0.0357 - binary_ce_metric: 0.0357 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy
: 0.2780 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class
0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binar
y_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accur
acy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00

```
conv_pw_11_bn (BatchNormalizati (None, None, None, 5 2048        conv_pw_11[0][0]
__________________________________________________________________________________________________
conv_pw_11_relu (ReLU)          (None, None, None, 5 0           conv_pw_11_bn[0][0]
__________________________________________________________________________________________________
conv_pad_12 (ZeroPadding2D)     (None, None, None, 5 0           conv_pw_11_relu[0][0]
__________________________________________________________________________________________________
conv_dw_12 (DepthwiseConv2D)    (None, None, None, 5 4608        conv_pad_12[0][0]
__________________________________________________________________________________________________
conv_dw_12_bn (BatchNormalizati (None, None, None, 5 2048        conv_dw_12[0][0]
__________________________________________________________________________________________________
conv_dw_12_relu (ReLU)          (None, None, None, 5 0           conv_dw_12_bn[0][0]
__________________________________________________________________________________________________
conv_pw_12 (Conv2D)             (None, None, None, 1 524288      conv_dw_12_relu[0][0]
__________________________________________________________________________________________________
conv_pw_12_bn (BatchNormalizati (None, None, None, 1 4096        conv_pw_12[0][0]
__________________________________________________________________________________________________
conv_pw_12_relu (ReLU)          (None, None, None, 1 0           conv_pw_12_bn[0][0]
__________________________________________________________________________________________________
conv_dw_13 (DepthwiseConv2D)    (None, None, None, 1 9216        conv_pw_12_relu[0][0]
__________________________________________________________________________________________________
conv_dw_13_bn (BatchNormalizati (None, None, None, 1 4096        conv_dw_13[0][0]
__________________________________________________________________________________________________
conv_dw_13_relu (ReLU)          (None, None, None, 1 0           conv_dw_13_bn[0][0]
__________________________________________________________________________________________________
conv_pw_13 (Conv2D)             (None, None, None, 1 1048576     conv_dw_13_relu[0][0]
__________________________________________________________________________________________________
conv_pw_13_bn (BatchNormalizati (None, None, None, 1 4096        conv_pw_13[0][0]
__________________________________________________________________________________________________
conv_pw_13_relu (ReLU)          (None, None, None, 1 0           conv_pw_13_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 262144      conv_pw_13_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 2 0           decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0c_conv (Conv2D)   (None, None, None, 5 131072      decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0c_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0c_relu (Activatio (None, None, None, 5 0           decoder_stage0c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_add (Add)        (None, None, None, 5 0           decoder_stage0c_relu[0][0]
conv_pw_11_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 65536       decoder_stage0_add[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 1 0           decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 2 32768       decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 2 1024        decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 2 0           decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 2 0           decoder_stage1c_relu[0][0]
conv_pw_5_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 16384       decoder_stage1_add[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 6 0           decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 1 8192        decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 1 512         decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 1 0           decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 1 0           decoder_stage2c_relu[0][0]
conv_pw_3_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 4096        decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 3 0           decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3c_conv (Conv2D)   (None, None, None, 6 2048        decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3c_bn (BatchNormal (None, None, None, 6 256         decoder_stage3c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3c_relu (Activatio (None, None, None, 6 0           decoder_stage3c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 6 0           decoder_stage3c_relu[0][0]
conv_pw_1_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 1024        decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 1 0           decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 256         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d[0][0]
==================================================================================================
```

Total params: 4,545,779
Trainable params: 4,519,955
Non-trainable params: 25,824

```
mixed10 (Concatenate)          (None, None, None, 2 0          activation_85[0][0]
mixed9_1[0][0]
concatenate_1[0][0]
activation_93[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 5 1048576     mixed10[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 5 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 5 0           decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 5 2359296     decoder_stage0_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 5 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0c_conv (Conv2D)   (None, None, None, 7 393216      decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0c_bn (BatchNormal (None, None, None, 7 3072        decoder_stage0c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0c_relu (Activatio (None, None, None, 7 0           decoder_stage0c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_add (Add)        (None, None, None, 7 0           decoder_stage0c_relu[0][0]
mixed7[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage0_add[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 768         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 1 0           decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 331776      decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 768         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 2 55296       decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 2 1152        decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 2 0           decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 2 0           decoder_stage1c_relu[0][0]
mixed2[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 7 20736       decoder_stage1_add[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 7 288         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 7 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 7 0           decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 7 46656       decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 7 288         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 7 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 1 13824       decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 1 768         decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 1 0           decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 1 0           decoder_stage2c_relu[0][0]
activation_4[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 4 9216        decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 4 192         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 4 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 4 0           decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 4 20736       decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 4 192         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 4 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3c_conv (Conv2D)   (None, None, None, 6 3072        decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3c_bn (BatchNormal (None, None, None, 6 256         decoder_stage3c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3c_relu (Activatio (None, None, None, 6 0           decoder_stage3c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 6 0           decoder_stage3c_relu[0][0]
activation_2[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 1024        decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 1 0           decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 256         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d_94 (Conv2D)              (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d_94[0][0]
==================================================================================================
Total params: 26,268,115
Trainable params: 26,227,667
Non-trainable params: 40,448
```

```
loss: 0.0382 - binary_ce_metric: 0.0382 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy
: 0.0348 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class
0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binar
y_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accur
acy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

```
concatenate_49 (Concatenate)    (None, None, None, 2 0           conv2d_3340[0][0]
                                                                 conv2d_3341[0][0]
                                                                 conv2d_3342[0][0]
                                                                 conv2d_3343[0][0]
                                                                 conv2d_3344[0][0]
                                                                 conv2d_3345[0][0]
                                                                 conv2d_3346[0][0]
                                                                 conv2d_3347[0][0]
                                                                 conv2d_3348[0][0]
                                                                 conv2d_3349[0][0]
                                                                 conv2d_3350[0][0]
                                                                 conv2d_3351[0][0]
                                                                 conv2d_3352[0][0]
                                                                 conv2d_3353[0][0]
                                                                 conv2d_3354[0][0]
                                                                 conv2d_3355[0][0]
                                                                 conv2d_3356[0][0]
                                                                 conv2d_3357[0][0]
                                                                 conv2d_3358[0][0]
                                                                 conv2d_3359[0][0]
                                                                 conv2d_3360[0][0]
                                                                 conv2d_3361[0][0]
                                                                 conv2d_3362[0][0]
                                                                 conv2d_3363[0][0]
                                                                 conv2d_3364[0][0]
                                                                 conv2d_3365[0][0]
                                                                 conv2d_3366[0][0]
                                                                 conv2d_3367[0][0]
                                                                 conv2d_3368[0][0]
                                                                 conv2d_3369[0][0]
                                                                 conv2d_3370[0][0]
                                                                 conv2d_3371[0][0]
                                                                 conv2d_3372[0][0]
                                                                 conv2d_3373[0][0]
                                                                 conv2d_3374[0][0]
                                                                 conv2d_3375[0][0]
                                                                 conv2d_3376[0][0]
                                                                 conv2d_3377[0][0]
                                                                 conv2d_3378[0][0]
                                                                 conv2d_3379[0][0]
                                                                 conv2d_3380[0][0]
                                                                 conv2d_3381[0][0]
                                                                 conv2d_3382[0][0]
                                                                 conv2d_3383[0][0]
                                                                 conv2d_3384[0][0]
                                                                 conv2d_3385[0][0]
                                                                 conv2d_3386[0][0]
                                                                 conv2d_3387[0][0]
                                                                 conv2d_3388[0][0]
                                                                 conv2d_3389[0][0]
                                                                 conv2d_3390[0][0]
                                                                 conv2d_3391[0][0]
                                                                 conv2d_3392[0][0]
                                                                 conv2d_3393[0][0]
                                                                 conv2d_3394[0][0]
                                                                 conv2d_3395[0][0]
                                                                 conv2d_3396[0][0]
                                                                 conv2d_3397[0][0]
                                                                 conv2d_3398[0][0]
                                                                 conv2d_3399[0][0]
                                                                 conv2d_3400[0][0]
                                                                 conv2d_3401[0][0]
                                                                 conv2d_3402[0][0]
                                                                 conv2d_3403[0][0]
__________________________________________________________________________________________________
batch_normalization_155 (BatchN (None, None, None, 2 8192        concatenate_49[0][0]
__________________________________________________________________________________________________
activation_249 (Activation)     (None, None, None, 2 0           batch_normalization_155[0][0]
__________________________________________________________________________________________________
conv2d_3404 (Conv2D)            (None, None, None, 2 4194304     activation_249[0][0]
__________________________________________________________________________________________________
batch_normalization_156 (BatchN (None, None, None, 2 8192        conv2d_3404[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_49 (Gl (None, 2048)         0           batch_normalization_156[0][0]
__________________________________________________________________________________________________
lambda_3249 (Lambda)            (None, 1, 1, 2048)   0           global_average_pooling2d_49[0][0]
__________________________________________________________________________________________________
conv2d_3405 (Conv2D)            (None, 1, 1, 128)    262272      lambda_3249[0][0]
__________________________________________________________________________________________________
activation_250 (Activation)     (None, 1, 1, 128)    0           conv2d_3405[0][0]
__________________________________________________________________________________________________
conv2d_3406 (Conv2D)            (None, 1, 1, 2048)   264192      activation_250[0][0]
__________________________________________________________________________________________________
activation_251 (Activation)     (None, 1, 1, 2048)   0           conv2d_3406[0][0]
```

```
Error: Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in execution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 632, in _call
    return self._stateless_fn(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function._filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError: 2 root error(s) found.
  (0) Resource exhausted:  OOM when allocating tensor with shape[16,512,64,64] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
         [[node model_1/batch_normalization_27/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

         [[metrics/class0_precision/assert_greater_equal/Assert/AssertGuard/pivot_f/_209/_789]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

  (1) Resource exhausted:  OOM when allocating tensor with shape[16,512,64,64] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
         [[node model_1/batch_normalization_27/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

0 successful operations.
0 derived errors ignored. [Op:__inference_distributed_function_308046]

Function call stack:
distributed_function -> distributed_function
```

multiply_49 (Multiply) (None, None, None, 2 0 batch_normalization_156[0][0]
activation_251[0][0]

add_49 (Add) (None, None, None, 2 0 multiply_49[0][0]
activation_247[0][0]

activation_252 (Activation) (None, None, None, 2 0 add_49[0][0]

decoder_stage0a_conv (Conv2D) (None, None, None, 5 1048576 activation_252[0][0]

decoder_stage0a_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0a_conv[0][0]

decoder_stage0a_relu (Activatio (None, None, None, 5 0 decoder_stage0a_bn[0][0]

decoder_stage0_upsampling (UpSa (None, None, None, 5 0 decoder_stage0a_relu[0][0]

decoder_stage0b_conv (Conv2D) (None, None, None, 5 2359296 decoder_stage0_upsampling[0][0]

decoder_stage0b_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0b_conv[0][0]

decoder_stage0b_relu (Activatio (None, None, None, 5 0 decoder_stage0b_bn[0][0]

decoder_stage0c_conv (Conv2D) (None, None, None, 1 524288 decoder_stage0b_relu[0][0]

decoder_stage0c_bn (BatchNormal (None, None, None, 1 4096 decoder_stage0c_conv[0][0]

decoder_stage0c_relu (Activatio (None, None, None, 1 0 decoder_stage0c_bn[0][0]

decoder_stage0_add (Add) (None, None, None, 1 0 decoder_stage0c_relu[0][0]
activation_237[0][0]

decoder_stage1a_conv (Conv2D) (None, None, None, 2 262144 decoder_stage0_add[0][0]

decoder_stage1a_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1a_conv[0][0]

decoder_stage1a_relu (Activatio (None, None, None, 2 0 decoder_stage1a_bn[0][0]

decoder_stage1_upsampling (UpSa (None, None, None, 2 0 decoder_stage1a_relu[0][0]

decoder_stage1b_conv (Conv2D) (None, None, None, 2 589824 decoder_stage1_upsampling[0][0]

decoder_stage1b_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1b_conv[0][0]

decoder_stage1b_relu (Activatio (None, None, None, 2 0 decoder_stage1b_bn[0][0]

decoder_stage1c_conv (Conv2D) (None, None, None, 5 131072 decoder_stage1b_relu[0][0]

decoder_stage1c_bn (BatchNormal (None, None, None, 5 2048 decoder_stage1c_conv[0][0]

decoder_stage1c_relu (Activatio (None, None, None, 5 0 decoder_stage1c_bn[0][0]

decoder_stage1_add (Add) (None, None, None, 5 0 decoder_stage1c_relu[0][0]
activation_57[0][0]

decoder_stage2a_conv (Conv2D) (None, None, None, 1 65536 decoder_stage1_add[0][0]

decoder_stage2a_bn (BatchNormal (None, None, None, 1 512 decoder_stage2a_conv[0][0]

decoder_stage2a_relu (Activatio (None, None, None, 1 0 decoder_stage2a_bn[0][0]

decoder_stage2_upsampling (UpSa (None, None, None, 1 0 decoder_stage2a_relu[0][0]

decoder_stage2b_conv (Conv2D) (None, None, None, 1 147456 decoder_stage2_upsampling[0][0]

decoder_stage2b_bn (BatchNormal (None, None, None, 1 512 decoder_stage2b_conv[0][0]

decoder_stage2b_relu (Activatio (None, None, None, 1 0 decoder_stage2b_bn[0][0]

decoder_stage2c_conv (Conv2D) (None, None, None, 2 32768 decoder_stage2b_relu[0][0]

decoder_stage2c_bn (BatchNormal (None, None, None, 2 1024 decoder_stage2c_conv[0][0]

decoder_stage2c_relu (Activatio (None, None, None, 2 0 decoder_stage2c_bn[0][0]

decoder_stage2_add (Add) (None, None, None, 2 0 decoder_stage2c_relu[0][0]
activation_17[0][0]

decoder_stage3a_conv (Conv2D) (None, None, None, 6 16384 decoder_stage2_add[0][0]

decoder_stage3a_bn (BatchNormal (None, None, None, 6 256 decoder_stage3a_conv[0][0]

decoder_stage3a_relu (Activatio (None, None, None, 6 0 decoder_stage3a_bn[0][0]

decoder_stage3_upsampling (UpSa (None, None, None, 6 0 decoder_stage3a_relu[0][0]

decoder_stage3b_conv (Conv2D) (None, None, None, 6 36864 decoder_stage3_upsampling[0][0]

decoder_stage3b_bn (BatchNormal (None, None, None, 6 256 decoder_stage3b_conv[0][0]

decoder_stage3b_relu (Activatio (None, None, None, 6 0 decoder_stage3b_bn[0][0]

decoder_stage3_add (Add) (None, None, None, 1 0 decoder_stage3c_relu[0][0]
activation_2[0][0]

decoder_stage4a_conv (Conv2D) (None, None, None, 3 4096 decoder_stage3_add[0][0]

decoder_stage4a_bn (BatchNormal (None, None, None, 3 128 decoder_stage4a_conv[0][0]

decoder_stage4a_relu (Activatio (None, None, None, 3 0 decoder_stage4a_bn[0][0]

decoder_stage4_upsampling (UpSa (None, None, None, 3 0 decoder_stage4a_relu[0][0]

decoder_stage4b_conv (Conv2D) (None, None, None, 3 9216 decoder_stage4_upsampling[0][0]

decoder_stage4b_bn (BatchNormal (None, None, None, 3 128 decoder_stage4b_conv[0][0]

decoder_stage4b_relu (Activatio (None, None, None, 3 0 decoder_stage4b_bn[0][0]

decoder_stage4c_conv (Conv2D) (None, None, None, 1 512 decoder_stage4b_relu[0][0]

decoder_stage4c_bn (BatchNormal (None, None, None, 1 64 decoder_stage4c_conv[0][0]

decoder_stage4c_relu (Activatio (None, None, None, 1 0 decoder_stage4c_bn[0][0]

```
conv2d_3407 (Conv2D)            (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d_3407[0][0]
==================================================================================================
Total params: 118,538,723
Trainable params: 118,283,331
Non-trainable params: 255,392
__________________________________________________________________________________________________
```

```
Error: Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in execution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 632, in _call
    return self._stateless_fn(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function._filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError: 2 root error(s) found.
  (0) Resource exhausted:  OOM when allocating tensor with shape[16,256,128,128] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
         [[node model_1/decoder_stage2_add/add (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

         [[metrics/f1_score/PartitionedFunctionCall/assert_less_equal/Assert/AssertGuard/pivot_f/_645/_255]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

  (1) Resource exhausted:  OOM when allocating tensor with shape[16,256,128,128] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
         [[node model_1/decoder_stage2_add/add (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

0 successful operations.
0 derived errors ignored. [Op:__inference_distributed_function_71881]

Function call stack:
distributed_function -> distributed_function

2020-10-21 04:41:46.698426: W tensorflow/core/kernels/data/generator_dataset_op.cc:103] Error occurred when finalizing GeneratorDataset iterator: Cancelled: Operation was cancelled
bbarbour@bbarbour-necstlab-0:~/necstlab-damage-segmentation$
```

```
concatenate_15 (Concatenate)    (None, None, None, 1 0           conv2d_546[0][0]
                                                                 conv2d_547[0][0]
                                                                 conv2d_548[0][0]
                                                                 conv2d_549[0][0]
                                                                 conv2d_550[0][0]
                                                                 conv2d_551[0][0]
                                                                 conv2d_552[0][0]
                                                                 conv2d_553[0][0]
                                                                 conv2d_554[0][0]
                                                                 conv2d_555[0][0]
                                                                 conv2d_556[0][0]
                                                                 conv2d_557[0][0]
                                                                 conv2d_558[0][0]
                                                                 conv2d_559[0][0]
                                                                 conv2d_560[0][0]
                                                                 conv2d_561[0][0]
                                                                 conv2d_562[0][0]
                                                                 conv2d_563[0][0]
                                                                 conv2d_564[0][0]
                                                                 conv2d_565[0][0]
                                                                 conv2d_566[0][0]
                                                                 conv2d_567[0][0]
                                                                 conv2d_568[0][0]
                                                                 conv2d_569[0][0]
                                                                 conv2d_570[0][0]
                                                                 conv2d_571[0][0]
                                                                 conv2d_572[0][0]
                                                                 conv2d_573[0][0]
                                                                 conv2d_574[0][0]
                                                                 conv2d_575[0][0]
                                                                 conv2d_576[0][0]
                                                                 conv2d_577[0][0]
__________________________________________________________________________________________________
batch_normalization_51 (BatchNo (None, None, None, 1 4096        concatenate_15[0][0]
__________________________________________________________________________________________________
activation_77 (Activation)      (None, None, None, 1 0           batch_normalization_51[0][0]
__________________________________________________________________________________________________
conv2d_578 (Conv2D)             (None, None, None, 2 2097152     activation_77[0][0]
__________________________________________________________________________________________________
batch_normalization_52 (BatchNo (None, None, None, 2 8192        conv2d_578[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_15 (Gl (None, 2048)         0           batch_normalization_52[0][0]
__________________________________________________________________________________________________
lambda_527 (Lambda)             (None, 1, 1, 2048)   0           global_average_pooling2d_15[0][0]
__________________________________________________________________________________________________
conv2d_579 (Conv2D)             (None, 1, 1, 128)    262272      lambda_527[0][0]
__________________________________________________________________________________________________
activation_78 (Activation)      (None, 1, 1, 128)    0           conv2d_579[0][0]
__________________________________________________________________________________________________
conv2d_578 (Conv2D)             (None, None, None, 2 2097152     activation_77[0][0]
__________________________________________________________________________________________________
batch_normalization_52 (BatchNo (None, None, None, 2 8192        conv2d_578[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_15 (Gl (None, 2048)         0           batch_normalization_52[0][0]
__________________________________________________________________________________________________
lambda_527 (Lambda)             (None, 1, 1, 2048)   0           global_average_pooling2d_15[0][0]
__________________________________________________________________________________________________
conv2d_579 (Conv2D)             (None, 1, 1, 128)    262272      lambda_527[0][0]
__________________________________________________________________________________________________
activation_78 (Activation)      (None, 1, 1, 128)    0           conv2d_579[0][0]
__________________________________________________________________________________________________
conv2d_580 (Conv2D)             (None, 1, 1, 2048)   264192      activation_78[0][0]
__________________________________________________________________________________________________
activation_79 (Activation)      (None, 1, 1, 2048)   0           conv2d_580[0][0]
__________________________________________________________________________________________________
multiply_15 (Multiply)          (None, None, None, 2 0           batch_normalization_52[0][0]
                                                                 activation_79[0][0]
__________________________________________________________________________________________________
add_15 (Add)                    (None, None, None, 2 0           multiply_15[0][0]
                                                                 activation_75[0][0]
__________________________________________________________________________________________________
activation_80 (Activation)      (None, None, None, 2 0           add_15[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 5 1048576     activation_80[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 5 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 5 0           decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 5 2359296     decoder_stage0_upsampling[0][0]
```

decoder_stage0b_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0b_conv[0][0]

decoder_stage0b_relu (Activatio (None, None, None, 5 0 decoder_stage0b_bn[0][0]

decoder_stage0c_conv (Conv2D) (None, None, None, 1 524288 decoder_stage0b_relu[0][0]

decoder_stage0c_bn (BatchNormal (None, None, None, 1 4096 decoder_stage0c_conv[0][0]

decoder_stage0c_relu (Activatio (None, None, None, 1 0 decoder_stage0c_bn[0][0]

decoder_stage0_add (Add) (None, None, None, 1 0 decoder_stage0c_relu[0][0]
activation_65[0][0]

decoder_stage1a_conv (Conv2D) (None, None, None, 2 262144 decoder_stage0_add[0][0]

decoder_stage1a_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1a_conv[0][0]

decoder_stage1a_relu (Activatio (None, None, None, 2 0 decoder_stage1a_bn[0][0]

decoder_stage1_upsampling (UpSa (None, None, None, 2 0 decoder_stage1a_relu[0][0]

decoder_stage1b_conv (Conv2D) (None, None, None, 2 589824 decoder_stage1_upsampling[0][0]

decoder_stage1b_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1b_conv[0][0]

decoder_stage1b_relu (Activatio (None, None, None, 2 0 decoder_stage1b_bn[0][0]

decoder_stage1c_conv (Conv2D) (None, None, None, 5 131072 decoder_stage1b_relu[0][0]

decoder_stage1c_bn (BatchNormal (None, None, None, 5 2048 decoder_stage1c_conv[0][0]

decoder_stage1c_relu (Activatio (None, None, None, 5 0 decoder_stage1c_bn[0][0]

decoder_stage1_add (Add) (None, None, None, 5 0 decoder_stage1c_relu[0][0]
activation_35[0][0]

decoder_stage2a_conv (Conv2D) (None, None, None, 1 65536 decoder_stage1_add[0][0]

decoder_stage2a_bn (BatchNormal (None, None, None, 1 512 decoder_stage2a_conv[0][0]

decoder_stage2a_relu (Activatio (None, None, None, 1 0 decoder_stage2a_bn[0][0]

decoder_stage2_upsampling (UpSa (None, None, None, 1 0 decoder_stage2a_relu[0][0]

decoder_stage2b_conv (Conv2D) (None, None, None, 1 147456 decoder_stage2_upsampling[0][0]

decoder_stage2b_bn (BatchNormal (None, None, None, 1 512 decoder_stage2b_conv[0][0]

decoder_stage2b_relu (Activatio (None, None, None, 1 0 decoder_stage2b_bn[0][0]

decoder_stage2c_conv (Conv2D) (None, None, None, 2 32768 decoder_stage2b_relu[0][0]

decoder_stage2c_bn (BatchNormal (None, None, None, 2 1024 decoder_stage2c_conv[0][0]

decoder_stage2c_relu (Activatio (None, None, None, 2 0 decoder_stage2c_bn[0][0]

decoder_stage2_add (Add) (None, None, None, 2 0 decoder_stage2c_relu[0][0]
activation_15[0][0]

decoder_stage3a_conv (Conv2D) (None, None, None, 6 16384 decoder_stage2_add[0][0]

decoder_stage3a_bn (BatchNormal (None, None, None, 6 256 decoder_stage3a_conv[0][0]

decoder_stage3a_relu (Activatio (None, None, None, 6 0 decoder_stage3a_bn[0][0]

decoder_stage3_upsampling (UpSa (None, None, None, 6 0 decoder_stage3a_relu[0][0]

decoder_stage3b_conv (Conv2D) (None, None, None, 6 36864 decoder_stage3_upsampling[0][0]

decoder_stage3b_bn (BatchNormal (None, None, None, 6 256 decoder_stage3b_conv[0][0]

decoder_stage3b_relu (Activatio (None, None, None, 6 0 decoder_stage3b_bn[0][0]

decoder_stage3c_conv (Conv2D) (None, None, None, 6 4096 decoder_stage3b_relu[0][0]

decoder_stage3c_bn (BatchNormal (None, None, None, 6 256 decoder_stage3c_conv[0][0]

decoder_stage3c_relu (Activatio (None, None, None, 6 0 decoder_stage3c_bn[0][0]

decoder_stage3_add (Add) (None, None, None, 6 0 decoder_stage3c_relu[0][0]
activation[0][0]

decoder_stage4a_conv (Conv2D) (None, None, None, 1 1024 decoder_stage3_add[0][0]

decoder_stage4a_bn (BatchNormal (None, None, None, 1 64 decoder_stage4a_conv[0][0]

decoder_stage4a_relu (Activatio (None, None, None, 1 0 decoder_stage4a_bn[0][0]

decoder_stage4_upsampling (UpSa (None, None, None, 1 0 decoder_stage4a_relu[0][0]

decoder_stage4b_conv (Conv2D) (None, None, None, 1 2304 decoder_stage4_upsampling[0][0]

decoder_stage4b_bn (BatchNormal (None, None, None, 1 64 decoder_stage4b_conv[0][0]

decoder_stage4b_relu (Activatio (None, None, None, 1 0 decoder_stage4b_bn[0][0]

decoder_stage4c_conv (Conv2D) (None, None, None, 1 256 decoder_stage4b_relu[0][0]

decoder_stage4c_bn (BatchNormal (None, None, None, 1 64 decoder_stage4c_conv[0][0]

decoder_stage4c_relu (Activatio (None, None, None, 1 0 decoder_stage4c_bn[0][0]

conv2d_581 (Conv2D) (None, None, None, 3 435 decoder_stage4c_relu[0][0]

sigmoid (Activation) (None, None, None, 3 0 conv2d_581[0][0]

==========

Total params: 30,810,467
Trainable params: 30,734,595
Non-trainable params: 75,872

concatenate_15 (Concatenate) (None, None, None, 1 0 conv2d_480[0][0]

```
Error: Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_
epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in exe
cution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 632, in _call
    return self._stateless_fn(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function.__filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError: 2 root error(s) found.
  (0) Resource exhausted:  OOM when allocating tensor with shape[16,16,256,256] and type float on /job:localhost/replica:0/task:0/d$
vice:GPU:0 by allocator GPU_0_bfc
         [[node model_1/decoder_stage4a_conv/Conv2D (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for cur$
ent allocation info.        [[metrics/class1_binary_accuracy_1/keras/PartitionedFunctionCall/assert_less_equal/Assert/AssertGuard/pivot_f/_849/_131]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

  (1) Resource exhausted:  OOM when allocating tensor with shape[16,16,256,256] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
         [[node model_1/decoder_stage4a_conv/Conv2D (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

0 successful operations.
0 derived errors ignored. [Op:__inference_distributed_function_67515]

Function call stack:
distributed_function -> distributed_function

2020-10-21 04:27:48.506435: W tensorflow/core/kernels/data/generator_dataset_op.cc:103] Error occurred when finalizing GeneratorDataset iterator: Cancelled: Operation was cancelled
```

conv2d_481[0][0]
conv2d_482[0][0]
conv2d_483[0][0]
conv2d_484[0][0]
conv2d_485[0][0]
conv2d_486[0][0]
conv2d_487[0][0]
conv2d_488[0][0]
conv2d_489[0][0]
conv2d_490[0][0]
conv2d_491[0][0]
conv2d_492[0][0]
conv2d_493[0][0]
conv2d_494[0][0]
conv2d_495[0][0]
conv2d_496[0][0]
conv2d_497[0][0]
conv2d_498[0][0]
conv2d_499[0][0]
conv2d_500[0][0]
conv2d_501[0][0]
conv2d_502[0][0]
conv2d_503[0][0]
conv2d_504[0][0]
conv2d_505[0][0]
conv2d_506[0][0]
conv2d_507[0][0]
conv2d_508[0][0]
conv2d_509[0][0]
conv2d_510[0][0]
conv2d_511[0][0]

---

stage4_unit3_bn2 (BatchNormaliz (None, None, None, 1 4096 concatenate_15[0][0]

---

stage4_unit3_relu2 (Activation) (None, None, None, 1 0 stage4_unit3_bn2[0][0]

---

stage4_unit3_conv3 (Conv2D) (None, None, None, 2 2097152 stage4_unit3_relu2[0][0]

---

stage4_unit3_bn3 (BatchNormaliz (None, None, None, 2 8192 stage4_unit3_conv3[0][0]

---

add_15 (Add) (None, None, None, 2 0 stage4_unit3_bn3[0][0]
stage4_unit2_relu[0][0]

---

stage4_unit3_relu (Activation) (None, None, None, 2 0 add_15[0][0]

---

decoder_stage0a_conv (Conv2D) (None, None, None, 5 1048576 stage4_unit3_relu[0][0]

---

decoder_stage0a_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0a_conv[0][0]

---

decoder_stage0a_relu (Activatio (None, None, None, 5 0 decoder_stage0a_bn[0][0]

---

decoder_stage0_upsampling (UpSa (None, None, None, 5 0 decoder_stage0a_relu[0][0]

---

decoder_stage0b_conv (Conv2D) (None, None, None, 5 2359296 decoder_stage0_upsampling[0][0]

---

decoder_stage0b_bn (BatchNormal (None, None, None, 5 2048 decoder_stage0b_conv[0][0]

---

decoder_stage0b_relu (Activatio (None, None, None, 5 0 decoder_stage0b_bn[0][0]

---

decoder_stage0c_conv (Conv2D) (None, None, None, 1 524288 decoder_stage0b_relu[0][0]

---

decoder_stage0c_bn (BatchNormal (None, None, None, 1 4096 decoder_stage0c_conv[0][0]

---

decoder_stage0c_relu (Activatio (None, None, None, 1 0 decoder_stage0c_bn[0][0]

---

decoder_stage0_add (Add) (None, None, None, 1 0 decoder_stage0c_relu[0][0]
stage4_unit1_relu1[0][0]

---

decoder_stage1a_conv (Conv2D) (None, None, None, 2 262144 decoder_stage0_add[0][0]

---

decoder_stage1a_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1a_conv[0][0]

---

decoder_stage1a_relu (Activatio (None, None, None, 2 0 decoder_stage1a_bn[0][0]

---

decoder_stage1_upsampling (UpSa (None, None, None, 2 0 decoder_stage1a_relu[0][0]

---

decoder_stage1b_conv (Conv2D) (None, None, None, 2 589824 decoder_stage1_upsampling[0][0]

---

decoder_stage1b_bn (BatchNormal (None, None, None, 2 1024 decoder_stage1b_conv[0][0]

```
decoder_stage1b_relu (Activatio (None, None, None, 2 0          decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 5 131072      decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 5 2048        decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 5 0          decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 5 0          decoder_stage1c_relu[0][0]
stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 1 65536       decoder_stage1_add[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 1 512         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 1 0          decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0          decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 1 512         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 1 0          decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 2 32768       decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 2 1024        decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 2 0          decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 2 0          decoder_stage2c_relu[0][0]
stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 6 16384       decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 6 256         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 6 0          decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0          decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 6 256         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 6 0          decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3c_conv (Conv2D)   (None, None, None, 6 4096        decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3c_bn (BatchNormal (None, None, None, 6 256         decoder_stage3c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3c_relu (Activatio (None, None, None, 6 0          decoder_stage3c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 6 0          decoder_stage3c_relu[0][0]
relu0[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 1024        decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0          decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 1 0          decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0          decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 256         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0          decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d_512 (Conv2D)             (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d_512[0][0]
==================================================================================================
Total params: 28,279,478
Trainable params: 28,203,604
Non-trainable params: 75,874
__________________________________________________________________________________________________
```

```
Model: "model_1"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
data (InputLayer)               [(None, None, None,  0
__________________________________________________________________________________________________
bn_data (BatchNormalization)    (None, None, None, 1 3           data[0][0]
__________________________________________________________________________________________________
zero_padding2d (ZeroPadding2D)  (None, None, None, 1 0           bn_data[0][0]
__________________________________________________________________________________________________
conv0 (Conv2D)                  (None, None, None, 6 3136        zero_padding2d[0][0]
__________________________________________________________________________________________________
bn0 (BatchNormalization)        (None, None, None, 6 256         conv0[0][0]
__________________________________________________________________________________________________
relu0 (Activation)              (None, None, None, 6 0           bn0[0][0]
__________________________________________________________________________________________________
zero_padding2d_1 (ZeroPadding2D (None, None, None, 6 0           relu0[0][0]
__________________________________________________________________________________________________
pooling0 (MaxPooling2D)         (None, None, None, 6 0           zero_padding2d_1[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         pooling0[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu1 (Activation) (None, None, None, 6 0           stage1_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_2 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_2[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu2 (Activation) (None, None, None, 6 0           stage1_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_3 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_3[0][0]
__________________________________________________________________________________________________
global_average_pooling2d (Globa (None, 64)           0           stage1_unit1_conv2[0][0]
__________________________________________________________________________________________________
lambda (Lambda)                 (None, 1, 1, 64)     0           global_average_pooling2d[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, 1, 1, 4)      260         lambda[0][0]
__________________________________________________________________________________________________
activation (Activation)         (None, 1, 1, 4)      0           conv2d[0][0]
__________________________________________________________________________________________________
conv2d_1 (Conv2D)               (None, 1, 1, 64)     320         activation[0][0]
__________________________________________________________________________________________________
activation_1 (Activation)       (None, 1, 1, 64)     0           conv2d_1[0][0]
__________________________________________________________________________________________________
multiply (Multiply)             (None, None, None, 6 0           stage1_unit1_conv2[0][0]
                                                                 activation_1[0][0]
__________________________________________________________________________________________________
stage1_unit1_sc (Conv2D)        (None, None, None, 6 4096        stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
add (Add)                       (None, None, None, 6 0           multiply[0][0]
                                                                 stage1_unit1_sc[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn1 (BatchNormaliz (None, None, None, 6 256         add[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu1 (Activation) (None, None, None, 6 0           stage1_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_4 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_4[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu2 (Activation) (None, None, None, 6 0           stage1_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_5 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_5[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_1 (Glo (None, 64)           0           stage1_unit2_conv2[0][0]
__________________________________________________________________________________________________
lambda_1 (Lambda)               (None, 1, 1, 64)     0           global_average_pooling2d_1[0][0]
__________________________________________________________________________________________________
conv2d_2 (Conv2D)               (None, 1, 1, 4)      260         lambda_1[0][0]
__________________________________________________________________________________________________
activation_2 (Activation)       (None, 1, 1, 4)      0           conv2d_2[0][0]
__________________________________________________________________________________________________
conv2d_3 (Conv2D)               (None, 1, 1, 64)     320         activation_2[0][0]
__________________________________________________________________________________________________
activation_3 (Activation)       (None, 1, 1, 64)     0           conv2d_3[0][0]
__________________________________________________________________________________________________
multiply_1 (Multiply)           (None, None, None, 6 0           stage1_unit2_conv2[0][0]
                                                                 activation_3[0][0]
__________________________________________________________________________________________________
add_1 (Add)                     (None, None, None, 6 0           multiply_1[0][0]
                                                                 add[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         add_1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu1 (Activation) (None, None, None, 6 0           stage2_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_6 (ZeroPadding2D (None, None, None, 6 0           stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv1 (Conv2D)     (None, None, None, 1 73728       zero_padding2d_6[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn2 (BatchNormaliz (None, None, None, 1 512         stage2_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu2 (Activation) (None, None, None, 1 0           stage2_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_7 (ZeroPadding2D (None, None, None, 1 0           stage2_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv2 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_7[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_2 (Glo (None, 128)          0           stage2_unit1_conv2[0][0]
__________________________________________________________________________________________________
lambda_2 (Lambda)               (None, 1, 1, 128)    0           global_average_pooling2d_2[0][0]
```

```
loss: 0.1105 - binary_ce_metric: 0.1105 - accuracy: 0.0000e+00 - class_all_bi
nary_accuracy_tfkeras: 0.9998 - class_all_binary_accuracy_sm: 0.9998 - binary_accuracy: 0.9998 - categorical_accuracy: 0.0040 - fals
e_neg: 8324.0000 - true_neg: 75484952.0000 - false_pos: 4198.0000 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+0
0 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class0_binary_accuracy_sm: 0.9999 - cla
ss0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - cl
ass0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfker
as: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 -
class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accuracy_sm: 0.9997 - class2_binary_accuracy_tfkeras: 0.9997 - class2_iou_s
core: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

conv2d_4 (Conv2D) (None, 1, 1, 8) 1032 lambda_2[0][0]

activation_4 (Activation) (None, 1, 1, 8) 0 conv2d_4[0][0]

conv2d_5 (Conv2D) (None, 1, 1, 128) 1152 activation_4[0][0]

activation_5 (Activation) (None, 1, 1, 128) 0 conv2d_5[0][0]

multiply_2 (Multiply) (None, None, None, 1 0 stage2_unit1_conv2[0][0]
activation_5[0][0]

stage2_unit1_sc (Conv2D) (None, None, None, 1 8192 stage2_unit1_relu1[0][0]

add_2 (Add) (None, None, None, 1 0 multiply_2[0][0]
stage2_unit1_sc[0][0]

stage2_unit2_bn1 (BatchNormaliz (None, None, None, 1 512 add_2[0][0]

stage2_unit2_relu1 (Activation) (None, None, None, 1 0 stage2_unit2_bn1[0][0]

zero_padding2d_8 (ZeroPadding2D (None, None, None, 1 0 stage2_unit2_relu1[0][0]

stage2_unit2_conv1 (Conv2D) (None, None, None, 1 147456 zero_padding2d_8[0][0]

stage2_unit2_bn2 (BatchNormaliz (None, None, None, 1 512 stage2_unit2_conv1[0][0]

stage2_unit2_relu2 (Activation) (None, None, None, 1 0 stage2_unit2_bn2[0][0]

zero_padding2d_9 (ZeroPadding2D (None, None, None, 1 0 stage2_unit2_relu2[0][0]

stage2_unit2_conv2 (Conv2D) (None, None, None, 1 147456 zero_padding2d_9[0][0]

global_average_pooling2d_3 (Glo (None, 128) 0 stage2_unit2_conv2[0][0]

lambda_3 (Lambda) (None, 1, 1, 128) 0 global_average_pooling2d_3[0][0]

conv2d_6 (Conv2D) (None, 1, 1, 8) 1032 lambda_3[0][0]

activation_6 (Activation) (None, 1, 1, 8) 0 conv2d_6[0][0]

conv2d_7 (Conv2D) (None, 1, 1, 128) 1152 activation_6[0][0]

activation_7 (Activation) (None, 1, 1, 128) 0 conv2d_7[0][0]

multiply_3 (Multiply) (None, None, None, 1 0 stage2_unit2_conv2[0][0]
activation_7[0][0]

add_3 (Add) (None, None, None, 1 0 multiply_3[0][0]
add_2[0][0]

stage3_unit1_bn1 (BatchNormaliz (None, None, None, 1 512 add_3[0][0]

stage3_unit1_relu1 (Activation) (None, None, None, 1 0 stage3_unit1_bn1[0][0]

zero_padding2d_10 (ZeroPadding2 (None, None, None, 1 0 stage3_unit1_relu1[0][0]

stage3_unit1_conv1 (Conv2D) (None, None, None, 2 294912 zero_padding2d_10[0][0]

stage3_unit1_bn2 (BatchNormaliz (None, None, None, 2 1024 stage3_unit1_conv1[0][0]

stage3_unit1_relu2 (Activation) (None, None, None, 2 0 stage3_unit1_bn2[0][0]

zero_padding2d_11 (ZeroPadding2 (None, None, None, 2 0 stage3_unit1_relu2[0][0]

stage3_unit1_conv2 (Conv2D) (None, None, None, 2 589824 zero_padding2d_11[0][0]

global_average_pooling2d_4 (Glo (None, 256) 0 stage3_unit1_conv2[0][0]

lambda_4 (Lambda) (None, 1, 1, 256) 0 global_average_pooling2d_4[0][0]

conv2d_8 (Conv2D) (None, 1, 1, 16) 4112 lambda_4[0][0]

activation_8 (Activation) (None, 1, 1, 16) 0 conv2d_8[0][0]

conv2d_9 (Conv2D) (None, 1, 1, 256) 4352 activation_8[0][0]

activation_9 (Activation) (None, 1, 1, 256) 0 conv2d_9[0][0]

multiply_4 (Multiply) (None, None, None, 2 0 stage3_unit1_conv2[0][0]
activation_9[0][0]

stage3_unit1_sc (Conv2D) (None, None, None, 2 32768 stage3_unit1_relu1[0][0]

add_4 (Add) (None, None, None, 2 0 multiply_4[0][0]
stage3_unit1_sc[0][0]

stage3_unit2_bn1 (BatchNormaliz (None, None, None, 2 1024 add_4[0][0]

stage3_unit2_relu1 (Activation) (None, None, None, 2 0 stage3_unit2_bn1[0][0]

zero_padding2d_12 (ZeroPadding2 (None, None, None, 2 0 stage3_unit2_relu1[0][0]

stage3_unit2_conv1 (Conv2D) (None, None, None, 2 589824 zero_padding2d_12[0][0]

stage3_unit2_bn2 (BatchNormaliz (None, None, None, 2 1024 stage3_unit2_conv1[0][0]

stage3_unit2_relu2 (Activation) (None, None, None, 2 0 stage3_unit2_bn2[0][0]

zero_padding2d_13 (ZeroPadding2 (None, None, None, 2 0 stage3_unit2_relu2[0][0]

stage3_unit2_conv2 (Conv2D) (None, None, None, 2 589824 zero_padding2d_13[0][0]

global_average_pooling2d_5 (Glo (None, 256) 0 stage3_unit2_conv2[0][0]

lambda_5 (Lambda) (None, 1, 1, 256) 0 global_average_pooling2d_5[0][0]

conv2d_10 (Conv2D) (None, 1, 1, 16) 4112 lambda_5[0][0]

activation_10 (Activation) (None, 1, 1, 16) 0 conv2d_10[0][0]

conv2d_11 (Conv2D) (None, 1, 1, 256) 4352 activation_10[0][0]

activation_11 (Activation) (None, 1, 1, 256) 0 conv2d_11[0][0]

multiply_5 (Multiply) (None, None, None, 2 0 stage3_unit2_conv2[0][0]
activation_11[0][0]

add_5 (Add) (None, None, None, 2 0 multiply_5[0][0]
add_4[0][0]

stage4_unit1_bn1 (BatchNormaliz (None, None, None, 2 1024 add_5[0][0]

stage4_unit1_relu1 (Activation) (None, None, None, 2 0 stage4_unit1_bn1[0][0]

zero_padding2d_14 (ZeroPadding2 (None, None, None, 2 0 stage4_unit1_relu1[0][0]

stage4_unit1_conv1 (Conv2D) (None, None, None, 5 1179648 zero_padding2d_14[0][0]

stage4_unit1_bn2 (BatchNormaliz (None, None, None, 5 2048 stage4_unit1_conv1[0][0]

stage4_unit1_relu2 (Activation) (None, None, None, 5 0 stage4_unit1_bn2[0][0]

zero_padding2d_15 (ZeroPadding2 (None, None, None, 5 0 stage4_unit1_relu2[0][0]

stage4_unit1_conv2 (Conv2D) (None, None, None, 5 2359296 zero_padding2d_15[0][0]

global_average_pooling2d_6 (Glo (None, 512) 0 stage4_unit1_conv2[0][0]

lambda_6 (Lambda) (None, 1, 1, 512) 0 global_average_pooling2d_6[0][0]

conv2d_12 (Conv2D) (None, 1, 1, 32) 16416 lambda_6[0][0]

activation_12 (Activation) (None, 1, 1, 32) 0 conv2d_12[0][0]

conv2d_13 (Conv2D) (None, 1, 1, 512) 16896 activation_12[0][0]

activation_13 (Activation) (None, 1, 1, 512) 0 conv2d_13[0][0]

multiply_6 (Multiply) (None, None, None, 5 0 stage4_unit1_conv2[0][0]
activation_13[0][0]

stage4_unit1_sc (Conv2D) (None, None, None, 5 131072 stage4_unit1_relu1[0][0]

add_6 (Add) (None, None, None, 5 0 multiply_6[0][0]
stage4_unit1_sc[0][0]

stage4_unit2_bn1 (BatchNormaliz (None, None, None, 5 2048 add_6[0][0]

stage4_unit2_relu1 (Activation) (None, None, None, 5 0 stage4_unit2_bn1[0][0]

zero_padding2d_16 (ZeroPadding2 (None, None, None, 5 0 stage4_unit2_relu1[0][0]

stage4_unit2_conv1 (Conv2D) (None, None, None, 5 2359296 zero_padding2d_16[0][0]

stage4_unit2_bn2 (BatchNormaliz (None, None, None, 5 2048 stage4_unit2_conv1[0][0]

stage4_unit2_relu2 (Activation) (None, None, None, 5 0 stage4_unit2_bn2[0][0]

zero_padding2d_17 (ZeroPadding2 (None, None, None, 5 0 stage4_unit2_relu2[0][0]

stage4_unit2_conv2 (Conv2D) (None, None, None, 5 2359296 zero_padding2d_17[0][0]

global_average_pooling2d_7 (Glo (None, 512) 0 stage4_unit2_conv2[0][0]

lambda_7 (Lambda) (None, 1, 1, 512) 0 global_average_pooling2d_7[0][0]

conv2d_14 (Conv2D) (None, 1, 1, 32) 16416 lambda_7[0][0]

activation_14 (Activation) (None, 1, 1, 32) 0 conv2d_14[0][0]

conv2d_15 (Conv2D) (None, 1, 1, 512) 16896 activation_14[0][0]

activation_15 (Activation) (None, 1, 1, 512) 0 conv2d_15[0][0]

multiply_7 (Multiply) (None, None, None, 5 0 stage4_unit2_conv2[0][0]
activation_15[0][0]

add_7 (Add) (None, None, None, 5 0 multiply_7[0][0]
add_6[0][0]

bn1 (BatchNormalization) (None, None, None, 5 2048 add_7[0][0]

relu1 (Activation) (None, None, None, 5 0 bn1[0][0]

decoder_stage0a_conv (Conv2D) (None, None, None, 1 65536 relu1[0][0]

decoder_stage0a_bn (BatchNormal (None, None, None, 1 512 decoder_stage0a_conv[0][0]

decoder_stage0a_relu (Activatio (None, None, None, 1 0 decoder_stage0a_bn[0][0]

decoder_stage0_upsampling (UpSa (None, None, None, 1 0 decoder_stage0a_relu[0][0]

decoder_stage0b_conv (Conv2D) (None, None, None, 1 147456 decoder_stage0_upsampling[0][0]

decoder_stage0b_bn (BatchNormal (None, None, None, 1 512 decoder_stage0b_conv[0][0]

decoder_stage0b_relu (Activatio (None, None, None, 1 0 decoder_stage0b_bn[0][0]

decoder_stage0c_conv (Conv2D) (None, None, None, 2 32768 decoder_stage0b_relu[0][0]

decoder_stage0c_bn (BatchNormal (None, None, None, 2 1024 decoder_stage0c_conv[0][0]

decoder_stage0c_relu (Activatio (None, None, None, 2 0 decoder_stage0c_bn[0][0]

decoder_stage0_add (Add) (None, None, None, 2 0 decoder_stage0c_relu[0][0]
stage4_unit1_relu1[0][0]

```
decoder_stage1a_conv (Conv2D)   (None, None, None, 6 16384      decoder_stage0_add[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 6 256        decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 6 0          decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 6 0          decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 6 36864      decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 6 256        decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 6 0          decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 6 0          decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 6 36864      decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 6 256        decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 6 0          decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 1 8192       decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 1 512        decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 1 0          decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 1 0          decoder_stage1c_relu[0][0]
stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 3 4096       decoder_stage1_add[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 3 128        decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 3 0          decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 3 0          decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 3 9216       decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 3 128        decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 3 0          decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 6 2048       decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 6 256        decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 6 0          decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 6 0          decoder_stage2c_relu[0][0]
stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 1 1024       decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 1 64         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 1 0          decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 1 0          decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 1 2304       decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 1 64         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 1 0          decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3c_conv (Conv2D)   (None, None, None, 6 1024       decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3c_bn (BatchNormal (None, None, None, 6 256        decoder_stage3c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3c_relu (Activatio (None, None, None, 6 0          decoder_stage3c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 6 0          decoder_stage3c_relu[0][0]
relu0[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 1024       decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64         decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0          decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 1 0          decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304       decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64         decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0          decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 256        decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64         decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0          decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d_16 (Conv2D)              (None, None, None, 3 435        decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0          conv2d_16[0][0]
==================================================================================================
Total params: 11,604,782
Trainable params: 11,594,764
Non-trainable params: 10,018
__________________________________________________________________________________________________
```

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Model: "model_1"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
data (InputLayer)               [(None, None, None,  0
__________________________________________________________________________________________________
bn_data (BatchNormalization)    (None, None, None, 1 3           data[0][0]
__________________________________________________________________________________________________
zero_padding2d (ZeroPadding2D)  (None, None, None, 1 0           bn_data[0][0]
__________________________________________________________________________________________________
conv0 (Conv2D)                  (None, None, None, 6 3136        zero_padding2d[0][0]
__________________________________________________________________________________________________
bn0 (BatchNormalization)        (None, None, None, 6 256         conv0[0][0]
__________________________________________________________________________________________________
relu0 (Activation)              (None, None, None, 6 0           bn0[0][0]
__________________________________________________________________________________________________
zero_padding2d_1 (ZeroPadding2D (None, None, None, 6 0           relu0[0][0]
__________________________________________________________________________________________________
pooling0 (MaxPooling2D)         (None, None, None, 6 0           zero_padding2d_1[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         pooling0[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu1 (Activation) (None, None, None, 6 0           stage1_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_2 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_2[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu2 (Activation) (None, None, None, 6 0           stage1_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_3 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_3[0][0]
__________________________________________________________________________________________________
stage1_unit1_sc (Conv2D)        (None, None, None, 6 4096        stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
add (Add)                       (None, None, None, 6 0           stage1_unit1_conv2[0][0]
                                                                 stage1_unit1_sc[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn1 (BatchNormaliz (None, None, None, 6 256         add[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu1 (Activation) (None, None, None, 6 0           stage1_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_4 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_4[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu2 (Activation) (None, None, None, 6 0           stage1_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_5 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_5[0][0]
__________________________________________________________________________________________________
add_1 (Add)                     (None, None, None, 6 0           stage1_unit2_conv2[0][0]
                                                                 add[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         add_1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu1 (Activation) (None, None, None, 6 0           stage2_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_6 (ZeroPadding2D (None, None, None, 6 0           stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv1 (Conv2D)     (None, None, None, 1 73728       zero_padding2d_6[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn2 (BatchNormaliz (None, None, None, 1 512         stage2_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu2 (Activation) (None, None, None, 1 0           stage2_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_7 (ZeroPadding2D (None, None, None, 1 0           stage2_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv2 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_7[0][0]
__________________________________________________________________________________________________
stage2_unit1_sc (Conv2D)        (None, None, None, 1 8192        stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_2 (Add)                     (None, None, None, 1 0           stage2_unit1_conv2[0][0]
                                                                 stage2_unit1_sc[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn1 (BatchNormaliz (None, None, None, 1 512         add_2[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu1 (Activation) (None, None, None, 1 0           stage2_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_8 (ZeroPadding2D (None, None, None, 1 0           stage2_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv1 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_8[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn2 (BatchNormaliz (None, None, None, 1 512         stage2_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu2 (Activation) (None, None, None, 1 0           stage2_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_9 (ZeroPadding2D (None, None, None, 1 0           stage2_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv2 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_9[0][0]
__________________________________________________________________________________________________
add_3 (Add)                     (None, None, None, 1 0           stage2_unit2_conv2[0][0]
                                                                 add_2[0][0]
__________________________________________________________________________________________________
stage3_unit1_bn1 (BatchNormaliz (None, None, None, 1 512         add_3[0][0]
__________________________________________________________________________________________________
```

```
loss: 0.0431 - binary_ce_metric: 0.0431 - accuracy: 0.0000e+00 - class_all_bi
nary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.7371 - fals
e_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+
00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class0_binary_accuracy_sm: 0.9999 - cl
ass0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - c
lass0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfke
ras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00
- class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accuracy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_
score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00 - val_loss: 0.0098 - val_
binary_ce_metric: 0.0098
```

stage3_unit1_relu1 (Activation) (None, None, None, 1 0 stage3_unit1_bn1[0][0]

zero_padding2d_10 (ZeroPadding2 (None, None, None, 1 0 stage3_unit1_relu1[0][0]

stage3_unit1_conv1 (Conv2D) (None, None, None, 2 294912 zero_padding2d_10[0][0]

stage3_unit1_bn2 (BatchNormaliz (None, None, None, 2 1024 stage3_unit1_conv1[0][0]

stage3_unit1_relu2 (Activation) (None, None, None, 2 0 stage3_unit1_bn2[0][0]

zero_padding2d_11 (ZeroPadding2 (None, None, None, 2 0 stage3_unit1_relu2[0][0]

stage3_unit1_conv2 (Conv2D) (None, None, None, 2 589824 zero_padding2d_11[0][0]

stage3_unit1_sc (Conv2D) (None, None, None, 2 32768 stage3_unit1_relu1[0][0]

add_4 (Add) (None, None, None, 2 0 stage3_unit1_conv2[0][0]
stage3_unit1_sc[0][0]

stage3_unit2_bn1 (BatchNormaliz (None, None, None, 2 1024 add_4[0][0]

stage3_unit2_relu1 (Activation) (None, None, None, 2 0 stage3_unit2_bn1[0][0]

zero_padding2d_12 (ZeroPadding2 (None, None, None, 2 0 stage3_unit2_relu1[0][0]

stage3_unit2_conv1 (Conv2D) (None, None, None, 2 589824 zero_padding2d_12[0][0]

stage3_unit2_bn2 (BatchNormaliz (None, None, None, 2 1024 stage3_unit2_conv1[0][0]

stage3_unit2_relu2 (Activation) (None, None, None, 2 0 stage3_unit2_bn2[0][0]

zero_padding2d_13 (ZeroPadding2 (None, None, None, 2 0 stage3_unit2_relu2[0][0]

stage3_unit2_conv2 (Conv2D) (None, None, None, 2 589824 zero_padding2d_13[0][0]

add_5 (Add) (None, None, None, 2 0 stage3_unit2_conv2[0][0]
add_4[0][0]

stage4_unit1_bn1 (BatchNormaliz (None, None, None, 2 1024 add_5[0][0]

stage4_unit1_relu1 (Activation) (None, None, None, 2 0 stage4_unit1_bn1[0][0]

zero_padding2d_14 (ZeroPadding2 (None, None, None, 2 0 stage4_unit1_relu1[0][0]

stage4_unit1_conv1 (Conv2D) (None, None, None, 5 1179648 zero_padding2d_14[0][0]

stage4_unit1_bn2 (BatchNormaliz (None, None, None, 5 2048 stage4_unit1_conv1[0][0]

stage4_unit1_relu2 (Activation) (None, None, None, 5 0 stage4_unit1_bn2[0][0]

zero_padding2d_14 (ZeroPadding2 (None, None, None, 2 0 stage4_unit1_relu1[0][0]

stage4_unit1_conv1 (Conv2D) (None, None, None, 5 1179648 zero_padding2d_14[0][0]

stage4_unit1_bn2 (BatchNormaliz (None, None, None, 5 2048 stage4_unit1_conv1[0][0]

stage4_unit1_relu2 (Activation) (None, None, None, 5 0 stage4_unit1_bn2[0][0]

zero_padding2d_15 (ZeroPadding2 (None, None, None, 5 0 stage4_unit1_relu2[0][0]

stage4_unit1_conv2 (Conv2D) (None, None, None, 5 2359296 zero_padding2d_15[0][0]

stage4_unit1_sc (Conv2D) (None, None, None, 5 131072 stage4_unit1_relu1[0][0]

add_6 (Add) (None, None, None, 5 0 stage4_unit1_conv2[0][0]
stage4_unit1_sc[0][0]

stage4_unit2_bn1 (BatchNormaliz (None, None, None, 5 2048 add_6[0][0]

stage4_unit2_relu1 (Activation) (None, None, None, 5 0 stage4_unit2_bn1[0][0]

zero_padding2d_16 (ZeroPadding2 (None, None, None, 5 0 stage4_unit2_relu1[0][0]

stage4_unit2_conv1 (Conv2D) (None, None, None, 5 2359296 zero_padding2d_16[0][0]

stage4_unit2_bn2 (BatchNormaliz (None, None, None, 5 2048 stage4_unit2_conv1[0][0]

stage4_unit2_relu2 (Activation) (None, None, None, 5 0 stage4_unit2_bn2[0][0]

zero_padding2d_17 (ZeroPadding2 (None, None, None, 5 0 stage4_unit2_relu2[0][0]

stage4_unit2_conv2 (Conv2D) (None, None, None, 5 2359296 zero_padding2d_17[0][0]

add_7 (Add) (None, None, None, 5 0 stage4_unit2_conv2[0][0]
add_6[0][0]

bn1 (BatchNormalization) (None, None, None, 5 2048 add_7[0][0]

relu1 (Activation) (None, None, None, 5 0 bn1[0][0]

decoder_stage0a_conv (Conv2D) (None, None, None, 1 65536 relu1[0][0]

decoder_stage0a_bn (BatchNormal (None, None, None, 1 512 decoder_stage0a_conv[0][0]

decoder_stage0a_relu (Activatio (None, None, None, 1 0 decoder_stage0a_bn[0][0]

decoder_stage0_upsampling (UpSa (None, None, None, 1 0 decoder_stage0a_relu[0][0]

decoder_stage0b_conv (Conv2D) (None, None, None, 1 147456 decoder_stage0_upsampling[0][0]

decoder_stage0b_bn (BatchNormal (None, None, None, 1 512 decoder_stage0b_conv[0][0]

decoder_stage0b_relu (Activatio (None, None, None, 1 0 decoder_stage0b_bn[0][0]

decoder_stage0c_conv (Conv2D) (None, None, None, 2 32768 decoder_stage0b_relu[0][0]

decoder_stage0c_bn (BatchNormal (None, None, None, 2 1024 decoder_stage0c_conv[0][0]

decoder_stage0c_relu (Activatio (None, None, None, 2 0 decoder_stage0c_bn[0][0]

decoder_stage0_add (Add) (None, None, None, 2 0 decoder_stage0c_relu[0][0]
stage4_unit1_relu1[0][0]

decoder_stage1a_conv (Conv2D) (None, None, None, 6 16384 decoder_stage0_add[0][0]

decoder_stage1a_bn (BatchNormal (None, None, None, 6 256 decoder_stage1a_conv[0][0]

decoder_stage1a_relu (Activatio (None, None, None, 6 0 decoder_stage1a_bn[0][0]

decoder_stage1_upsampling (UpSa (None, None, None, 6 0 decoder_stage1a_relu[0][0]

decoder_stage1b_conv (Conv2D) (None, None, None, 6 36864 decoder_stage1_upsampling[0][0]

decoder_stage1b_bn (BatchNormal (None, None, None, 6 256 decoder_stage1b_conv[0][0]

decoder_stage1b_relu (Activatio (None, None, None, 6 0 decoder_stage1b_bn[0][0]

decoder_stage1c_conv (Conv2D) (None, None, None, 1 8192 decoder_stage1b_relu[0][0]

decoder_stage1c_bn (BatchNormal (None, None, None, 1 512 decoder_stage1c_conv[0][0]

decoder_stage1c_relu (Activatio (None, None, None, 1 0 decoder_stage1c_bn[0][0]

decoder_stage1_add (Add) (None, None, None, 1 0 decoder_stage1c_relu[0][0]
stage3_unit1_relu1[0][0]

decoder_stage2a_conv (Conv2D) (None, None, None, 3 4096 decoder_stage1_add[0][0]

decoder_stage2a_bn (BatchNormal (None, None, None, 3 128 decoder_stage2a_conv[0][0]

decoder_stage2a_relu (Activatio (None, None, None, 3 0 decoder_stage2a_bn[0][0]

decoder_stage2_upsampling (UpSa (None, None, None, 3 0 decoder_stage2a_relu[0][0]

decoder_stage2b_conv (Conv2D) (None, None, None, 3 9216 decoder_stage2_upsampling[0][0]

decoder_stage2b_bn (BatchNormal (None, None, None, 3 128 decoder_stage2b_conv[0][0]

decoder_stage2b_relu (Activatio (None, None, None, 3 0 decoder_stage2b_bn[0][0]

decoder_stage2c_conv (Conv2D) (None, None, None, 6 2048 decoder_stage2b_relu[0][0]

decoder_stage2c_bn (BatchNormal (None, None, None, 6 256 decoder_stage2c_conv[0][0]

decoder_stage2c_relu (Activatio (None, None, None, 6 0 decoder_stage2c_bn[0][0]

decoder_stage2_add (Add) (None, None, None, 6 0 decoder_stage2c_relu[0][0]
stage2_unit1_relu1[0][0]

decoder_stage3a_conv (Conv2D) (None, None, None, 1 1024 decoder_stage2_add[0][0]

decoder_stage3a_bn (BatchNormal (None, None, None, 1 64 decoder_stage3a_conv[0][0]

decoder_stage3a_relu (Activatio (None, None, None, 1 0 decoder_stage3a_bn[0][0]

decoder_stage3_upsampling (UpSa (None, None, None, 1 0 decoder_stage3a_relu[0][0]

decoder_stage3b_conv (Conv2D) (None, None, None, 1 2304 decoder_stage3_upsampling[0][0]

decoder_stage3b_bn (BatchNormal (None, None, None, 1 64 decoder_stage3b_conv[0][0]

decoder_stage3b_relu (Activatio (None, None, None, 1 0 decoder_stage3b_bn[0][0]

decoder_stage3c_conv (Conv2D) (None, None, None, 6 1024 decoder_stage3b_relu[0][0]

decoder_stage3c_bn (BatchNormal (None, None, None, 6 256 decoder_stage3c_conv[0][0]

decoder_stage3c_relu (Activatio (None, None, None, 6 0 decoder_stage3c_bn[0][0]

decoder_stage3_add (Add) (None, None, None, 6 0 decoder_stage3c_relu[0][0]
relu0[0][0]

decoder_stage4a_conv (Conv2D) (None, None, None, 1 1024 decoder_stage3_add[0][0]

decoder_stage4a_bn (BatchNormal (None, None, None, 1 64 decoder_stage4a_conv[0][0]

decoder_stage4a_relu (Activatio (None, None, None, 1 0 decoder_stage4a_bn[0][0]

decoder_stage4_upsampling (UpSa (None, None, None, 1 0 decoder_stage4a_relu[0][0]

decoder_stage4b_conv (Conv2D) (None, None, None, 1 2304 decoder_stage4_upsampling[0][0]

decoder_stage4b_bn (BatchNormal (None, None, None, 1 64 decoder_stage4b_conv[0][0]

decoder_stage4b_relu (Activatio (None, None, None, 1 0 decoder_stage4b_bn[0][0]

decoder_stage4c_conv (Conv2D) (None, None, None, 1 256 decoder_stage4b_relu[0][0]

decoder_stage4c_bn (BatchNormal (None, None, None, 1 64 decoder_stage4c_conv[0][0]

decoder_stage4c_relu (Activatio (None, None, None, 1 0 decoder_stage4c_bn[0][0]

conv2d (Conv2D) (None, None, None, 3 435 decoder_stage4c_relu[0][0]

sigmoid (Activation)	(None, None, None, 3	0	conv2d[0][0]										
~==========													
Total params: 11,515,702													
Trainable params: 11,505,684													
Non-trainable params: 10,018													
_____													

Model: "model"

loss: 0.0774 - binary_ce_metric: 0.0774 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.0434 - false_neg: 6791.0000 - true_neg: 62907532.0000 - false_pos: 240.0000 - true_pos: 0.0000e+00 - recall: 0.

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, None, None,	0	
block1_conv1 (Conv2D)	(None, None, None, 6	640	input_1[0][0]
block1_conv2 (Conv2D)	(None, None, None, 6	36928	block1_conv1[0][0]
block1_pool (MaxPooling2D)	(None, None, None, 6	0	block1_conv2[0][0]
block2_conv1 (Conv2D)	(None, None, None, 1	73856	block1_pool[0][0]
block2_conv2 (Conv2D)	(None, None, None, 1	147584	block2_conv1[0][0]
block2_pool (MaxPooling2D)	(None, None, None, 1	0	block2_conv2[0][0]
block3_conv1 (Conv2D)	(None, None, None, 2	295168	block2_pool[0][0]
block3_conv2 (Conv2D)	(None, None, None, 2	590080	block3_conv1[0][0]
block3_conv3 (Conv2D)	(None, None, None, 2	590080	block3_conv2[0][0]
block3_conv4 (Conv2D)	(None, None, None, 2	590080	block3_conv3[0][0]
block3_pool (MaxPooling2D)	(None, None, None, 2	0	block3_conv4[0][0]
block4_conv1 (Conv2D)	(None, None, None, 5	1180160	block3_pool[0][0]
block4_conv2 (Conv2D)	(None, None, None, 5	2359808	block4_conv1[0][0]
block4_conv3 (Conv2D)	(None, None, None, 5	2359808	block4_conv2[0][0]
block4_conv4 (Conv2D)	(None, None, None, 5	2359808	block4_conv3[0][0]
block4_pool (MaxPooling2D)	(None, None, None, 5	0	block4_conv4[0][0]
block5_conv1 (Conv2D)	(None, None, None, 5	2359808	block4_pool[0][0]
block5_conv2 (Conv2D)	(None, None, None, 5	2359808	block5_conv1[0][0]
block5_conv3 (Conv2D)	(None, None, None, 5	2359808	block5_conv2[0][0]
block5_conv4 (Conv2D)	(None, None, None, 5	2359808	block5_conv3[0][0]
block5_pool (MaxPooling2D)	(None, None, None, 5	0	block5_conv4[0][0]
center_block1_conv (Conv2D)	(None, None, None, 5	2359296	block5_pool[0][0]
center_block1_bn (BatchNormaliz	(None, None, None, 5	2048	center_block1_conv[0][0]
center_block1_relu (Activation)	(None, None, None, 5	0	center_block1_bn[0][0]
center_block2_conv (Conv2D)	(None, None, None, 5	2359296	center_block1_relu[0][0]
center_block2_bn (BatchNormaliz	(None, None, None, 5	2048	center_block2_conv[0][0]
center_block2_relu (Activation)	(None, None, None, 5	0	center_block2_bn[0][0]
decoder_stage0a_conv (Conv2D)	(None, None, None, 1	65536	center_block2_relu[0][0]
decoder_stage0a_bn (BatchNormal	(None, None, None, 1	512	decoder_stage0a_conv[0][0]
decoder_stage0a_relu (Activatio	(None, None, None, 1	0	decoder_stage0a_bn[0][0]
decoder_stage0_upsampling (UpSa	(None, None, None, 1	0	decoder_stage0a_relu[0][0]
decoder_stage0b_conv (Conv2D)	(None, None, None, 1	147456	decoder_stage0_upsampling[0][0]
decoder_stage0b_bn (BatchNormal	(None, None, None, 1	512	decoder_stage0b_conv[0][0]
decoder_stage0b_relu (Activatio	(None, None, None, 1	0	decoder_stage0b_bn[0][0]
decoder_stage0c_conv (Conv2D)	(None, None, None, 5	65536	decoder_stage0b_relu[0][0]
decoder_stage0c_bn (BatchNormal	(None, None, None, 5	2048	decoder_stage0c_conv[0][0]
decoder_stage0c_relu (Activatio	(None, None, None, 5	0	decoder_stage0c_bn[0][0]
decoder_stage0_add (Add)	(None, None, None, 5	0	decoder_stage0c_relu[0][0] block5_conv4[0][0]
decoder_stage1a_conv (Conv2D)	(None, None, None, 1	65536	decoder_stage0_add[0][0]
decoder_stage1a_bn (BatchNormal	(None, None, None, 1	512	decoder_stage1a_conv[0][0]
decoder_stage1a_relu (Activatio	(None, None, None, 1	0	decoder_stage1a_bn[0][0]
decoder_stage1_upsampling (UpSa	(None, None, None, 1	0	decoder_stage1a_relu[0][0]
decoder_stage1b_conv (Conv2D)	(None, None, None, 1	147456	decoder_stage1_upsampling[0][0]
decoder_stage1b_bn (BatchNormal	(None, None, None, 1	512	decoder_stage1b_conv[0][0]
decoder_stage1b_relu (Activatio	(None, None, None, 1	0	decoder_stage1b_bn[0][0]
decoder_stage1c_conv (Conv2D)	(None, None, None, 5	65536	decoder_stage1b_relu[0][0]
decoder_stage1c_bn (BatchNormal	(None, None, None, 5	2048	decoder_stage1c_conv[0][0]
decoder_stage1c_relu (Activatio	(None, None, None, 5	0	decoder_stage1c_bn[0][0]
decoder_stage1_add (Add)	(None, None, None, 5	0	decoder_stage1c_relu[0][0] block4_conv4[0][0]
decoder_stage2a_conv (Conv2D)	(None, None, None, 1	65536	decoder_stage1_add[0][0]
decoder_stage2a_bn (BatchNormal	(None, None, None, 1	512	decoder_stage2a_conv[0][0]
decoder_stage2a_relu (Activatio	(None, None, None, 1	0	decoder_stage2a_bn[0][0]
decoder_stage2_upsampling (UpSa	(None, None, None, 1	0	decoder_stage2a_relu[0][0]
decoder_stage2b_conv (Conv2D)	(None, None, None, 1	147456	decoder_stage2_upsampling[0][0]
decoder_stage2b_bn (BatchNormal	(None, None, None, 1	512	decoder_stage2b_conv[0][0]
decoder_stage2b_relu (Activatio	(None, None, None, 1	0	decoder_stage2b_bn[0][0]
decoder_stage2c_conv (Conv2D)	(None, None, None, 2	32768	decoder_stage2b_relu[0][0]
decoder_stage2c_bn (BatchNormal	(None, None, None, 2	1024	decoder_stage2c_conv[0][0]
decoder_stage2c_relu (Activatio	(None, None, None, 2	0	decoder_stage2c_bn[0][0]
decoder_stage2_add (Add)	(None, None, None, 2	0	decoder_stage2c_relu[0][0] block3_conv4[0][0]
decoder_stage3a_conv (Conv2D)	(None, None, None, 6	16384	decoder_stage2_add[0][0]
decoder_stage3a_bn (BatchNormal	(None, None, None, 6	256	decoder_stage3a_conv[0][0]
decoder_stage3a_relu (Activatio	(None, None, None, 6	0	decoder_stage3a_bn[0][0]
decoder_stage3_upsampling (UpSa	(None, None, None, 6	0	decoder_stage3a_relu[0][0]
decoder_stage3b_conv (Conv2D)	(None, None, None, 6	36864	decoder_stage3_upsampling[0][0]
decoder_stage3b_bn (BatchNormal	(None, None, None, 6	256	decoder_stage3b_conv[0][0]
decoder_stage3b_relu (Activatio	(None, None, None, 6	0	decoder_stage3b_bn[0][0]
decoder_stage3c_conv (Conv2D)	(None, None, None, 1	8192	decoder_stage3b_relu[0][0]
decoder_stage3c_bn (BatchNormal	(None, None, None, 1	512	decoder_stage3c_conv[0][0]
decoder_stage3c_relu (Activatio	(None, None, None, 1	0	decoder_stage3c_bn[0][0]
decoder_stage3_add (Add)	(None, None, None, 1	0	decoder_stage3c_relu[0][0] block2_conv2[0][0]
decoder_stage4a_conv (Conv2D)	(None, None, None, 3	4096	decoder_stage3_add[0][0]
decoder_stage4a_bn (BatchNormal	(None, None, None, 3	128	decoder_stage4a_conv[0][0]
decoder_stage4a_relu (Activatio	(None, None, None, 3	0	decoder_stage4a_bn[0][0]
decoder_stage4_upsampling (UpSa	(None, None, None, 3	0	decoder_stage4a_relu[0][0]
decoder_stage4b_conv (Conv2D)	(None, None, None, 3	9216	decoder_stage4_upsampling[0][0]
decoder_stage4b_bn (BatchNormal	(None, None, None, 3	128	decoder_stage4b_conv[0][0]
decoder_stage4b_relu (Activatio	(None, None, None, 3	0	decoder_stage4b_bn[0][0]
decoder_stage4c_conv (Conv2D)	(None, None, None, 1	512	decoder_stage4b_relu[0][0]

```
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d[0][0]
==================================================================================================
Total params: 25,633,971
Trainable params: 25,627,155
Non-trainable params: 6,816
__________________________________________________________________________________________________
```

```
Model: "model"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
input_1 (InputLayer)            [(None, None, None,  0
__________________________________________________________________________________________________
block1_conv1 (Conv2D)           (None, None, None, 6 640         input_1[0][0]
__________________________________________________________________________________________________
block1_conv2 (Conv2D)           (None, None, None, 6 36928       block1_conv1[0][0]
__________________________________________________________________________________________________
block1_pool (MaxPooling2D)      (None, None, None, 6 0           block1_conv2[0][0]
__________________________________________________________________________________________________
block2_conv1 (Conv2D)           (None, None, None, 1 73856       block1_pool[0][0]
__________________________________________________________________________________________________
block2_conv2 (Conv2D)           (None, None, None, 1 147584      block2_conv1[0][0]
__________________________________________________________________________________________________
block2_pool (MaxPooling2D)      (None, None, None, 1 0           block2_conv2[0][0]
__________________________________________________________________________________________________
block3_conv1 (Conv2D)           (None, None, None, 2 295168      block2_pool[0][0]
__________________________________________________________________________________________________
block3_conv2 (Conv2D)           (None, None, None, 2 590080      block3_conv1[0][0]
__________________________________________________________________________________________________
block3_conv3 (Conv2D)           (None, None, None, 2 590080      block3_conv2[0][0]
__________________________________________________________________________________________________
block3_pool (MaxPooling2D)      (None, None, None, 2 0           block3_conv3[0][0]
__________________________________________________________________________________________________
block4_conv1 (Conv2D)           (None, None, None, 5 1180160     block3_pool[0][0]
__________________________________________________________________________________________________
block4_conv2 (Conv2D)           (None, None, None, 5 2359808     block4_conv1[0][0]
__________________________________________________________________________________________________
block4_conv3 (Conv2D)           (None, None, None, 5 2359808     block4_conv2[0][0]
__________________________________________________________________________________________________
block4_pool (MaxPooling2D)      (None, None, None, 5 0           block4_conv3[0][0]
__________________________________________________________________________________________________
block5_conv1 (Conv2D)           (None, None, None, 5 2359808     block4_pool[0][0]
__________________________________________________________________________________________________
block5_conv2 (Conv2D)           (None, None, None, 5 2359808     block5_conv1[0][0]
__________________________________________________________________________________________________
block5_conv3 (Conv2D)           (None, None, None, 5 2359808     block5_conv2[0][0]
__________________________________________________________________________________________________
block5_pool (MaxPooling2D)      (None, None, None, 5 0           block5_conv3[0][0]
__________________________________________________________________________________________________
center_block1_conv (Conv2D)     (None, None, None, 5 2359296     block5_pool[0][0]
__________________________________________________________________________________________________
center_block1_bn (BatchNormaliz (None, None, None, 5 2048        center_block1_conv[0][0]
__________________________________________________________________________________________________
center_block1_relu (Activation) (None, None, None, 5 0           center_block1_bn[0][0]
__________________________________________________________________________________________________
center_block2_conv (Conv2D)     (None, None, None, 5 2359296     center_block1_relu[0][0]
__________________________________________________________________________________________________
center_block2_bn (BatchNormaliz (None, None, None, 5 2048        center_block2_conv[0][0]
__________________________________________________________________________________________________
center_block2_relu (Activation) (None, None, None, 5 0           center_block2_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 1 65536       center_block2_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 1 512         decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 1 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 1 0           decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage0_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 1 512         decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 1 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0c_conv (Conv2D)   (None, None, None, 5 65536       decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0c_bn (BatchNormal (None, None, None, 5 2048        decoder_stage0c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0c_relu (Activatio (None, None, None, 5 0           decoder_stage0c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_add (Add)        (None, None, None, 5 0           decoder_stage0c_relu[0][0]
block5_conv3[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 65536       decoder_stage0_add[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 1 0           decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1c_conv (Conv2D)   (None, None, None, 5 65536       decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1c_bn (BatchNormal (None, None, None, 5 2048        decoder_stage1c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1c_relu (Activatio (None, None, None, 5 0           decoder_stage1c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_add (Add)        (None, None, None, 5 0           decoder_stage1c_relu[0][0]
block4_conv3[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 1 65536       decoder_stage1_add[0][0]
__________________________________________________________________________________________________
```

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decoder_stage2a_bn (BatchNormal (None, None, None, 1 512         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 1 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage2_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 1 512         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 1 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2c_conv (Conv2D)   (None, None, None, 2 32768       decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2c_bn (BatchNormal (None, None, None, 2 1024        decoder_stage2c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2c_relu (Activatio (None, None, None, 2 0           decoder_stage2c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_add (Add)        (None, None, None, 2 0           decoder_stage2c_relu[0][0]
block3_conv3[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 6 16384       decoder_stage2_add[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 6 256         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 6 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage3_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 6 256         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 6 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3c_conv (Conv2D)   (None, None, None, 1 8192        decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3c_bn (BatchNormal (None, None, None, 1 512         decoder_stage3c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3c_relu (Activatio (None, None, None, 1 0           decoder_stage3c_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_add (Add)        (None, None, None, 1 0           decoder_stage3c_relu[0][0]
block2_conv2[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 3 4096        decoder_stage3_add[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 3 128         decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 3 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 3 128         decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 3 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4c_conv (Conv2D)   (None, None, None, 1 512         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4c_bn (BatchNormal (None, None, None, 1 64          decoder_stage4c_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4c_relu (Activatio (None, None, None, 1 0           decoder_stage4c_bn[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, None, None, 3 435         decoder_stage4c_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           conv2d[0][0]
~==================================================================================================
Total params: 20,324,275
Trainable params: 20,317,459
Non-trainable params: 6,816
__________________________________________________________________________________________________
None
```

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val_loss: 0.0221 - val_binary_ce_metric: 0.0221 - val_accuracy: 0.7946 - val_class_all_binary_accuracy_
tfkeras: 0.9999 - val_class_all_binary_accuracy_sm: 0.9999 - val_binary_accuracy: 0.9999 - val_categorical_accuracy
: 0.7589 - val_false_neg: 9013.0000 - val_true_neg: 75488456.0000 - val_false_pos: 0.0000e+00 - val_true_pos: 0.000
0e+00 - val_recall: 0.0000e+00 - val_precision: 0.0000e+00 - val_f1_score: 0.0000e+00 - val_iou_score: 0.0000e+00 -
val_class0_binary_cross_entropy: 1.2875e-11 - val_class0_binary_accuracy_sm: 0.9999 - val_class0_binary_accuracy_t
fkeras: 0.9999 - val_class0_iou_score: 0.0000e+00 - val_class0_f1_score: 0.0000e+00 - val_class0_precision: 0.0000e
,=+00 - val_class0_recall: 0.0000e+00 - val_class1_binary_cross_entropy: 2.5082e-11 - val_class1_binary_accuracy_sm:
0.9998 - val_class1_binary_accuracy_tfkeras: 0.9998 - val_class1_iou_score: 0.0000e+00 - val_class1_f1_score: 0.000
0e+00 - val_class1_precision: 0.0000e+00 - val_class1_recall: 0.0000e+00 - val_class2_binary_cross_entropy: 4.7370e
-12 - val_class2_binary_accuracy_sm: 1.0000 - val_class2_binary_accuracy_tfkeras: 1.0000 - val_class2_iou_score: 0.
0000e+00 - val_class2_f1_score: 0.0000e+00 - val_class2_precision: 0.0000e+00 - val_class2_recall: 0.0000e+00
```

```
Model: "model"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
input_1 (InputLayer)            [(None, None, None,  0
__________________________________________________________________________________________________
stem_conv (Conv2D)              (None, None, None, 3 288         input_1[0][0]
__________________________________________________________________________________________________
stem_bn (BatchNormalization)    (None, None, None, 3 128         stem_conv[0][0]
__________________________________________________________________________________________________
stem_activation (Activation)    (None, None, None, 3 0           stem_bn[0][0]
__________________________________________________________________________________________________
block1a_dwconv (DepthwiseConv2D (None, None, None, 3 288         stem_activation[0][0]
__________________________________________________________________________________________________
block1a_bn (BatchNormalization) (None, None, None, 3 128         block1a_dwconv[0][0]
__________________________________________________________________________________________________
block1a_activation (Activation) (None, None, None, 3 0           block1a_bn[0][0]
__________________________________________________________________________________________________
block1a_se_squeeze (GlobalAvera (None, 32)          0           block1a_activation[0][0]
__________________________________________________________________________________________________
block1a_se_reshape (Reshape)    (None, 1, 1, 32)    0           block1a_se_squeeze[0][0]
__________________________________________________________________________________________________
block1a_se_reduce (Conv2D)      (None, 1, 1, 8)     264         block1a_se_reshape[0][0]
__________________________________________________________________________________________________
block1a_se_expand (Conv2D)      (None, 1, 1, 32)    288         block1a_se_reduce[0][0]
__________________________________________________________________________________________________
block1a_se_excite (Multiply)    (None, None, None, 3 0           block1a_activation[0][0]
                                                                 block1a_se_expand[0][0]
__________________________________________________________________________________________________
block1a_project_conv (Conv2D)   (None, None, None, 1 512         block1a_se_excite[0][0]
__________________________________________________________________________________________________
block1a_project_bn (BatchNormal (None, None, None, 1 64          block1a_project_conv[0][0]
__________________________________________________________________________________________________
block2a_expand_conv (Conv2D)    (None, None, None, 9 1536        block1a_project_bn[0][0]
__________________________________________________________________________________________________
block2a_expand_bn (BatchNormali (None, None, None, 9 384         block2a_expand_conv[0][0]
__________________________________________________________________________________________________
block2a_expand_activation (Acti (None, None, None, 9 0           block2a_expand_bn[0][0]
__________________________________________________________________________________________________
block2a_dwconv (DepthwiseConv2D (None, None, None, 9 864         block2a_expand_activation[0][0]
__________________________________________________________________________________________________
block2a_bn (BatchNormalization) (None, None, None, 9 384         block2a_dwconv[0][0]
__________________________________________________________________________________________________
block2a_activation (Activation) (None, None, None, 9 0           block2a_bn[0][0]
__________________________________________________________________________________________________
block2a_se_squeeze (GlobalAvera (None, 96)          0           block2a_activation[0][0]
__________________________________________________________________________________________________
block2a_se_reshape (Reshape)    (None, 1, 1, 96)    0           block2a_se_squeeze[0][0]
__________________________________________________________________________________________________
block2a_se_reduce (Conv2D)      (None, 1, 1, 4)     388         block2a_se_reshape[0][0]
__________________________________________________________________________________________________
block2a_se_expand (Conv2D)      (None, 1, 1, 96)    480         block2a_se_reduce[0][0]
__________________________________________________________________________________________________
block2a_se_excite (Multiply)    (None, None, None, 9 0           block2a_activation[0][0]
                                                                 block2a_se_expand[0][0]
__________________________________________________________________________________________________
block2a_project_conv (Conv2D)   (None, None, None, 2 2304        block2a_se_excite[0][0]
__________________________________________________________________________________________________
block2a_project_bn (BatchNormal (None, None, None, 2 96          block2a_project_conv[0][0]
__________________________________________________________________________________________________
block2b_expand_conv (Conv2D)    (None, None, None, 1 3456        block2a_project_bn[0][0]
__________________________________________________________________________________________________
block2b_expand_bn (BatchNormali (None, None, None, 1 576         block2b_expand_conv[0][0]
__________________________________________________________________________________________________
block2b_expand_activation (Acti (None, None, None, 1 0           block2b_expand_bn[0][0]
__________________________________________________________________________________________________
block2b_dwconv (DepthwiseConv2D (None, None, None, 1 1296        block2b_expand_activation[0][0]
__________________________________________________________________________________________________
block2b_bn (BatchNormalization) (None, None, None, 1 576         block2b_dwconv[0][0]
__________________________________________________________________________________________________
block2b_activation (Activation) (None, None, None, 1 0           block2b_bn[0][0]
__________________________________________________________________________________________________
block2b_se_squeeze (GlobalAvera (None, 144)         0           block2b_activation[0][0]
__________________________________________________________________________________________________
block2b_se_reshape (Reshape)    (None, 1, 1, 144)   0           block2b_se_squeeze[0][0]
__________________________________________________________________________________________________
block2b_se_reduce (Conv2D)      (None, 1, 1, 6)     870         block2b_se_reshape[0][0]
__________________________________________________________________________________________________
block2b_se_expand (Conv2D)      (None, 1, 1, 144)   1008        block2b_se_reduce[0][0]
__________________________________________________________________________________________________
block2b_se_excite (Multiply)    (None, None, None, 1 0           block2b_activation[0][0]
                                                                 block2b_se_expand[0][0]
__________________________________________________________________________________________________
block2b_project_conv (Conv2D)   (None, None, None, 2 3456        block2b_se_excite[0][0]
__________________________________________________________________________________________________
block2b_project_bn (BatchNormal (None, None, None, 2 96          block2b_project_conv[0][0]
__________________________________________________________________________________________________
block2b_drop (FixedDropout)     (None, None, None, 2 0           block2b_project_bn[0][0]
__________________________________________________________________________________________________
block2b_add (Add)               (None, None, None, 2 0           block2b_drop[0][0]
                                                                 block2a_project_bn[0][0]
__________________________________________________________________________________________________
block3a_expand_conv (Conv2D)    (None, None, None, 1 3456        block2b_add[0][0]
__________________________________________________________________________________________________
block3a_expand_bn (BatchNormali (None, None, None, 1 576         block3a_expand_conv[0][0]
__________________________________________________________________________________________________
block3a_expand_activation (Acti (None, None, None, 1 0           block3a_expand_bn[0][0]
__________________________________________________________________________________________________
block3a_dwconv (DepthwiseConv2D (None, None, None, 1 3600        block3a_expand_activation[0][0]
__________________________________________________________________________________________________
block3a_bn (BatchNormalization) (None, None, None, 1 576         block3a_dwconv[0][0]
__________________________________________________________________________________________________
block3a_activation (Activation) (None, None, None, 1 0           block3a_bn[0][0]
__________________________________________________________________________________________________
block3a_se_squeeze (GlobalAvera (None, 144)         0           block3a_activation[0][0]
__________________________________________________________________________________________________
block3a_se_reshape (Reshape)    (None, 1, 1, 144)   0           block3a_se_squeeze[0][0]
__________________________________________________________________________________________________
block3a_se_reduce (Conv2D)      (None, 1, 1, 6)     870         block3a_se_reshape[0][0]
__________________________________________________________________________________________________
block3a_se_expand (Conv2D)      (None, 1, 1, 144)   1008        block3a_se_reduce[0][0]
__________________________________________________________________________________________________
block3a_se_excite (Multiply)    (None, None, None, 1 0           block3a_activation[0][0]
                                                                 block3a_se_expand[0][0]
__________________________________________________________________________________________________
block3a_project_conv (Conv2D)   (None, None, None, 4 5760        block3a_se_excite[0][0]
__________________________________________________________________________________________________
block3a_project_bn (BatchNormal (None, None, None, 4 160         block3a_project_conv[0][0]
__________________________________________________________________________________________________
block3b_expand_conv (Conv2D)    (None, None, None, 2 9600        block3a_project_bn[0][0]
__________________________________________________________________________________________________
block3b_expand_bn (BatchNormali (None, None, None, 2 960         block3b_expand_conv[0][0]
__________________________________________________________________________________________________
block3b_expand_activation (Acti (None, None, None, 2 0           block3b_expand_bn[0][0]
__________________________________________________________________________________________________
block3b_dwconv (DepthwiseConv2D (None, None, None, 2 6000        block3b_expand_activation[0][0]
__________________________________________________________________________________________________
block3b_bn (BatchNormalization) (None, None, None, 2 960         block3b_dwconv[0][0]
__________________________________________________________________________________________________
block3b_activation (Activation) (None, None, None, 2 0           block3b_bn[0][0]
__________________________________________________________________________________________________
block3b_se_squeeze (GlobalAvera (None, 240)         0           block3b_activation[0][0]
__________________________________________________________________________________________________
block3b_se_reshape (Reshape)    (None, 1, 1, 240)   0           block3b_se_squeeze[0][0]
__________________________________________________________________________________________________
block3b_se_reduce (Conv2D)      (None, 1, 1, 10)    2410        block3b_se_reshape[0][0]
__________________________________________________________________________________________________
block3b_se_expand (Conv2D)      (None, 1, 1, 240)   2640        block3b_se_reduce[0][0]
__________________________________________________________________________________________________
block3b_se_excite (Multiply)    (None, None, None, 2 0           block3b_activation[0][0]
                                                                 block3b_se_expand[0][0]
__________________________________________________________________________________________________
block3b_project_conv (Conv2D)   (None, None, None, 4 9600        block3b_se_excite[0][0]
__________________________________________________________________________________________________
block3b_project_bn (BatchNormal (None, None, None, 4 160         block3b_project_conv[0][0]
__________________________________________________________________________________________________
block3b_drop (FixedDropout)     (None, None, None, 4 0           block3b_project_bn[0][0]
```

```
10 epoch
Epoch 00010: loss improved from 0.05575 to 0.04608, saving model to tmp/models/segmentation-model-small-3class_20200930T022117Z/model.hdf5
6/6 [==============================] - 9s 1s/step - loss: 0.0461 - binary_ce_metric: 0.0461 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.
0463 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class0_binary
_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binary_accuracy_s
m: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accuracy_sm: 0.9999 -
class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

block3b_add (Add) (None, None, None, 4 0 block3b_drop[0][0]
block3a_project_bn[0][0]

block4a_expand_conv (Conv2D) (None, None, None, 2 9600 block3b_add[0][0]

block4a_expand_bn (BatchNormali (None, None, None, 2 960 block4a_expand_conv[0][0]

block4a_expand_activation (Acti (None, None, None, 2 0 block4a_expand_bn[0][0]

block4a_dwconv (DepthwiseConv2D (None, None, None, 2 2160 block4a_expand_activation[0][0]

block4a_bn (BatchNormalization) (None, None, None, 2 960 block4a_dwconv[0][0]

block4a_activation (Activation) (None, None, None, 2 0 block4a_bn[0][0]

block4a_se_squeeze (GlobalAvera (None, 240) 0 block4a_activation[0][0]

block4a_se_reshape (Reshape) (None, 1, 1, 240) 0 block4a_se_squeeze[0][0]

block4a_se_reduce (Conv2D) (None, 1, 1, 10) 2410 block4a_se_reshape[0][0]

block4a_se_expand (Conv2D) (None, 1, 1, 240) 2640 block4a_se_reduce[0][0]

block4a_se_excite (Multiply) (None, None, None, 2 0 block4a_activation[0][0]
block4a_se_expand[0][0]

block4a_project_conv (Conv2D) (None, None, None, 8 19200 block4a_se_excite[0][0]

block4a_project_bn (BatchNormal (None, None, None, 8 320 block4a_project_conv[0][0]

block4b_expand_conv (Conv2D) (None, None, None, 4 38400 block4a_project_bn[0][0]

block4b_expand_bn (BatchNormali (None, None, None, 4 1920 block4b_expand_conv[0][0]

block4b_expand_activation (Acti (None, None, None, 4 0 block4b_expand_bn[0][0]

block4b_dwconv (DepthwiseConv2D (None, None, None, 4 4320 block4b_expand_activation[0][0]

block4b_bn (BatchNormalization) (None, None, None, 4 1920 block4b_dwconv[0][0]

block4b_activation (Activation) (None, None, None, 4 0 block4b_bn[0][0]

block4b_se_squeeze (GlobalAvera (None, 480) 0 block4b_activation[0][0]

block4b_se_reshape (Reshape) (None, 1, 1, 480) 0 block4b_se_squeeze[0][0]

block4b_se_reduce (Conv2D) (None, 1, 1, 20) 9620 block4b_se_reshape[0][0]

block4b_se_expand (Conv2D) (None, 1, 1, 480) 10080 block4b_se_reduce[0][0]

block4b_se_excite (Multiply) (None, None, None, 4 0 block4b_activation[0][0]
block4b_se_expand[0][0]

block4b_project_conv (Conv2D) (None, None, None, 8 38400 block4b_se_excite[0][0]

block4b_project_bn (BatchNormal (None, None, None, 8 320 block4b_project_conv[0][0]

block4b_drop (FixedDropout) (None, None, None, 8 0 block4b_project_bn[0][0]

block4b_add (Add) (None, None, None, 8 0 block4b_drop[0][0]
block4a_project_bn[0][0]

block4c_expand_conv (Conv2D) (None, None, None, 4 38400 block4b_add[0][0]

block4c_expand_bn (BatchNormali (None, None, None, 4 1920 block4c_expand_conv[0][0]

block4c_expand_activation (Acti (None, None, None, 4 0 block4c_expand_bn[0][0]

block4c_dwconv (DepthwiseConv2D (None, None, None, 4 4320 block4c_expand_activation[0][0]

block4c_bn (BatchNormalization) (None, None, None, 4 1920 block4c_dwconv[0][0]

block4c_activation (Activation) (None, None, None, 4 0 block4c_bn[0][0]

block4c_se_squeeze (GlobalAvera (None, 480) 0 block4c_activation[0][0]

block4c_se_reshape (Reshape) (None, 1, 1, 480) 0 block4c_se_squeeze[0][0]

block4c_se_reduce (Conv2D) (None, 1, 1, 20) 9620 block4c_se_reshape[0][0]

block4c_se_expand (Conv2D) (None, 1, 1, 480) 10080 block4c_se_reduce[0][0]

block4c_se_excite (Multiply) (None, None, None, 4 0 block4c_activation[0][0]
block4c_se_expand[0][0]

block4c_project_conv (Conv2D) (None, None, None, 8 38400 block4c_se_excite[0][0]

block4c_project_bn (BatchNormal (None, None, None, 8 320 block4c_project_conv[0][0]

block4c_drop (FixedDropout) (None, None, None, 8 0 block4c_project_bn[0][0]

block4c_add (Add) (None, None, None, 8 0 block4c_drop[0][0]
block4b_add[0][0]

block5a_expand_conv (Conv2D) (None, None, None, 4 38400 block4c_add[0][0]

block5a_expand_bn (BatchNormali (None, None, None, 4 1920 block5a_expand_conv[0][0]

block5a_expand_activation (Acti (None, None, None, 4 0 block5a_expand_bn[0][0]

block5a_dwconv (DepthwiseConv2D (None, None, None, 4 12000 block5a_expand_activation[0][0]

block5a_bn (BatchNormalization) (None, None, None, 4 1920 block5a_dwconv[0][0]

block5a_activation (Activation) (None, None, None, 4 0 block5a_bn[0][0]

block5a_se_squeeze (GlobalAvera (None, 480) 0 block5a_activation[0][0]

block5a_se_reshape (Reshape) (None, 1, 1, 480) 0 block5a_se_squeeze[0][0]

block5a_se_reduce (Conv2D) (None, 1, 1, 20) 9620 block5a_se_reshape[0][0]

block5a_se_expand (Conv2D) (None, 1, 1, 480) 10080 block5a_se_reduce[0][0]

block5a_se_excite (Multiply) (None, None, None, 4 0 block5a_activation[0][0]
block5a_se_expand[0][0]

block5a_project_conv (Conv2D) (None, None, None, 1 53760 block5a_se_excite[0][0]

block5a_project_bn (BatchNormal (None, None, None, 1 448 block5a_project_conv[0][0]

block5b_expand_conv (Conv2D) (None, None, None, 6 75264 block5a_project_bn[0][0]

block5b_expand_bn (BatchNormali (None, None, None, 6 2688 block5b_expand_conv[0][0]

block5b_expand_activation (Acti (None, None, None, 6 0 block5b_expand_bn[0][0]

block5b_dwconv (DepthwiseConv2D (None, None, None, 6 16800 block5b_expand_activation[0][0]

block5b_bn (BatchNormalization) (None, None, None, 6 2688 block5b_dwconv[0][0]

block5b_activation (Activation) (None, None, None, 6 0 block5b_bn[0][0]

block5b_se_squeeze (GlobalAvera (None, 672) 0 block5b_activation[0][0]

block5b_se_reshape (Reshape) (None, 1, 1, 672) 0 block5b_se_squeeze[0][0]

block5b_se_reduce (Conv2D) (None, 1, 1, 28) 18844 block5b_se_reshape[0][0]

block5b_se_expand (Conv2D) (None, 1, 1, 672) 19488 block5b_se_reduce[0][0]

block5b_se_excite (Multiply) (None, None, None, 6 0 block5b_activation[0][0]
block5b_se_expand[0][0]

block5b_project_conv (Conv2D) (None, None, None, 1 75264 block5b_se_excite[0][0]

block5b_project_bn (BatchNormal (None, None, None, 1 448 block5b_project_conv[0][0]

block5b_drop (FixedDropout) (None, None, None, 1 0 block5b_project_bn[0][0]

block5b_add (Add) (None, None, None, 1 0 block5b_drop[0][0]
block5a_project_bn[0][0]

block5c_expand_conv (Conv2D) (None, None, None, 6 75264 block5b_add[0][0]

block5c_expand_bn (BatchNormali (None, None, None, 6 2688 block5c_expand_conv[0][0]

block5c_expand_activation (Acti (None, None, None, 6 0 block5c_expand_bn[0][0]

block5c_dwconv (DepthwiseConv2D (None, None, None, 6 16800 block5c_expand_activation[0][0]

block5c_bn (BatchNormalization) (None, None, None, 6 2688 block5c_dwconv[0][0]

block5c_activation (Activation) (None, None, None, 6 0 block5c_bn[0][0]

block5c_se_squeeze (GlobalAvera (None, 672) 0 block5c_activation[0][0]

block5c_se_reshape (Reshape) (None, 1, 1, 672) 0 block5c_se_squeeze[0][0]

block5c_se_reduce (Conv2D) (None, 1, 1, 28) 18844 block5c_se_reshape[0][0]

block5c_se_expand (Conv2D) (None, 1, 1, 672) 19488 block5c_se_reduce[0][0]

block5c_se_excite (Multiply) (None, None, None, 6 0 block5c_activation[0][0]
block5c_se_expand[0][0]

block5c_project_conv (Conv2D) (None, None, None, 1 75264 block5c_se_excite[0][0]

block5c_project_bn (BatchNormal (None, None, None, 1 448 block5c_project_conv[0][0]

block5c_drop (FixedDropout) (None, None, None, 1 0 block5c_project_bn[0][0]

block5c_add (Add) (None, None, None, 1 0 block5c_drop[0][0]
block5b_add[0][0]

block6a_expand_conv (Conv2D) (None, None, None, 6 75264 block5c_add[0][0]

block6a_expand_bn (BatchNormali (None, None, None, 6 2688 block6a_expand_conv[0][0]

block6a_expand_activation (Acti (None, None, None, 6 0 block6a_expand_bn[0][0]

block6a_dwconv (DepthwiseConv2D (None, None, None, 6 16800 block6a_expand_activation[0][0]

block6a_bn (BatchNormalization) (None, None, None, 6 2688 block6a_dwconv[0][0]

block6a_activation (Activation) (None, None, None, 6 0 block6a_bn[0][0]

block6a_se_squeeze (GlobalAvera (None, 672) 0 block6a_activation[0][0]

block6a_se_reshape (Reshape) (None, 1, 1, 672) 0 block6a_se_squeeze[0][0]

block6a_se_reduce (Conv2D) (None, 1, 1, 28) 18844 block6a_se_reshape[0][0]

block6a_se_expand (Conv2D) (None, 1, 1, 672) 19488 block6a_se_reduce[0][0]

block6a_se_excite (Multiply) (None, None, None, 6 0 block6a_activation[0][0]
block6a_se_expand[0][0]

block6a_project_conv (Conv2D) (None, None, None, 1 129024 block6a_se_excite[0][0]

block6a_project_bn (BatchNormal (None, None, None, 1 768 block6a_project_conv[0][0]

block6b_expand_conv (Conv2D) (None, None, None, 1 221184 block6a_project_bn[0][0]

block6b_expand_bn (BatchNormali (None, None, None, 1 4608 block6b_expand_conv[0][0]

block6b_expand_activation (Acti (None, None, None, 1 0 block6b_expand_bn[0][0]

block6b_dwconv (DepthwiseConv2D (None, None, None, 1 28800 block6b_expand_activation[0][0]

block6b_bn (BatchNormalization) (None, None, None, 1 4608 block6b_dwconv[0][0]

block6b_activation (Activation) (None, None, None, 1 0 block6b_bn[0][0]

block6b_se_squeeze (GlobalAvera (None, 1152) 0 block6b_activation[0][0]

block6b_se_reshape (Reshape) (None, 1, 1, 1152) 0 block6b_se_squeeze[0][0]

block6b_se_reduce (Conv2D) (None, 1, 1, 48) 55344 block6b_se_reshape[0][0]

block6b_se_expand (Conv2D) (None, 1, 1, 1152) 56448 block6b_se_reduce[0][0]

block6b_se_excite (Multiply) (None, None, None, 1 0 block6b_activation[0][0]
block6b_se_expand[0][0]

block6b_project_conv (Conv2D) (None, None, None, 1 221184 block6b_se_excite[0][0]

block6b_project_bn (BatchNormal (None, None, None, 1 768 block6b_project_conv[0][0]

block6b_drop (FixedDropout) (None, None, None, 1 0 block6b_project_bn[0][0]

block6b_add (Add) (None, None, None, 1 0 block6b_drop[0][0]
block6a_project_bn[0][0]

block6c_expand_conv (Conv2D) (None, None, None, 1 221184 block6b_add[0][0]

block6c_expand_bn (BatchNormali (None, None, None, 1 4608 block6c_expand_conv[0][0]

block6c_expand_activation (Acti (None, None, None, 1 0 block6c_expand_bn[0][0]

block6c_dwconv (DepthwiseConv2D (None, None, None, 1 28800 block6c_expand_activation[0][0]

block6c_bn (BatchNormalization) (None, None, None, 1 4608 block6c_dwconv[0][0]

block6c_activation (Activation) (None, None, None, 1 0 block6c_bn[0][0]

block6c_se_squeeze (GlobalAvera (None, 1152) 0 block6c_activation[0][0]

block6c_se_reshape (Reshape) (None, 1, 1, 1152) 0 block6c_se_squeeze[0][0]

block6c_se_reduce (Conv2D) (None, 1, 1, 48) 55344 block6c_se_reshape[0][0]

block6c_se_expand (Conv2D) (None, 1, 1, 1152) 56448 block6c_se_reduce[0][0]

block6c_se_excite (Multiply) (None, None, None, 1 0 block6c_activation[0][0]
block6c_se_expand[0][0]

block6c_project_conv (Conv2D) (None, None, None, 1 221184 block6c_se_excite[0][0]

block6c_project_bn (BatchNormal (None, None, None, 1 768 block6c_project_conv[0][0]

block6c_drop (FixedDropout) (None, None, None, 1 0 block6c_project_bn[0][0]

block6c_add (Add) (None, None, None, 1 0 block6c_drop[0][0]
block6b_add[0][0]

block6d_expand_conv (Conv2D) (None, None, None, 1 221184 block6c_add[0][0]

block6d_expand_bn (BatchNormali (None, None, None, 1 4608 block6d_expand_conv[0][0]

block6d_expand_activation (Acti (None, None, None, 1 0 block6d_expand_bn[0][0]

block6d_dwconv (DepthwiseConv2D (None, None, None, 1 28800 block6d_expand_activation[0][0]

block6d_bn (BatchNormalization) (None, None, None, 1 4608 block6d_dwconv[0][0]

block6d_activation (Activation) (None, None, None, 1 0 block6d_bn[0][0]

block6d_se_squeeze (GlobalAvera (None, 1152) 0 block6d_activation[0][0]

block6d_se_reshape (Reshape) (None, 1, 1, 1152) 0 block6d_se_squeeze[0][0]

block6d_se_reduce (Conv2D) (None, 1, 1, 48) 55344 block6d_se_reshape[0][0]

```
block6d_se_expand (Conv2D)      (None, 1, 1, 1152)   56448       block6d_se_reduce[0][0]
__________________________________________________________________________________________________
block6d_se_excite (Multiply)    (None, None, None, 1 0           block6d_activation[0][0]
                                                                 block6d_se_expand[0][0]
__________________________________________________________________________________________________
block6d_project_conv (Conv2D)   (None, None, None, 1 221184      block6d_se_excite[0][0]
__________________________________________________________________________________________________
block6d_project_bn (BatchNormal (None, None, None, 1 768         block6d_project_conv[0][0]
__________________________________________________________________________________________________
block6d_drop (FixedDropout)     (None, None, None, 1 0           block6d_project_bn[0][0]
__________________________________________________________________________________________________
block6d_add (Add)               (None, None, None, 1 0           block6d_drop[0][0]
                                                                 block6c_add[0][0]
__________________________________________________________________________________________________
block7a_expand_conv (Conv2D)    (None, None, None, 1 221184      block6d_add[0][0]
__________________________________________________________________________________________________
block7a_expand_bn (BatchNormali (None, None, None, 1 4608        block7a_expand_conv[0][0]
__________________________________________________________________________________________________
block7a_expand_activation (Acti (None, None, None, 1 0           block7a_expand_bn[0][0]
__________________________________________________________________________________________________
block7a_dwconv (DepthwiseConv2D (None, None, None, 1 10368       block7a_expand_activation[0][0]
__________________________________________________________________________________________________
block7a_bn (BatchNormalization) (None, None, None, 1 4608        block7a_dwconv[0][0]
__________________________________________________________________________________________________
block7a_activation (Activation) (None, None, None, 1 0           block7a_bn[0][0]
__________________________________________________________________________________________________
block7a_se_squeeze (GlobalAvera (None, 1152)         0           block7a_activation[0][0]
__________________________________________________________________________________________________
block7a_se_reshape (Reshape)    (None, 1, 1, 1152)   0           block7a_se_squeeze[0][0]
__________________________________________________________________________________________________
block7a_se_reduce (Conv2D)      (None, 1, 1, 48)     55344       block7a_se_reshape[0][0]
__________________________________________________________________________________________________
block7a_se_expand (Conv2D)      (None, 1, 1, 1152)   56448       block7a_se_reduce[0][0]
__________________________________________________________________________________________________
block7a_se_excite (Multiply)    (None, None, None, 1 0           block7a_activation[0][0]
                                                                 block7a_se_expand[0][0]
__________________________________________________________________________________________________
block7a_project_conv (Conv2D)   (None, None, None, 3 368640      block7a_se_excite[0][0]
__________________________________________________________________________________________________
block7a_project_bn (BatchNormal (None, None, None, 3 1280        block7a_project_conv[0][0]
__________________________________________________________________________________________________
top_conv (Conv2D)               (None, None, None, 1 409600      block7a_project_bn[0][0]
__________________________________________________________________________________________________
top_bn (BatchNormalization)     (None, None, None, 1 5120        top_conv[0][0]
__________________________________________________________________________________________________
top_activation (Activation)     (None, None, None, 1 0           top_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 1 0           top_activation[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 1 0           decoder_stage0_upsampling[0][0]
                                                                 block6a_expand_activation[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 4497408     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 4 0           decoder_stage1_upsampling[0][0]
                                                                 block4a_expand_activation[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 571392      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 2 0           decoder_stage2_upsampling[0][0]
                                                                 block3a_expand_activation[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 156672      decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
                                                                 block2a_expand_activation[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 46080       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
==================================================================================================
Total params: 10,115,215
Trainable params: 10,071,215
Non-trainable params: 44,000
__________________________________________________________________________________________________
```

```
Model: "model"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
input_1 (InputLayer)            [(None, None, None,  0
__________________________________________________________________________________________________
conv1_pad (ZeroPadding2D)       (None, None, None, 1 0           input_1[0][0]
__________________________________________________________________________________________________
conv1 (Conv2D)                  (None, None, None, 3 288         conv1_pad[0][0]
__________________________________________________________________________________________________
conv1_bn (BatchNormalization)   (None, None, None, 3 128         conv1[0][0]
__________________________________________________________________________________________________
conv1_relu (ReLU)               (None, None, None, 3 0           conv1_bn[0][0]
__________________________________________________________________________________________________
conv_dw_1 (DepthwiseConv2D)     (None, None, None, 3 288         conv1_relu[0][0]
__________________________________________________________________________________________________
conv_dw_1_bn (BatchNormalizatio (None, None, None, 3 128         conv_dw_1[0][0]
__________________________________________________________________________________________________
conv_dw_1_relu (ReLU)           (None, None, None, 3 0           conv_dw_1_bn[0][0]
__________________________________________________________________________________________________
conv_pw_1 (Conv2D)              (None, None, None, 6 2048        conv_dw_1_relu[0][0]
__________________________________________________________________________________________________
conv_pw_1_bn (BatchNormalizatio (None, None, None, 6 256         conv_pw_1[0][0]
__________________________________________________________________________________________________
conv_pw_1_relu (ReLU)           (None, None, None, 6 0           conv_pw_1_bn[0][0]
__________________________________________________________________________________________________
conv_pad_2 (ZeroPadding2D)      (None, None, None, 6 0           conv_pw_1_relu[0][0]
__________________________________________________________________________________________________
conv_dw_2 (DepthwiseConv2D)     (None, None, None, 6 576         conv_pad_2[0][0]
__________________________________________________________________________________________________
conv_dw_2_bn (BatchNormalizatio (None, None, None, 6 256         conv_dw_2[0][0]
__________________________________________________________________________________________________
conv_dw_2_relu (ReLU)           (None, None, None, 6 0           conv_dw_2_bn[0][0]
__________________________________________________________________________________________________
conv_pw_2 (Conv2D)              (None, None, None, 1 8192        conv_dw_2_relu[0][0]
__________________________________________________________________________________________________
conv_pw_2_bn (BatchNormalizatio (None, None, None, 1 512         conv_pw_2[0][0]
__________________________________________________________________________________________________
conv_pw_2_relu (ReLU)           (None, None, None, 1 0           conv_pw_2_bn[0][0]
__________________________________________________________________________________________________
conv_dw_3 (DepthwiseConv2D)     (None, None, None, 1 1152        conv_pw_2_relu[0][0]
__________________________________________________________________________________________________
conv_dw_3_bn (BatchNormalizatio (None, None, None, 1 512         conv_dw_3[0][0]
__________________________________________________________________________________________________
conv_dw_3_relu (ReLU)           (None, None, None, 1 0           conv_dw_3_bn[0][0]
__________________________________________________________________________________________________
conv_pw_3 (Conv2D)              (None, None, None, 1 16384       conv_dw_3_relu[0][0]
__________________________________________________________________________________________________
conv_pw_3_bn (BatchNormalizatio (None, None, None, 1 512         conv_pw_3[0][0]
__________________________________________________________________________________________________
conv_pw_3_relu (ReLU)           (None, None, None, 1 0           conv_pw_3_bn[0][0]
__________________________________________________________________________________________________
conv_pad_4 (ZeroPadding2D)      (None, None, None, 1 0           conv_pw_3_relu[0][0]
__________________________________________________________________________________________________
conv_dw_4 (DepthwiseConv2D)     (None, None, None, 1 1152        conv_pad_4[0][0]
__________________________________________________________________________________________________
conv_dw_4_bn (BatchNormalizatio (None, None, None, 1 512         conv_dw_4[0][0]
__________________________________________________________________________________________________
conv_dw_4_relu (ReLU)           (None, None, None, 1 0           conv_dw_4_bn[0][0]
__________________________________________________________________________________________________
conv_pw_4 (Conv2D)              (None, None, None, 2 32768       conv_dw_4_relu[0][0]
__________________________________________________________________________________________________
conv_pw_4_bn (BatchNormalizatio (None, None, None, 2 1024        conv_pw_4[0][0]
__________________________________________________________________________________________________
conv_pw_4_relu (ReLU)           (None, None, None, 2 0           conv_pw_4_bn[0][0]
__________________________________________________________________________________________________
conv_dw_5 (DepthwiseConv2D)     (None, None, None, 2 2304        conv_pw_4_relu[0][0]
__________________________________________________________________________________________________
conv_dw_5_bn (BatchNormalizatio (None, None, None, 2 1024        conv_dw_5[0][0]
__________________________________________________________________________________________________
conv_dw_5_relu (ReLU)           (None, None, None, 2 0           conv_dw_5_bn[0][0]
__________________________________________________________________________________________________
conv_pw_5 (Conv2D)              (None, None, None, 2 65536       conv_dw_5_relu[0][0]
__________________________________________________________________________________________________
conv_pw_5_bn (BatchNormalizatio (None, None, None, 2 1024        conv_pw_5[0][0]
__________________________________________________________________________________________________
conv_pw_5_relu (ReLU)           (None, None, None, 2 0           conv_pw_5_bn[0][0]
__________________________________________________________________________________________________
conv_pad_6 (ZeroPadding2D)      (None, None, None, 2 0           conv_pw_5_relu[0][0]
__________________________________________________________________________________________________
conv_dw_6 (DepthwiseConv2D)     (None, None, None, 2 2304        conv_pad_6[0][0]
__________________________________________________________________________________________________
conv_dw_6_bn (BatchNormalizatio (None, None, None, 2 1024        conv_dw_6[0][0]
__________________________________________________________________________________________________
conv_dw_6_relu (ReLU)           (None, None, None, 2 0           conv_dw_6_bn[0][0]
__________________________________________________________________________________________________
conv_pw_6 (Conv2D)              (None, None, None, 5 131072      conv_dw_6_relu[0][0]
__________________________________________________________________________________________________
conv_pw_6_bn (BatchNormalizatio (None, None, None, 5 2048        conv_pw_6[0][0]
__________________________________________________________________________________________________
conv_pw_6_relu (ReLU)           (None, None, None, 5 0           conv_pw_6_bn[0][0]
__________________________________________________________________________________________________
conv_dw_7 (DepthwiseConv2D)     (None, None, None, 5 4608        conv_pw_6_relu[0][0]
__________________________________________________________________________________________________
conv_dw_7_bn (BatchNormalizatio (None, None, None, 5 2048        conv_dw_7[0][0]
__________________________________________________________________________________________________
conv_dw_7_relu (ReLU)           (None, None, None, 5 0           conv_dw_7_bn[0][0]
__________________________________________________________________________________________________
conv_pw_7 (Conv2D)              (None, None, None, 5 262144      conv_dw_7_relu[0][0]
__________________________________________________________________________________________________
conv_pw_7_bn (BatchNormalizatio (None, None, None, 5 2048        conv_pw_7[0][0]
__________________________________________________________________________________________________
conv_pw_7_relu (ReLU)           (None, None, None, 5 0           conv_pw_7_bn[0][0]
__________________________________________________________________________________________________
conv_dw_8 (DepthwiseConv2D)     (None, None, None, 5 4608        conv_pw_7_relu[0][0]
__________________________________________________________________________________________________
conv_dw_8_bn (BatchNormalizatio (None, None, None, 5 2048        conv_dw_8[0][0]
__________________________________________________________________________________________________
conv_dw_8_relu (ReLU)           (None, None, None, 5 0           conv_dw_8_bn[0][0]
__________________________________________________________________________________________________
conv_pw_8 (Conv2D)              (None, None, None, 5 262144      conv_dw_8_relu[0][0]
__________________________________________________________________________________________________
conv_pw_8_bn (BatchNormalizatio (None, None, None, 5 2048        conv_pw_8[0][0]
__________________________________________________________________________________________________
conv_pw_8_relu (ReLU)           (None, None, None, 5 0           conv_pw_8_bn[0][0]
__________________________________________________________________________________________________
conv_dw_9 (DepthwiseConv2D)     (None, None, None, 5 4608        conv_pw_8_relu[0][0]
__________________________________________________________________________________________________
conv_dw_9_bn (BatchNormalizatio (None, None, None, 5 2048        conv_dw_9[0][0]
__________________________________________________________________________________________________
conv_dw_9_relu (ReLU)           (None, None, None, 5 0           conv_dw_9_bn[0][0]
__________________________________________________________________________________________________
conv_pw_9 (Conv2D)              (None, None, None, 5 262144      conv_dw_9_relu[0][0]
__________________________________________________________________________________________________
conv_pw_9_bn (BatchNormalizatio (None, None, None, 5 2048        conv_pw_9[0][0]
__________________________________________________________________________________________________
conv_pw_9_relu (ReLU)           (None, None, None, 5 0           conv_pw_9_bn[0][0]
__________________________________________________________________________________________________
conv_dw_10 (DepthwiseConv2D)    (None, None, None, 5 4608        conv_pw_9_relu[0][0]
__________________________________________________________________________________________________
conv_dw_10_bn (BatchNormalizati (None, None, None, 5 2048        conv_dw_10[0][0]
__________________________________________________________________________________________________
conv_dw_10_relu (ReLU)          (None, None, None, 5 0           conv_dw_10_bn[0][0]
__________________________________________________________________________________________________
conv_pw_10 (Conv2D)             (None, None, None, 5 262144      conv_dw_10_relu[0][0]
__________________________________________________________________________________________________
conv_pw_10_bn (BatchNormalizati (None, None, None, 5 2048        conv_pw_10[0][0]
__________________________________________________________________________________________________
conv_pw_10_relu (ReLU)          (None, None, None, 5 0           conv_pw_10_bn[0][0]
__________________________________________________________________________________________________
conv_dw_11 (DepthwiseConv2D)    (None, None, None, 5 4608        conv_pw_10_relu[0][0]
__________________________________________________________________________________________________
conv_dw_11_bn (BatchNormalizati (None, None, None, 5 2048        conv_dw_11[0][0]
__________________________________________________________________________________________________
conv_dw_11_relu (ReLU)          (None, None, None, 5 0           conv_dw_11_bn[0][0]
__________________________________________________________________________________________________
conv_pw_11 (Conv2D)             (None, None, None, 5 262144      conv_dw_11_relu[0][0]
```

```
10 epochs
Epoch 00010: loss improved from 0.06243 to 0.05213, saving model to tmp/models/segmentation-model-small-3class_20200930T021326Z/model.hdf5
6/6 [==============================] - 7s 1s/step - loss: 0.0521 - binary_ce_metric: 0.0521 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.
0043 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class0_binary
_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binary_accuracy_s
m: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accuracy_sm: 0.9999 -
class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

```
conv_pw_11_bn (BatchNormalizati (None, None, None, 5 2048        conv_pw_11[0][0]
__________________________________________________________________________________________________
conv_pw_11_relu (ReLU)          (None, None, None, 5 0           conv_pw_11_bn[0][0]
__________________________________________________________________________________________________
conv_pad_12 (ZeroPadding2D)     (None, None, None, 5 0           conv_pw_11_relu[0][0]
__________________________________________________________________________________________________
conv_dw_12 (DepthwiseConv2D)    (None, None, None, 5 4608        conv_pad_12[0][0]
__________________________________________________________________________________________________
conv_dw_12_bn (BatchNormalizati (None, None, None, 5 2048        conv_dw_12[0][0]
__________________________________________________________________________________________________
conv_dw_12_relu (ReLU)          (None, None, None, 5 0           conv_dw_12_bn[0][0]
__________________________________________________________________________________________________
conv_pw_12 (Conv2D)             (None, None, None, 1 524288      conv_dw_12_relu[0][0]
__________________________________________________________________________________________________
conv_pw_12_bn (BatchNormalizati (None, None, None, 1 4096        conv_pw_12[0][0]
__________________________________________________________________________________________________
conv_pw_12_relu (ReLU)          (None, None, None, 1 0           conv_pw_12_bn[0][0]
__________________________________________________________________________________________________
conv_dw_13 (DepthwiseConv2D)    (None, None, None, 1 9216        conv_pw_12_relu[0][0]
__________________________________________________________________________________________________
conv_dw_13_bn (BatchNormalizati (None, None, None, 1 4096        conv_dw_13[0][0]
__________________________________________________________________________________________________
conv_dw_13_relu (ReLU)          (None, None, None, 1 0           conv_dw_13_bn[0][0]
__________________________________________________________________________________________________
conv_pw_13 (Conv2D)             (None, None, None, 1 1048576     conv_dw_13_relu[0][0]
__________________________________________________________________________________________________
conv_pw_13_bn (BatchNormalizati (None, None, None, 1 4096        conv_pw_13[0][0]
__________________________________________________________________________________________________
conv_pw_13_relu (ReLU)          (None, None, None, 1 0           conv_pw_13_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 1 0           conv_pw_13_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 1 0           decoder_stage0_upsampling[0][0]
                                                                 conv_pw_11_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 3538944     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 5 0           decoder_stage1_upsampling[0][0]
                                                                 conv_pw_5_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 589824      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 2 0           decoder_stage2_upsampling[0][0]
                                                                 conv_pw_3_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 147456      decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
                                                                 conv_pw_1_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 36864       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
==================================================================================================
Total params: 8,336,051
Trainable params: 8,312,179
Non-trainable params: 23,872
__________________________________________________________________________________________________
```

```
mixed10 (Concatenate)          (None, None, None, 2 0          activation_85[0][0]
mixed9_1[0][0]
concatenate_1[0][0]
activation_93[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 2 0          mixed10[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 2 0          decoder_stage0_upsampling[0][0]
mixed7[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 6488064     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 5 0           decoder_stage1_upsampling[0][0]
mixed2[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 626688      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 3 0           decoder_stage2_upsampling[0][0]
activation_4[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 184320      decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
activation_2[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 36864       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
==================================================================================================
Total params: 29,932,819
Trainable params: 29,896,403
Non-trainable params: 36,416
__________________________________________________________________________________________________
```

```
10 epochs report
Epoch 00010: loss improved from 0.06234 to 0.05005, saving model to tmp/models/segmentation-model-small-3class_20200930T020231Z/model.hdf5
6/6 [==============================] - 9s 2s/step - loss: 0.0501 - binary_ce_metric: 0.0501 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.
0073 - false_neg: 8324.0000 - true_neg: 75487040.0000 - false_pos: 2109.0000 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - class0_binary_
accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_binary_accuracy_sm
: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accuracy_sm: 0.9998 -
class2_binary_accuracy_tfkeras: 0.9998 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

```
concatenate_49 (Concatenate)    (None, None, None, 2 0           conv2d_3340[0][0]
conv2d_3341[0][0]
conv2d_3342[0][0]
conv2d_3343[0][0]
conv2d_3344[0][0]
conv2d_3345[0][0]
conv2d_3346[0][0]
conv2d_3347[0][0]
conv2d_3348[0][0]
conv2d_3349[0][0]
conv2d_3350[0][0]
conv2d_3351[0][0]
conv2d_3352[0][0]
conv2d_3353[0][0]
conv2d_3354[0][0]
conv2d_3355[0][0]
conv2d_3356[0][0]
conv2d_3357[0][0]
conv2d_3358[0][0]
conv2d_3359[0][0]
conv2d_3360[0][0]
conv2d_3361[0][0]
conv2d_3362[0][0]
conv2d_3363[0][0]
conv2d_3364[0][0]
conv2d_3365[0][0]
conv2d_3366[0][0]
conv2d_3367[0][0]
conv2d_3368[0][0]
conv2d_3369[0][0]
conv2d_3370[0][0]
conv2d_3371[0][0]
conv2d_3372[0][0]
conv2d_3373[0][0]
conv2d_3374[0][0]
conv2d_3375[0][0]
conv2d_3376[0][0]
conv2d_3377[0][0]
conv2d_3378[0][0]
conv2d_3379[0][0]
conv2d_3380[0][0]
conv2d_3381[0][0]
conv2d_3382[0][0]
conv2d_3383[0][0]
conv2d_3384[0][0]
conv2d_3385[0][0]
conv2d_3386[0][0]
conv2d_3387[0][0]
conv2d_3388[0][0]
conv2d_3389[0][0]
conv2d_3390[0][0]
conv2d_3391[0][0]
conv2d_3392[0][0]
conv2d_3393[0][0]
conv2d_3394[0][0]
conv2d_3395[0][0]
conv2d_3396[0][0]
conv2d_3397[0][0]
conv2d_3398[0][0]
conv2d_3399[0][0]
conv2d_3400[0][0]
conv2d_3400[0][0]
conv2d_3401[0][0]
conv2d_3402[0][0]
conv2d_3403[0][0]
__________________________________________________________________________________________
batch_normalization_155 (BatchN (None, None, None, 2 8192        concatenate_49[0][0]
__________________________________________________________________________________________
activation_249 (Activation)     (None, None, None, 2 0           batch_normalization_155[0][0]
__________________________________________________________________________________________
conv2d_3404 (Conv2D)            (None, None, None, 2 4194304     activation_249[0][0]
__________________________________________________________________________________________
batch_normalization_156 (BatchN (None, None, None, 2 8192        conv2d_3404[0][0]
__________________________________________________________________________________________
global_average_pooling2d_49 (Gl (None, 2048)         0           batch_normalization_156[0][0]
__________________________________________________________________________________________
lambda_3249 (Lambda)            (None, 1, 1, 2048)   0           global_average_pooling2d_49[0][0]
__________________________________________________________________________________________
conv2d_3405 (Conv2D)            (None, 1, 1, 128)    262272      lambda_3249[0][0]
__________________________________________________________________________________________
activation_250 (Activation)     (None, 1, 1, 128)    0           conv2d_3405[0][0]
__________________________________________________________________________________________
conv2d_3406 (Conv2D)            (None, 1, 1, 2048)   264192      activation_250[0][0]
__________________________________________________________________________________________
activation_251 (Activation)     (None, 1, 1, 2048)   0           conv2d_3406[0][0]
__________________________________________________________________________________________
multiply_49 (Multiply)          (None, None, None, 2 0           batch_normalization_156[0][0]
activation_251[0][0]
__________________________________________________________________________________________
add_49 (Add)                    (None, None, None, 2 0           multiply_49[0][0]
activation_247[0][0]
__________________________________________________________________________________________
activation_252 (Activation)     (None, None, None, 2 0           add_49[0][0]
__________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 2 0           activation_252[0][0]
__________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 3 0           decoder_stage0_upsampling[0][0]
activation_237[0][0]
__________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 7077888     decoder_stage0_concat[0][0]
__________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________
```

Error

```
Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in execution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 632, in _call
    return self._stateless_fn(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function._filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError: 2 root error(s) found.
  (0) Resource exhausted:  OOM when allocating tensor with shape[16,512,64,64] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
     [[node model_1/batch_normalization_27/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
     Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

     [[metrics/iou_score/PartitionedFunctionCall/assert_less_equal/Assert/AssertGuard/pivot_f/_673/_463]]
     Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

  (1) Resource exhausted:  OOM when allocating tensor with shape[16,512,64,64] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
     [[node model_1/batch_normalization_27/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
     Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

0 successful operations.
0 derived errors ignored. [Op:__inference_distributed_function_306690]

Function call stack:
distributed_function -> distributed_function

2020-09-30 01:54:48.630618: W tensorflow/core/kernels/data/generator_dataset_op.cc:103] Error occurred when finalizing GeneratorDataset iterator: Cancelled: Operation was cancelled
```

```
decoder_stage0b_relu (Activatio (None, None, None, 2 0          decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0          decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 7 0          decoder_stage1_upsampling[0][0]
activation_57[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 884736     decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512        decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0          decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456     decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512        decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0          decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0          decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 3 0          decoder_stage2_upsampling[0][0]
activation_17[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 221184     decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256        decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0          decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864      decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256        decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0          decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0          decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0          decoder_stage3_upsampling[0][0]
activation_2[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 55296      decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128        decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0          decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216       decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128        decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0          decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0          decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608       decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64         decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0          decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304       decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64         decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0          decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435        decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0          final_conv[0][0]
==================================================================================================
Total params: 122,320,163
Trainable params: 122,070,627
Non-trainable params: 249,536
__________________________________________________________________________________________________
None
```

```
batch_normalization_51 (BatchNo (None, None, None, 1 4096        concatenate_15[0][0]
__________________________________________________________________________________________________
activation_77 (Activation)      (None, None, None, 1 0           batch_normalization_51[0][0]
__________________________________________________________________________________________________
conv2d_578 (Conv2D)             (None, None, None, 2 2097152     activation_77[0][0]
__________________________________________________________________________________________________
batch_normalization_52 (BatchNo (None, None, None, 2 8192        conv2d_578[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_15 (Gl (None, 2048)         0           batch_normalization_52[0][0]
__________________________________________________________________________________________________
lambda_527 (Lambda)             (None, 1, 1, 2048)   0           global_average_pooling2d_15[0][0]
__________________________________________________________________________________________________
conv2d_579 (Conv2D)             (None, 1, 1, 128)    262272      lambda_527[0][0]
__________________________________________________________________________________________________
activation_78 (Activation)      (None, 1, 1, 128)    0           conv2d_579[0][0]
__________________________________________________________________________________________________
conv2d_580 (Conv2D)             (None, 1, 1, 2048)   264192      activation_78[0][0]
__________________________________________________________________________________________________
activation_79 (Activation)      (None, 1, 1, 2048)   0           conv2d_580[0][0]
__________________________________________________________________________________________________
multiply_15 (Multiply)          (None, None, None, 2 0           batch_normalization_52[0][0]
activation_79[0][0]
__________________________________________________________________________________________________
add_15 (Add)                    (None, None, None, 2 0           multiply_15[0][0]
activation_75[0][0]
__________________________________________________________________________________________________
activation_80 (Activation)      (None, None, None, 2 0           add_15[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 2 0           activation_80[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 3 0           decoder_stage0_upsampling[0][0]
activation_65[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 7077888     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 7 0           decoder_stage1_upsampling[0][0]
activation_35[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 884736      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 3 0           decoder_stage2_upsampling[0][0]
activation_15[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 221184      decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
activation[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 36864       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
~==================================================================================================
Total params: 34,588,195
Trainable params: 34,517,987
Non-trainable params: 70,208
__________________________________________________________________________________________________
```

```
ERROR
Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in execution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 632, in _call
    return self._stateless_fn(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function._filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError: 2 root error(s) found.
  (0) Resource exhausted:  OOM when allocating tensor with shape[16,64,256,256] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
    [[{{node model_1/decoder_stage3_concat/concat-0-TransposeNHWCToNCHW-LayoutOptimizer}}]]
    Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

    [[metrics/false_neg/assert_less_equal/Assert/AssertGuard/pivot_f/_20/_263]]
    Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

  (1) Resource exhausted:  OOM when allocating tensor with shape[16,64,256,256] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
    [[{{node model_1/decoder_stage3_concat/concat-0-TransposeNHWCToNCHW-LayoutOptimizer}}]]
    Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

0 successful operations.
0 derived errors ignored. [Op:__inference_distributed_function_70525]

Function call stack:
distributed_function -> distributed_function

2020-09-30 01:39:17.763325: W tensorflow/core/kernels/data/generator_dataset_op.cc:103] Error occurred when finalizing GeneratorDataset iterator: Cancelled: Operation was cancelled
```

```
stage4_unit3_bn2 (BatchNormaliz (None, None, None, 1 4096        concatenate_15[0][0]
__________________________________________________________________________________________________
stage4_unit3_relu2 (Activation) (None, None, None, 1 0           stage4_unit3_bn2[0][0]
__________________________________________________________________________________________________
stage4_unit3_conv3 (Conv2D)     (None, None, None, 2 2097152     stage4_unit3_relu2[0][0]
__________________________________________________________________________________________________
stage4_unit3_bn3 (BatchNormaliz (None, None, None, 2 8192        stage4_unit3_conv3[0][0]
__________________________________________________________________________________________________
add_15 (Add)                    (None, None, None, 2 0           stage4_unit3_bn3[0][0]
stage4_unit2_relu[0][0]
__________________________________________________________________________________________________
stage4_unit3_relu (Activation)  (None, None, None, 2 0           add_15[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 2 0           stage4_unit3_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 3 0           decoder_stage0_upsampling[0][0]
stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 7077888     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 7 0           decoder_stage1_upsampling[0][0]
stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 884736      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 3 0           decoder_stage2_upsampling[0][0]
stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 221184      decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
relu0[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 36864       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
~==================================================================================================
Total params: 32,057,206
Trainable params: 31,986,996
Non-trainable params: 70,210
__________________________________________________________________________________________________
```

ERROR

```
Traceback (most recent call last):
  File "train_segmentation_model.py", line 212, in <module>
    train(**argparser.parse_args().__dict__)
  File "train_segmentation_model.py", line 115, in train
    callbacks=[model_checkpoint_callback, tensorboard_callback, csv_logger_callback]
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training.py", line 819, in fit
    use_multiprocessing=use_multiprocessing)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 342, in fit
    total_epochs=epochs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2.py", line 128, in run_one_epoch
    batch_outs = execution_function(iterator)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/keras/engine/training_v2_utils.py", line 98, in execution_function
    distributed_function(input_fn))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 568, in __call__
    result = self._call(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/def_function.py", line 632, in _call
    return self._stateless_fn(*args, **kwds)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 2363, in __call__
    return graph_function._filtered_call(args, kwargs)  # pylint: disable=protected-access
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1611, in _filtered_call
    self.captured_inputs)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 1692, in _call_flat
    ctx, args, cancellation_manager=cancellation_manager))
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/function.py", line 545, in call
    ctx=ctx)
  File "/home/bbarbour/.local/lib/python3.5/site-packages/tensorflow_core/python/eager/execute.py", line 67, in quick_execute
    six.raise_from(core._status_to_exception(e.code, message), None)
  File "<string>", line 3, in raise_from
tensorflow.python.framework.errors_impl.ResourceExhaustedError: 2 root error(s) found.
  (0) Resource exhausted:  OOM when allocating tensor with shape[16,16,512,512] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
    [[node model_1/decoder_stage4b_bn/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

    [[metrics/true_pos/assert_less_equal/Assert/AssertGuard/pivot_f/_104/_409]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

  (1) Resource exhausted:  OOM when allocating tensor with shape[16,16,512,512] and type float on /job:localhost/replica:0/task:0/device:GPU:0 by allocator GPU_0_bfc
    [[node model_1/decoder_stage4b_bn/FusedBatchNormV3 (defined at train_segmentation_model.py:115) ]]
Hint: If you want to see a list of allocated tensors when OOM happens, add report_tensor_allocations_upon_oom to RunOptions for current allocation info.

0 successful operations.
0 derived errors ignored. [Op:__inference_distributed_function_66159]

Function call stack:
distributed_function -> distributed_function

2020-09-30 01:28:42.963571: W tensorflow/core/kernels/data/generator_dataset_op.cc:103] Error occurred when finalizing GeneratorDataset iterator: Cancelled: Operation was cancelled
```

```
Model: "model_1"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
data (InputLayer)               [(None, None, None,  0
__________________________________________________________________________________________________
bn_data (BatchNormalization)    (None, None, None, 1 3           data[0][0]
__________________________________________________________________________________________________
zero_padding2d (ZeroPadding2D)  (None, None, None, 1 0           bn_data[0][0]
__________________________________________________________________________________________________
conv0 (Conv2D)                  (None, None, None, 6 3136        zero_padding2d[0][0]
__________________________________________________________________________________________________
bn0 (BatchNormalization)        (None, None, None, 6 256         conv0[0][0]
__________________________________________________________________________________________________
relu0 (Activation)              (None, None, None, 6 0           bn0[0][0]
__________________________________________________________________________________________________
zero_padding2d_1 (ZeroPadding2D (None, None, None, 6 0           relu0[0][0]
__________________________________________________________________________________________________
pooling0 (MaxPooling2D)         (None, None, None, 6 0           zero_padding2d_1[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         pooling0[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu1 (Activation) (None, None, None, 6 0           stage1_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_2 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_2[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu2 (Activation) (None, None, None, 6 0           stage1_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_3 (ZeroPadding2D (None, None, None, 6 0           stage1_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_3[0][0]
__________________________________________________________________________________________________
global_average_pooling2d (Globa (None, 64)           0           stage1_unit1_conv2[0][0]
__________________________________________________________________________________________________
lambda (Lambda)                 (None, 1, 1, 64)     0           global_average_pooling2d[0][0]
__________________________________________________________________________________________________
conv2d (Conv2D)                 (None, 1, 1, 4)      260         lambda[0][0]
__________________________________________________________________________________________________
activation (Activation)         (None, 1, 1, 4)      0           conv2d[0][0]
__________________________________________________________________________________________________
conv2d_1 (Conv2D)               (None, 1, 1, 64)     320         activation[0][0]
__________________________________________________________________________________________________
activation_1 (Activation)       (None, 1, 1, 64)     0           conv2d_1[0][0]
__________________________________________________________________________________________________
multiply (Multiply)             (None, None, None, 6 0           stage1_unit1_conv2[0][0]
                                                                 activation_1[0][0]
__________________________________________________________________________________________________
stage1_unit1_sc (Conv2D)        (None, None, None, 6 4096        stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
add (Add)                       (None, None, None, 6 0           multiply[0][0]
                                                                 stage1_unit1_sc[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn1 (BatchNormaliz (None, None, None, 6 256         add[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu1 (Activation) (None, None, None, 6 0           stage1_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_4 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv1 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_4[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn2 (BatchNormaliz (None, None, None, 6 256         stage1_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu2 (Activation) (None, None, None, 6 0           stage1_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_5 (ZeroPadding2D (None, None, None, 6 0           stage1_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv2 (Conv2D)     (None, None, None, 6 36864       zero_padding2d_5[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_1 (Glo (None, 64)           0           stage1_unit2_conv2[0][0]
__________________________________________________________________________________________________
lambda_1 (Lambda)               (None, 1, 1, 64)     0           global_average_pooling2d_1[0][0]
__________________________________________________________________________________________________
conv2d_2 (Conv2D)               (None, 1, 1, 4)      260         lambda_1[0][0]
__________________________________________________________________________________________________
activation_2 (Activation)       (None, 1, 1, 4)      0           conv2d_2[0][0]
__________________________________________________________________________________________________
conv2d_3 (Conv2D)               (None, 1, 1, 64)     320         activation_2[0][0]
__________________________________________________________________________________________________
activation_3 (Activation)       (None, 1, 1, 64)     0           conv2d_3[0][0]
__________________________________________________________________________________________________
multiply_1 (Multiply)           (None, None, None, 6 0           stage1_unit2_conv2[0][0]
                                                                 activation_3[0][0]
__________________________________________________________________________________________________
add_1 (Add)                     (None, None, None, 6 0           multiply_1[0][0]
                                                                 add[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn1 (BatchNormaliz (None, None, None, 6 256         add_1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu1 (Activation) (None, None, None, 6 0           stage2_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_6 (ZeroPadding2D (None, None, None, 6 0           stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv1 (Conv2D)     (None, None, None, 1 73728       zero_padding2d_6[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn2 (BatchNormaliz (None, None, None, 1 512         stage2_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu2 (Activation) (None, None, None, 1 0           stage2_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_7 (ZeroPadding2D (None, None, None, 1 0           stage2_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv2 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_7[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_2 (Glo (None, 128)          0           stage2_unit1_conv2[0][0]
__________________________________________________________________________________________________
lambda_2 (Lambda)               (None, 1, 1, 128)    0           global_average_pooling2d_2[0][0]
__________________________________________________________________________________________________
conv2d_4 (Conv2D)               (None, 1, 1, 8)      1032        lambda_2[0][0]
__________________________________________________________________________________________________
activation_4 (Activation)       (None, 1, 1, 8)      0           conv2d_4[0][0]
__________________________________________________________________________________________________
conv2d_5 (Conv2D)               (None, 1, 1, 128)    1152        activation_4[0][0]
__________________________________________________________________________________________________
activation_5 (Activation)       (None, 1, 1, 128)    0           conv2d_5[0][0]
__________________________________________________________________________________________________
multiply_2 (Multiply)           (None, None, None, 1 0           stage2_unit1_conv2[0][0]
                                                                 activation_5[0][0]
__________________________________________________________________________________________________
stage2_unit1_sc (Conv2D)        (None, None, None, 1 8192        stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_2 (Add)                     (None, None, None, 1 0           multiply_2[0][0]
                                                                 stage2_unit1_sc[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn1 (BatchNormaliz (None, None, None, 1 512         add_2[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu1 (Activation) (None, None, None, 1 0           stage2_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_8 (ZeroPadding2D (None, None, None, 1 0           stage2_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv1 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_8[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn2 (BatchNormaliz (None, None, None, 1 512         stage2_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu2 (Activation) (None, None, None, 1 0           stage2_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_9 (ZeroPadding2D (None, None, None, 1 0           stage2_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv2 (Conv2D)     (None, None, None, 1 147456      zero_padding2d_9[0][0]
__________________________________________________________________________________________________
global_average_pooling2d_3 (Glo (None, 128)          0           stage2_unit2_conv2[0][0]
__________________________________________________________________________________________________
lambda_3 (Lambda)               (None, 1, 1, 128)    0           global_average_pooling2d_3[0][0]
__________________________________________________________________________________________________
conv2d_6 (Conv2D)               (None, 1, 1, 8)      1032        lambda_3[0][0]
__________________________________________________________________________________________________
activation_6 (Activation)       (None, 1, 1, 8)      0           conv2d_6[0][0]
__________________________________________________________________________________________________
conv2d_7 (Conv2D)               (None, 1, 1, 128)    1152        activation_6[0][0]
__________________________________________________________________________________________________
activation_7 (Activation)       (None, 1, 1, 128)    0           conv2d_7[0][0]
__________________________________________________________________________________________________
multiply_3 (Multiply)           (None, None, None, 1 0           stage2_unit2_conv2[0][0]
                                                                 activation_7[0][0]
__________________________________________________________________________________________________
add_3 (Add)                     (None, None, None, 1 0           multiply_3[0][0]
                                                                 add_2[0][0]
__________________________________________________________________________________________________
stage3_unit1_bn1 (BatchNormaliz (None, None, None, 1 512         add_3[0][0]
__________________________________________________________________________________________________
stage3_unit1_relu1 (Activation) (None, None, None, 1 0           stage3_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_10 (ZeroPadding2 (None, None, None, 1 0           stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage3_unit1_conv1 (Conv2D)     (None, None, None, 2 294912      zero_padding2d_10[0][0]
```

```
10 epoch results
loss: 0.0394 - binary_ce_metric: 0.0394 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.5865 - false_neg: 6791.0000 - true_neg: 62907772.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall
Epoch 00010: loss improved from 0.04684 to 0.03890, saving model to tmp/models/segmentation-model-small-3class_20200929T232811Z/model.hdf5
```

stage3_unit1_bn2 (BatchNormaliz	(None, None, None, 2	1024	stage3_unit1_conv1[0][0]		
stage3_unit1_relu2 (Activation)	(None, None, None, 2	0	stage3_unit1_bn2[0][0]		
zero_padding2d_11 (ZeroPadding2	(None, None, None, 2	0	stage3_unit1_relu2[0][0]		
stage3_unit1_conv2 (Conv2D)	(None, None, None, 2	589824	zero_padding2d_11[0][0]		
global_average_pooling2d_4 (Glo	(None, 256)	0	stage3_unit1_conv2[0][0]		
lambda_4 (Lambda)	(None, 1, 1, 256)	0	global_average_pooling2d_4[0][0]		
conv2d_8 (Conv2D)	(None, 1, 1, 16)	4112	lambda_4[0][0]		
activation_8 (Activation)	(None, 1, 1, 16)	0	conv2d_8[0][0]		
conv2d_9 (Conv2D)	(None, 1, 1, 256)	4352	activation_8[0][0]		
activation_9 (Activation)	(None, 1, 1, 256)	0	conv2d_9[0][0]		
multiply_4 (Multiply)	(None, None, None, 2	0	stage3_unit1_conv2[0][0]		
activation_9[0][0]					
stage3_unit1_sc (Conv2D)	(None, None, None, 2	32768	stage3_unit1_relu1[0][0]		
add_4 (Add)	(None, None, None, 2	0	multiply_4[0][0]		
stage3_unit1_sc[0][0]					
stage3_unit2_bn1 (BatchNormaliz	(None, None, None, 2	1024	add_4[0][0]		
stage3_unit2_relu1 (Activation)	(None, None, None, 2	0	stage3_unit2_bn1[0][0]		
zero_padding2d_12 (ZeroPadding2	(None, None, None, 2	0	stage3_unit2_relu1[0][0]		
stage3_unit2_conv1 (Conv2D)	(None, None, None, 2	589824	zero_padding2d_12[0][0]		
stage3_unit2_bn2 (BatchNormaliz	(None, None, None, 2	1024	stage3_unit2_conv1[0][0]		
stage3_unit2_relu2 (Activation)	(None, None, None, 2	0	stage3_unit2_bn2[0][0]		
zero_padding2d_13 (ZeroPadding2	(None, None, None, 2	0	stage3_unit2_relu2[0][0]		
stage3_unit2_conv2 (Conv2D)	(None, None, None, 2	589824	zero_padding2d_13[0][0]		
global_average_pooling2d_5 (Glo	(None, 256)	0	stage3_unit2_conv2[0][0]		
lambda_5 (Lambda)	(None, 1, 1, 256)	0	global_average_pooling2d_5[0][0]		
conv2d_10 (Conv2D)	(None, 1, 1, 16)	4112	lambda_5[0][0]		
activation_10 (Activation)	(None, 1, 1, 16)	0	conv2d_10[0][0]		
conv2d_11 (Conv2D)	(None, 1, 1, 256)	4352	activation_10[0][0]		
activation_11 (Activation)	(None, 1, 1, 256)	0	conv2d_11[0][0]		
multiply_5 (Multiply)	(None, None, None, 2	0	stage3_unit2_conv2[0][0]		
activation_11[0][0]					
add_5 (Add)	(None, None, None, 2	0	multiply_5[0][0]		
add_4[0][0]					
stage4_unit1_bn1 (BatchNormaliz	(None, None, None, 2	1024	add_5[0][0]		
stage4_unit1_relu1 (Activation)	(None, None, None, 2	0	stage4_unit1_bn1[0][0]		
zero_padding2d_14 (ZeroPadding2	(None, None, None, 2	0	stage4_unit1_relu1[0][0]		
stage4_unit1_conv1 (Conv2D)	(None, None, None, 5	1179648	zero_padding2d_14[0][0]		
stage4_unit1_bn2 (BatchNormaliz	(None, None, None, 5	2048	stage4_unit1_conv1[0][0]		
stage4_unit1_relu2 (Activation)	(None, None, None, 5	0	stage4_unit1_bn2[0][0]		
zero_padding2d_15 (ZeroPadding2	(None, None, None, 5	0	stage4_unit1_relu2[0][0]		
stage4_unit1_conv2 (Conv2D)	(None, None, None, 5	2359296	zero_padding2d_15[0][0]		
global_average_pooling2d_6 (Glo	(None, 512)	0	stage4_unit1_conv2[0][0]		
lambda_6 (Lambda)	(None, 1, 1, 512)	0	global_average_pooling2d_6[0][0]		
conv2d_12 (Conv2D)	(None, 1, 1, 32)	16416	lambda_6[0][0]		
activation_12 (Activation)	(None, 1, 1, 32)	0	conv2d_12[0][0]		
conv2d_13 (Conv2D)	(None, 1, 1, 512)	16896	activation_12[0][0]		
activation_13 (Activation)	(None, 1, 1, 512)	0	conv2d_13[0][0]		
multiply_6 (Multiply)	(None, None, None, 5	0	stage4_unit1_conv2[0][0]		
activation_13[0][0]					
stage4_unit1_sc (Conv2D)	(None, None, None, 5	131072	stage4_unit1_relu1[0][0]		
add_6 (Add)	(None, None, None, 5	0	multiply_6[0][0]		
stage4_unit1_sc[0][0]					
stage4_unit2_bn1 (BatchNormaliz	(None, None, None, 5	2048	add_6[0][0]		
stage4_unit2_relu1 (Activation)	(None, None, None, 5	0	stage4_unit2_bn1[0][0]		
zero_padding2d_16 (ZeroPadding2	(None, None, None, 5	0	stage4_unit2_relu1[0][0]		
stage4_unit2_conv1 (Conv2D)	(None, None, None, 5	2359296	zero_padding2d_16[0][0]		
stage4_unit2_bn2 (BatchNormaliz	(None, None, None, 5	2048	stage4_unit2_conv1[0][0]		
stage4_unit2_relu2 (Activation)	(None, None, None, 5	0	stage4_unit2_bn2[0][0]		
zero_padding2d_17 (ZeroPadding2	(None, None, None, 5	0	stage4_unit2_relu2[0][0]		
stage4_unit2_conv2 (Conv2D)	(None, None, None, 5	2359296	zero_padding2d_17[0][0]		
global_average_pooling2d_7 (Glo	(None, 512)	0	stage4_unit2_conv2[0][0]		
lambda_7 (Lambda)	(None, 1, 1, 512)	0	global_average_pooling2d_7[0][0]		
conv2d_14 (Conv2D)	(None, 1, 1, 32)	16416	lambda_7[0][0]		
activation_14 (Activation)	(None, 1, 1, 32)	0	conv2d_14[0][0]		
conv2d_15 (Conv2D)	(None, 1, 1, 512)	16896	activation_14[0][0]		
activation_15 (Activation)	(None, 1, 1, 512)	0	conv2d_15[0][0]		
multiply_7 (Multiply)	(None, None, None, 5	0	stage4_unit2_conv2[0][0]		
activation_15[0][0]					
add_7 (Add)	(None, None, None, 5	0	multiply_7[0][0]		
add_6[0][0]					
bn1 (BatchNormalization)	(None, None, None, 5	2048	add_7[0][0]		
relu1 (Activation)	(None, None, None, 5	0	bn1[0][0]		
decoder_stage0_upsampling (UpSa	(None, None, None, 5	0	relu1[0][0]		
decoder_stage0_concat (Concaten	(None, None, None, 7	0	decoder_stage0_upsampling[0][0]		
stage4_unit1_relu1[0][0]					
decoder_stage0a_conv (Conv2D)	(None, None, None, 2	1769472	decoder_stage0_concat[0][0]		
decoder_stage0a_bn (BatchNormal	(None, None, None, 2	1024	decoder_stage0a_conv[0][0]		
decoder_stage0a_relu (Activatio	(None, None, None, 2	0	decoder_stage0a_bn[0][0]		
decoder_stage0b_conv (Conv2D)	(None, None, None, 2	589824	decoder_stage0a_relu[0][0]		
decoder_stage0b_bn (BatchNormal	(None, None, None, 2	1024	decoder_stage0b_conv[0][0]		
decoder_stage0b_relu (Activatio	(None, None, None, 2	0	decoder_stage0b_bn[0][0]		
decoder_stage1_upsampling (UpSa	(None, None, None, 2	0	decoder_stage0b_relu[0][0]		
decoder_stage1_concat (Concaten	(None, None, None, 3	0	decoder_stage1_upsampling[0][0]		
stage3_unit1_relu1[0][0]					
decoder_stage1a_conv (Conv2D)	(None, None, None, 1	442368	decoder_stage1_concat[0][0]		
decoder_stage1a_bn (BatchNormal	(None, None, None, 1	512	decoder_stage1a_conv[0][0]		
decoder_stage1a_relu (Activatio	(None, None, None, 1	0	decoder_stage1a_bn[0][0]		
decoder_stage1b_conv (Conv2D)	(None, None, None, 1	147456	decoder_stage1a_relu[0][0]		

```
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512        decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0          decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0          decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 1 0          decoder_stage2_upsampling[0][0]
stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 110592     decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256        decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0          decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864      decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256        decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0          decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0          decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0          decoder_stage3_upsampling[0][0]
relu0[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 36864      decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128        decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0          decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216       decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128        decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0          decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0          decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608       decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64         decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0          decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304       decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64         decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0          decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435        decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0          final_conv[0][0]
==================================================================================================
Total params: 14,423,662
Trainable params: 14,413,740
Non-trainable params: 9,922
__________________________________________________________________________________________________
```

```
Model: "model_1"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
data (InputLayer)               [(None, None, None,  0
__________________________________________________________________________________________________
bn_data (BatchNormalization)    (None, None, None, 1 3          data[0][0]
__________________________________________________________________________________________________
zero_padding2d (ZeroPadding2D)  (None, None, None, 1 0          bn_data[0][0]
__________________________________________________________________________________________________
conv0 (Conv2D)                  (None, None, None, 6 3136       zero_padding2d[0][0]
__________________________________________________________________________________________________
bn0 (BatchNormalization)        (None, None, None, 6 256        conv0[0][0]
__________________________________________________________________________________________________
relu0 (Activation)              (None, None, None, 6 0          bn0[0][0]
__________________________________________________________________________________________________
zero_padding2d_1 (ZeroPadding2D (None, None, None, 6 0          relu0[0][0]
__________________________________________________________________________________________________
pooling0 (MaxPooling2D)         (None, None, None, 6 0          zero_padding2d_1[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn1 (BatchNormaliz (None, None, None, 6 256        pooling0[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu1 (Activation) (None, None, None, 6 0          stage1_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_2 (ZeroPadding2D (None, None, None, 6 0          stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv1 (Conv2D)     (None, None, None, 6 36864      zero_padding2d_2[0][0]
__________________________________________________________________________________________________
stage1_unit1_bn2 (BatchNormaliz (None, None, None, 6 256        stage1_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit1_relu2 (Activation) (None, None, None, 6 0          stage1_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_3 (ZeroPadding2D (None, None, None, 6 0          stage1_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit1_conv2 (Conv2D)     (None, None, None, 6 36864      zero_padding2d_3[0][0]
__________________________________________________________________________________________________
stage1_unit1_sc (Conv2D)        (None, None, None, 6 4096       stage1_unit1_relu1[0][0]
__________________________________________________________________________________________________
add (Add)                       (None, None, None, 6 0          stage1_unit1_conv2[0][0]
                                                                stage1_unit1_sc[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn1 (BatchNormaliz (None, None, None, 6 256        add[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu1 (Activation) (None, None, None, 6 0          stage1_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_4 (ZeroPadding2D (None, None, None, 6 0          stage1_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv1 (Conv2D)     (None, None, None, 6 36864      zero_padding2d_4[0][0]
__________________________________________________________________________________________________
stage1_unit2_bn2 (BatchNormaliz (None, None, None, 6 256        stage1_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage1_unit2_relu2 (Activation) (None, None, None, 6 0          stage1_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_5 (ZeroPadding2D (None, None, None, 6 0          stage1_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage1_unit2_conv2 (Conv2D)     (None, None, None, 6 36864      zero_padding2d_5[0][0]
__________________________________________________________________________________________________
add_1 (Add)                     (None, None, None, 6 0          stage1_unit2_conv2[0][0]
                                                                add[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn1 (BatchNormaliz (None, None, None, 6 256        add_1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu1 (Activation) (None, None, None, 6 0          stage2_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_6 (ZeroPadding2D (None, None, None, 6 0          stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv1 (Conv2D)     (None, None, None, 1 73728      zero_padding2d_6[0][0]
__________________________________________________________________________________________________
stage2_unit1_bn2 (BatchNormaliz (None, None, None, 1 512        stage2_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit1_relu2 (Activation) (None, None, None, 1 0          stage2_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_7 (ZeroPadding2D (None, None, None, 1 0          stage2_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit1_conv2 (Conv2D)     (None, None, None, 1 147456     zero_padding2d_7[0][0]
__________________________________________________________________________________________________
stage2_unit1_sc (Conv2D)        (None, None, None, 1 8192       stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_2 (Add)                     (None, None, None, 1 0          stage2_unit1_conv2[0][0]
                                                                stage2_unit1_sc[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn1 (BatchNormaliz (None, None, None, 1 512        add_2[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu1 (Activation) (None, None, None, 1 0          stage2_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_8 (ZeroPadding2D (None, None, None, 1 0          stage2_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv1 (Conv2D)     (None, None, None, 1 147456     zero_padding2d_8[0][0]
__________________________________________________________________________________________________
stage2_unit2_bn2 (BatchNormaliz (None, None, None, 1 512        stage2_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage2_unit2_relu2 (Activation) (None, None, None, 1 0          stage2_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_9 (ZeroPadding2D (None, None, None, 1 0          stage2_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage2_unit2_conv2 (Conv2D)     (None, None, None, 1 147456     zero_padding2d_9[0][0]
__________________________________________________________________________________________________
add_3 (Add)                     (None, None, None, 1 0          stage2_unit2_conv2[0][0]
                                                                add_2[0][0]
__________________________________________________________________________________________________
stage3_unit1_bn1 (BatchNormaliz (None, None, None, 1 512        add_3[0][0]
__________________________________________________________________________________________________
stage3_unit1_relu1 (Activation) (None, None, None, 1 0          stage3_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_10 (ZeroPadding2 (None, None, None, 1 0          stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage3_unit1_conv1 (Conv2D)     (None, None, None, 2 294912     zero_padding2d_10[0][0]
__________________________________________________________________________________________________
stage3_unit1_bn2 (BatchNormaliz (None, None, None, 2 1024       stage3_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage3_unit1_relu2 (Activation) (None, None, None, 2 0          stage3_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_11 (ZeroPadding2 (None, None, None, 2 0          stage3_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage3_unit1_conv2 (Conv2D)     (None, None, None, 2 589824     zero_padding2d_11[0][0]
__________________________________________________________________________________________________
stage3_unit1_sc (Conv2D)        (None, None, None, 2 32768      stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_4 (Add)                     (None, None, None, 2 0          stage3_unit1_conv2[0][0]
                                                                stage3_unit1_sc[0][0]
__________________________________________________________________________________________________
stage3_unit2_bn1 (BatchNormaliz (None, None, None, 2 1024       add_4[0][0]
__________________________________________________________________________________________________
stage3_unit2_relu1 (Activation) (None, None, None, 2 0          stage3_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_12 (ZeroPadding2 (None, None, None, 2 0          stage3_unit2_relu1[0][0]
__________________________________________________________________________________________________
stage3_unit2_conv1 (Conv2D)     (None, None, None, 2 589824     zero_padding2d_12[0][0]
__________________________________________________________________________________________________
stage3_unit2_bn2 (BatchNormaliz (None, None, None, 2 1024       stage3_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage3_unit2_relu2 (Activation) (None, None, None, 2 0          stage3_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_13 (ZeroPadding2 (None, None, None, 2 0          stage3_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage3_unit2_conv2 (Conv2D)     (None, None, None, 2 589824     zero_padding2d_13[0][0]
__________________________________________________________________________________________________
add_5 (Add)                     (None, None, None, 2 0          stage3_unit2_conv2[0][0]
                                                                add_4[0][0]
__________________________________________________________________________________________________
stage4_unit1_bn1 (BatchNormaliz (None, None, None, 2 1024       add_5[0][0]
__________________________________________________________________________________________________
stage4_unit1_relu1 (Activation) (None, None, None, 2 0          stage4_unit1_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_14 (ZeroPadding2 (None, None, None, 2 0          stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
stage4_unit1_conv1 (Conv2D)     (None, None, None, 5 1179648    zero_padding2d_14[0][0]
__________________________________________________________________________________________________
stage4_unit1_bn2 (BatchNormaliz (None, None, None, 5 2048       stage4_unit1_conv1[0][0]
__________________________________________________________________________________________________
stage4_unit1_relu2 (Activation) (None, None, None, 5 0          stage4_unit1_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_15 (ZeroPadding2 (None, None, None, 5 0          stage4_unit1_relu2[0][0]
__________________________________________________________________________________________________
stage4_unit1_conv2 (Conv2D)     (None, None, None, 5 2359296    zero_padding2d_15[0][0]
__________________________________________________________________________________________________
stage4_unit1_sc (Conv2D)        (None, None, None, 5 131072     stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
add_6 (Add)                     (None, None, None, 5 0          stage4_unit1_conv2[0][0]
                                                                stage4_unit1_sc[0][0]
__________________________________________________________________________________________________
stage4_unit2_bn1 (BatchNormaliz (None, None, None, 5 2048       add_6[0][0]
__________________________________________________________________________________________________
stage4_unit2_relu1 (Activation) (None, None, None, 5 0          stage4_unit2_bn1[0][0]
__________________________________________________________________________________________________
zero_padding2d_16 (ZeroPadding2 (None, None, None, 5 0          stage4_unit2_relu1[0][0]
__________________________________________________________________________________________________
```

```
10 epoch
loss: 0.0472 - binary_ce_metric: 0.0472 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accuracy: 0.4554 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall
.0036 - false_neg: 6791.0000 - true_neg: 62907772.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1153e-11 - class0_b
inary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.1960e-11 - class1_binary_a
ccuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.5490e-11 - class2_binary_accuracy
_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
Epoch 00010: loss improved from 0.08882 to 0.06966, saving model to tmp/models/segmentation-model-small-3class_20200929T233803Z/model.hdf5
```

```
stage4_unit2_conv1 (Conv2D)     (None, None, None, 5 2359296    zero_padding2d_16[0][0]
__________________________________________________________________________________________________
stage4_unit2_bn2 (BatchNormaliz (None, None, None, 5 2048       stage4_unit2_conv1[0][0]
__________________________________________________________________________________________________
stage4_unit2_relu2 (Activation) (None, None, None, 5 0          stage4_unit2_bn2[0][0]
__________________________________________________________________________________________________
zero_padding2d_17 (ZeroPadding2 (None, None, None, 5 0          stage4_unit2_relu2[0][0]
__________________________________________________________________________________________________
stage4_unit2_conv2 (Conv2D)     (None, None, None, 5 2359296    zero_padding2d_17[0][0]
__________________________________________________________________________________________________
add_7 (Add)                     (None, None, None, 5 0          stage4_unit2_conv2[0][0]
                                                                 add_6[0][0]
__________________________________________________________________________________________________
bn1 (BatchNormalization)        (None, None, None, 5 2048       add_7[0][0]
__________________________________________________________________________________________________
relu1 (Activation)              (None, None, None, 5 0          bn1[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 5 0          relu1[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 7 0          decoder_stage0_upsampling[0][0]
                                                                 stage4_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 1769472    decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024       decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0          decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824     decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024       decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0          decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0          decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 3 0          decoder_stage1_upsampling[0][0]
                                                                 stage3_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 442368     decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512        decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0          decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456     decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512        decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0          decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0          decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 1 0          decoder_stage2_upsampling[0][0]
                                                                 stage2_unit1_relu1[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 110592     decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256        decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0          decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864      decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256        decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0          decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0          decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0          decoder_stage3_upsampling[0][0]
                                                                 relu0[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 36864      decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128        decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0          decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216       decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128        decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0          decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0          decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608       decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64         decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0          decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304       decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64         decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0          decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435        decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0          final_conv[0][0]
==================================================================================================
Total params: 14,334,582
Trainable params: 14,324,660
Non-trainable params: 9,922
```

```
Model: "model"
_________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
input_1 (InputLayer)            [(None, None, None,  0
__________________________________________________________________________________________________
block1_conv1 (Conv2D)           (None, None, None, 6 640         input_1[0][0]
__________________________________________________________________________________________________
block1_conv2 (Conv2D)           (None, None, None, 6 36928       block1_conv1[0][0]
__________________________________________________________________________________________________
block1_pool (MaxPooling2D)      (None, None, None, 6 0           block1_conv2[0][0]
__________________________________________________________________________________________________
block2_conv1 (Conv2D)           (None, None, None, 1 73856       block1_pool[0][0]
__________________________________________________________________________________________________
block2_conv2 (Conv2D)           (None, None, None, 1 147584      block2_conv1[0][0]
__________________________________________________________________________________________________
block2_pool (MaxPooling2D)      (None, None, None, 1 0           block2_conv2[0][0]
__________________________________________________________________________________________________
block3_conv1 (Conv2D)           (None, None, None, 2 295168      block2_pool[0][0]
__________________________________________________________________________________________________
block3_conv2 (Conv2D)           (None, None, None, 2 590080      block3_conv1[0][0]
__________________________________________________________________________________________________
block3_conv3 (Conv2D)           (None, None, None, 2 590080      block3_conv2[0][0]
__________________________________________________________________________________________________
block3_conv4 (Conv2D)           (None, None, None, 2 590080      block3_conv3[0][0]
__________________________________________________________________________________________________
block3_pool (MaxPooling2D)      (None, None, None, 2 0           block3_conv4[0][0]
__________________________________________________________________________________________________
block4_conv1 (Conv2D)           (None, None, None, 5 1180160     block3_pool[0][0]
__________________________________________________________________________________________________
block4_conv2 (Conv2D)           (None, None, None, 5 2359808     block4_conv1[0][0]
__________________________________________________________________________________________________
block4_conv3 (Conv2D)           (None, None, None, 5 2359808     block4_conv2[0][0]
__________________________________________________________________________________________________
block4_conv4 (Conv2D)           (None, None, None, 5 2359808     block4_conv3[0][0]
__________________________________________________________________________________________________
block4_pool (MaxPooling2D)      (None, None, None, 5 0           block4_conv4[0][0]
__________________________________________________________________________________________________
block5_conv1 (Conv2D)           (None, None, None, 5 2359808     block4_pool[0][0]
__________________________________________________________________________________________________
block5_conv2 (Conv2D)           (None, None, None, 5 2359808     block5_conv1[0][0]
__________________________________________________________________________________________________
block5_conv3 (Conv2D)           (None, None, None, 5 2359808     block5_conv2[0][0]
__________________________________________________________________________________________________
block5_conv4 (Conv2D)           (None, None, None, 5 2359808     block5_conv3[0][0]
__________________________________________________________________________________________________
block5_pool (MaxPooling2D)      (None, None, None, 5 0           block5_conv4[0][0]
__________________________________________________________________________________________________
center_block1_conv (Conv2D)     (None, None, None, 5 2359296     block5_pool[0][0]
__________________________________________________________________________________________________
center_block1_bn (BatchNormaliz (None, None, None, 5 2048        center_block1_conv[0][0]
__________________________________________________________________________________________________
center_block1_relu (Activation) (None, None, None, 5 0           center_block1_bn[0][0]
__________________________________________________________________________________________________
center_block2_conv (Conv2D)     (None, None, None, 5 2359296     center_block1_relu[0][0]
__________________________________________________________________________________________________
center_block2_bn (BatchNormaliz (None, None, None, 5 2048        center_block2_conv[0][0]
__________________________________________________________________________________________________
center_block2_relu (Activation) (None, None, None, 5 0           center_block2_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 5 0           center_block2_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 1 0           decoder_stage0_upsampling[0][0]
                                                                 block5_conv4[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 2359296     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 7 0           decoder_stage1_upsampling[0][0]
                                                                 block4_conv4[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 884736      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 3 0           decoder_stage2_upsampling[0][0]
                                                                 block3_conv4[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 221184      decoder_stage2_concat[0][0]
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
                                                                 block2_conv2[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 55296       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
==================================================================================================A145
Total params: 29,061,107
```

```
loss: 0.0422 - binary_ce_metric: 0.0422 - accuracy: 0.0000e+00 - class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - categorical_accurac
y: 0.0065 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.0000e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_cross_entropy: 1.1037e-11 - clas
s0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1_binary_cross_entropy: 1.5045e-11 - class1_bina
ry_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - class1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00 - class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accu
racy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0.0000e+00
```

Trainable params: 29,057,075
Non-trainable params: 4,032

```
Model: "model"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
input_1 (InputLayer)            [(None, None, None,  0
__________________________________________________________________________________________________
block1_conv1 (Conv2D)           (None, None, None, 6 640         input_1[0][0]
__________________________________________________________________________________________________
block1_conv2 (Conv2D)           (None, None, None, 6 36928       block1_conv1[0][0]
__________________________________________________________________________________________________
block1_pool (MaxPooling2D)      (None, None, None, 6 0           block1_conv2[0][0]
__________________________________________________________________________________________________
block2_conv1 (Conv2D)           (None, None, None, 1 73856       block1_pool[0][0]
__________________________________________________________________________________________________
block2_conv2 (Conv2D)           (None, None, None, 1 147584      block2_conv1[0][0]
__________________________________________________________________________________________________
block2_pool (MaxPooling2D)      (None, None, None, 1 0           block2_conv2[0][0]
__________________________________________________________________________________________________
block3_conv1 (Conv2D)           (None, None, None, 2 295168      block2_pool[0][0]
__________________________________________________________________________________________________
block3_conv2 (Conv2D)           (None, None, None, 2 590080      block3_conv1[0][0]
__________________________________________________________________________________________________
block3_conv3 (Conv2D)           (None, None, None, 2 590080      block3_conv2[0][0]
__________________________________________________________________________________________________
block3_pool (MaxPooling2D)      (None, None, None, 2 0           block3_conv3[0][0]
__________________________________________________________________________________________________
block4_conv1 (Conv2D)           (None, None, None, 5 1180160     block3_pool[0][0]
__________________________________________________________________________________________________
block4_conv2 (Conv2D)           (None, None, None, 5 2359808     block4_conv1[0][0]
__________________________________________________________________________________________________
block4_conv3 (Conv2D)           (None, None, None, 5 2359808     block4_conv2[0][0]
__________________________________________________________________________________________________
block4_pool (MaxPooling2D)      (None, None, None, 5 0           block4_conv3[0][0]
__________________________________________________________________________________________________
block5_conv1 (Conv2D)           (None, None, None, 5 2359808     block4_pool[0][0]
__________________________________________________________________________________________________
block5_conv1 (Conv2D)           (None, None, None, 5 2359808     block4_pool[0][0]
__________________________________________________________________________________________________
block5_conv2 (Conv2D)           (None, None, None, 5 2359808     block5_conv1[0][0]
__________________________________________________________________________________________________
block5_conv3 (Conv2D)           (None, None, None, 5 2359808     block5_conv2[0][0]
__________________________________________________________________________________________________
block5_pool (MaxPooling2D)      (None, None, None, 5 0           block5_conv3[0][0]
__________________________________________________________________________________________________
center_block1_conv (Conv2D)     (None, None, None, 5 2359296     block5_pool[0][0]
__________________________________________________________________________________________________
center_block1_bn (BatchNormaliz (None, None, None, 5 2048        center_block1_conv[0][0]
__________________________________________________________________________________________________
center_block1_relu (Activation) (None, None, None, 5 0           center_block1_bn[0][0]
__________________________________________________________________________________________________
center_block2_conv (Conv2D)     (None, None, None, 5 2359296     center_block1_relu[0][0]
__________________________________________________________________________________________________
center_block2_bn (BatchNormaliz (None, None, None, 5 2048        center_block2_conv[0][0]
__________________________________________________________________________________________________
center_block2_relu (Activation) (None, None, None, 5 0           center_block2_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0_upsampling (UpSa (None, None, None, 5 0           center_block2_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0_concat (Concaten (None, None, None, 1 0           decoder_stage0_upsampling[0][0]
block5_conv3[0][0]
__________________________________________________________________________________________________
decoder_stage0a_conv (Conv2D)   (None, None, None, 2 2359296     decoder_stage0_concat[0][0]
__________________________________________________________________________________________________
decoder_stage0a_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0a_relu (Activatio (None, None, None, 2 0           decoder_stage0a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage0b_conv (Conv2D)   (None, None, None, 2 589824      decoder_stage0a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage0b_bn (BatchNormal (None, None, None, 2 1024        decoder_stage0b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage0b_relu (Activatio (None, None, None, 2 0           decoder_stage0b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1_upsampling (UpSa (None, None, None, 2 0           decoder_stage0b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1_concat (Concaten (None, None, None, 7 0           decoder_stage1_upsampling[0][0]
block4_conv3[0][0]
__________________________________________________________________________________________________
decoder_stage1a_conv (Conv2D)   (None, None, None, 1 884736      decoder_stage1_concat[0][0]
__________________________________________________________________________________________________
decoder_stage1a_bn (BatchNormal (None, None, None, 1 512         decoder_stage1a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1a_relu (Activatio (None, None, None, 1 0           decoder_stage1a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage1b_conv (Conv2D)   (None, None, None, 1 147456      decoder_stage1a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage1b_bn (BatchNormal (None, None, None, 1 512         decoder_stage1b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage1b_relu (Activatio (None, None, None, 1 0           decoder_stage1b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2_upsampling (UpSa (None, None, None, 1 0           decoder_stage1b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2_concat (Concaten (None, None, None, 3 0           decoder_stage2_upsampling[0][0]
block3_conv3[0][0]
__________________________________________________________________________________________________
decoder_stage2a_conv (Conv2D)   (None, None, None, 6 221184      decoder_stage2_concat[0][0]
```

```
10 epoch test results
loss: 0.0533 - binary_ce_metric: 0.0533 - accuracy: 0.0000e+00
- class_all_binary_accuracy_tfkeras: 0.9999 - class_all_binary_accuracy_sm: 0.9999 - binary_accuracy: 0.9999 - cate
gorical_accuracy: 0.9939 - false_neg: 8324.0000 - true_neg: 75489152.0000 - false_pos: 0.0000e+00 - true_pos: 0.000
0e+00 - recall: 0.0000e+00 - precision: 0.0000e+00 - f1_score: 0.0000e+00 - iou_score: 0.0000e+00 - class0_binary_c
ross_entropy: 1.1037e-11 - class0_binary_accuracy_sm: 0.9999 - class0_binary_accuracy_tfkeras: 0.9999 - class0_iou_
score: 0.0000e+00 - class0_f1_score: 0.0000e+00 - class0_precision: 0.0000e+00 - class0_recall: 0.0000e+00 - class1
_binary_cross_entropy: 1.5045e-11 - class1_binary_accuracy_sm: 0.9999 - class1_binary_accuracy_tfkeras: 0.9999 - cl
ass1_iou_score: 0.0000e+00 - class1_f1_score: 0.0000e+00 - class1_precision: 0.0000e+00 - class1_recall: 0.0000e+00
- class2_binary_cross_entropy: 1.3349e-11 - class2_binary_accuracy_sm: 0.9999 - class2_binary_accuracy_tfkeras: 0.
9999 - class2_iou_score: 0.0000e+00 - class2_f1_score: 0.0000e+00 - class2_precision: 0.0000e+00 - class2_recall: 0
.0000e+00 - val_loss: 0.0093 - val_binary_ce_metric: 0.0093 - val_accuracy: 0.0000e+00 - val_class_all_binary_accur
acy_tfkeras: 0.9999 - val_class_all_binary_accuracy_sm: 0.9999 - val_binary_accuracy: 0.9999 - val_categorical_accu
racy: 0.0524 - val_false_neg: 9013.0000 - val_true_neg: 75488456.0000 - val_false_pos: 0.0000e+00 - val_true_pos: 0
.0000e+00 - val_recall: 0.0000e+00 - val_precision: 0.0000e+00 - val_f1_score: 0.0000e+00 - val_iou_score: 0.0000e+
00 - val_class0_binary_cross_entropy: 1.2875e-11 - val_class0_binary_accuracy_sm: 0.9999 - val_class0_binary_accura
cy_tfkeras: 0.9999 - val_class0_iou_score: 0.0000e+00 - val_class0_f1_score: 0.0000e+00 - val_class0_precision: 0.0
000e+00 - val_class0_recall: 0.0000e+00 - val_class1_binary_cross_entropy: 2.5082e-11 - val_class1_binary_accuracy_
sm: 0.9998 - val_class1_binary_accuracy_tfkeras: 0.9998 - val_class1_iou_score: 0.0000e+00 - val_class1_f1_score: 0
.0000e+00 - val_class1_precision: 0.0000e+00 - val_class1_recall: 0.0000e+00 - val_class2_binary_cross_entropy: 4.7
370e-12 - val_class2_binary_accuracy_sm: 1.0000 - val_class2_binary_accuracy_tfkeras: 1.0000 - val_class2_iou_score
: 0.0000e+00 - val_class2_f1_score: 0.0000e+00 - val_class2_precision: 0.0000e+00 - val_class2_recall: 0.0000e+00
```

```
__________________________________________________________________________________________________
decoder_stage2a_bn (BatchNormal (None, None, None, 6 256         decoder_stage2a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2a_relu (Activatio (None, None, None, 6 0           decoder_stage2a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage2b_conv (Conv2D)   (None, None, None, 6 36864       decoder_stage2a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage2b_bn (BatchNormal (None, None, None, 6 256         decoder_stage2b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage2b_relu (Activatio (None, None, None, 6 0           decoder_stage2b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3_upsampling (UpSa (None, None, None, 6 0           decoder_stage2b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3_concat (Concaten (None, None, None, 1 0           decoder_stage3_upsampling[0][0]
block2_conv2[0][0]
__________________________________________________________________________________________________
decoder_stage3a_conv (Conv2D)   (None, None, None, 3 55296       decoder_stage3_concat[0][0]
__________________________________________________________________________________________________
decoder_stage3a_bn (BatchNormal (None, None, None, 3 128         decoder_stage3a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3a_relu (Activatio (None, None, None, 3 0           decoder_stage3a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage3b_conv (Conv2D)   (None, None, None, 3 9216        decoder_stage3a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage3b_bn (BatchNormal (None, None, None, 3 128         decoder_stage3b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage3b_relu (Activatio (None, None, None, 3 0           decoder_stage3b_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4_upsampling (UpSa (None, None, None, 3 0           decoder_stage3b_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4a_conv (Conv2D)   (None, None, None, 1 4608        decoder_stage4_upsampling[0][0]
__________________________________________________________________________________________________
decoder_stage4a_bn (BatchNormal (None, None, None, 1 64          decoder_stage4a_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4a_relu (Activatio (None, None, None, 1 0           decoder_stage4a_bn[0][0]
__________________________________________________________________________________________________
decoder_stage4b_conv (Conv2D)   (None, None, None, 1 2304        decoder_stage4a_relu[0][0]
__________________________________________________________________________________________________
decoder_stage4b_bn (BatchNormal (None, None, None, 1 64          decoder_stage4b_conv[0][0]
__________________________________________________________________________________________________
decoder_stage4b_relu (Activatio (None, None, None, 1 0           decoder_stage4b_bn[0][0]
__________________________________________________________________________________________________
final_conv (Conv2D)             (None, None, None, 3 435         decoder_stage4b_relu[0][0]
__________________________________________________________________________________________________
sigmoid (Activation)            (None, None, None, 3 0           final_conv[0][0]
~=================================================================================================
Total params: 23,751,411
Trainable params: 23,747,379
Non-trainable params: 4,032
__________________________________________________________________________________________________
```