

SMJE 4313
Image Processing
Semester 2 2021/2022
LAB 1
IMAGE ENHANCEMENT

LECTURER

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MARKS
REPORT [16] :
TOTAL:

Student's Particular:

Name
Matrix No.
Programme
Group
Date of exp.

LAB 1: IMAGE ENHANCEMENT

OBJECTIVES

Image enhancement techniques bring out the detail in an image that is obscured or highlight certain features of interest in an image. Enhancement techniques include contrast adjustment and deblurring. Image enhancement operations typically return a modified version of the original image and are frequently used as a preprocessing step to improve the results of image analysis techniques.

- To introduce and implement several image processing functions for contrast enhancement such as histogram equalization and adaptive histogram equalization
- To implement image enhancement techniques using point processing methods such as log transformation, power law and etc.
- To implement image enhancement techniques using gray level slicing method.

METHODS

1. Histogram equalization

IMPORTANT CODE

```
equalizedImg = cv2.equalizeHist(img)
print("Image Size: {} pixels".format(equalizedImg.shape))
print("width: {} pixels".format(equalizedImg.shape[1]))
print("height: {} pixels".format(equalizedImg.shape[0]))
#print("channels: {}".format(img.shape[2]))
cv2_imshow(equalizedImg)
```

2. Log Transformation

IMPORTANT CODE

```
# Log transformation using openCV and python3
c = 255 / np.log (1 + np.max (img)) # c = 255 / (log (1 + max_input_
pixel_value))
print("C Value: ", c)
img_log = c * np.log (img + 1)
```

```
img_log = np.array (img_log, dtype = np.uint8) # float value will be
converted to int
#cv2_imshow(image)
cv2_imshow(img_log)
```

3. Gray Level Slicing

IMPORTANT CODE

```
# Thresholding without background
# Let threshold =T
# Let pixel value in the original be denoted by r
# Let pixel value in the new image be denoted by s
# If  $r < T$ ,  $s = 0$ 
# If  $r > T$ ,  $s = 255$ 

T = 150

# create a array of zeros
img_thresh = np.zeros((m,n), dtype = int)

for i in range(m):
    for j in range(n):
        if img[i,j] < T:
            img_thresh[i,j]= 0
        else:
            img_thresh[i,j] = 255

# Display Image
cv2_imshow(img_thresh)
```

PROBLEM 1

You are required to implement contrast enhancement methods based on histogram equalization method for the given image. You can modify the above program to answer the following question.

- i. Analyse the resulting images for histogram equalization methods - display the image and its histogram.
- ii. Improve the lowest contrast region of the given image using histogram equalization method - display the image and its histogram.

RESULTS AND DISCUSSION

Resulting images/figures:

Discussion:

[4 marks]

PROBLEM 2

You are required to implement contrast enhancement methods based on log transformation method for the given image. You can modify the above program to answer the following question.

- i. Analyse the resulting images using log transformation (display the images and their histogram).
- ii. Change the value of c - (display the images and their histogram).

RESULTS AND DISCUSSION

Resulting images/figures:

Discussion:

[4 marks]

PROBLEM 3

You are required to implement Gray Level Slicing method for the given image. You can modify the above program to answer the following question.

- i. Analyse the resulting image (display the image and their histogram).
- ii. Change the value of min and max to highlight the object of interest (display the image and their histogram).

RESULTS AND DISCUSSION

Resulting images/figures:

Discussion:

[4 marks]

CONCLUSION

[4 marks]

REFERENCES