

GANs

Machine Learning Tokyo Workshop

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<https://gnuevo.github.io/yes-we-gan/>
https://github.com/dkatsios/Yes_we_GAN

Basics, Theory and Applications

Join us on [Slack](#)

Definition

[GANs will change the world](#) (blog post)

[Ian Goodfellow: Intro to GANs](#) (video + paper)

[Training Pokemon's](#) (video + code)

[Try your first GAN](#) (code)

[Advanced readings](#) (papers)

GETTING STARTED

Generative adversarial networks (GANs) are a class of artificial intelligence algorithms used in unsupervised deep learning, implemented by a system of two neural networks contesting with each other in a zero-sum game framework. They were introduced by Ian Goodfellow et al. in 2014.[1] This technique can generate fake data, e.g. images that look similar to the original, or at least superficially authentic to human observers, having many realistic characteristics (though in tests people can tell real from generated in many cases).

There are two networks: The generator, that generates data and the discriminator, that evaluates data. Typically, the generative network learns to map from a latent space to a

particular data distribution of interest, while the discriminative network discriminates between instances from the true data distribution and candidates produced by the generator. The generative network's training objective is to increase the error rate of the discriminative network (i.e., "fool" the discriminator network by producing novel synthesised instances that appear to have come from the true data distribution).

GANs will change the world

<https://medium.com/@Moscow25/gans-will-change-the-world-7ed6ae8515ca>

Ian Goodfellow explains Generative Adversarial Networks

<https://www.youtube.com/watch?v=9JpdAg6uMXs>

Original paper: <https://arxiv.org/abs/1406.2661>

Siraj is training Pokemon's in Tensorflow

<https://www.youtube.com/watch?v=yz6dNf7X7SA>

Github repo

https://github.com/ISourcell/Pokemon_GAN

TRY YOUR FIRST GAN

Things we'll use:

- PyTorch
- Colab

Your first GAN will be a very simple implementation, where we approximate a Gaussian function in one dimension. We will implement it in PyTorch, and we will work with Google's Colab, a Jupyter-like environment providing GPU for training. If you're not familiar with Colab please follow the instructions here: <https://colab.research.google.com/>

Once you're all set, please read the following, go through and run the code to get an understanding of the mechanisms inside of generative adversarial networks. This is not a mandatory step, but it will make things easier for you to understand when we look at generating MNIST data in the workshop.

Instructions:

1. Log into your gmail account (you need a gmail account)
2. Click on the link [\[COLAB NOTEBOOK\]](#)
3. Click [Open with Colab] right above the image
4. Make a copy of the notebook

5. Read, run and have fun!

CONGRATULATIONS!

Now you're ready and all set. We're looking forward to a great workshop day.

ADVANCED READINGS

We have a surprise for you! We asked Ian Goodfellow on his thoughts and advice concerning optimizing GANs. We particularly asked about finding equilibria in the game and avoiding mode collapse, and he replied to us and added two further readings, please check it out:

“So far, there hasn't been a lot of success in terms of designing algorithms that find equilibria. There has been some progress in terms of designing models that tend not to mode collapse when you train them with the same algorithms as we had in 2016.

<https://arxiv.org/abs/1710.10196>

<https://arxiv.org/abs/1802.05957>”

Ian Goodfellow

Progressive GANs (from the Nvidia example in the presentation)

<https://openreview.net/forum?id=Hk99zCeAb>

Japanese Anime Generation using Progressive GANs

<http://dena.com/intl/anime-generation/>