GANocracy Tutorial


Please check that you have completed the updated setup instructions at the link above
GANocracy
Workshop on Theory, Practice, and Artistry of Deep Generative Modeling

Event made possible by our generous sponsors:
Democratizing GANs

Image credit: goodfellow_ian (2019) "4.5 years of GAN progress on face generation." [Tweet]
Image credit: compiled from [Egor Zakharov]. (21 May 2019) "Few-Shot Adversarial Learning of Realistic Neural Talking Head Models".
It’s not just visual...

Audio
- style transfer
- sound generation

Cyber Security
- steganography
- password guessing

Data Augmentation
- signal boosting

Data Synthesis
- generate training samples

So how did we get here?

Given an observable variable $X$ and a target variable $Y$:

**Generative model**

$$P(X,Y)$$

- The joint probability distribution on $X \times Y$

**Discriminative model**

$$P(Y|X = x)$$

- The conditional probability of $Y$, given an observation $x$
1) Generative models with a parametric specification of a probability distribution function, trained by maximizing the log likelihood [e.g. Boltzmann machines]

2) Pairing generator networks with other networks [e.g. VAEs]

3) Two competing neural networks [e.g. predictability minimization]

Generative Adversarial Nets

“We propose a new framework for estimating generative models via an adversarial process, in which we simultaneously train two models: a generative model $G$ that captures the data distribution, and a discriminative model $D$ that estimates the probability that a sample came from the training data rather than $G$. The training procedure for $G$ is to maximize the probability of $D$ making a mistake. This framework corresponds to a minimax two-player game.”

Generative Adversarial Nets

- 2014: GANs
- 2015: cGAN, DCGAN
- 2016: InfoGAN
- 2017: Improved techniques for training GANs, WGAN & WGAN-GP, ProGAN
- 2018: SAGAN, BigGAN
- 2019: StyleGAN, Lipschitz GANs

Where are we going?

Image credit: goodfellow_ian (2019) "4.5 years of GAN progress on face generation." [Tweet]
Industry Applications


https://github.com/ajbrock/Neural-Photo-Editor
Tutorial Outline

Exploring a generator
Presented by: David Bau

What can GANdissect show us about the internal representations of a generator?

Training DCGAN
Presented by: Alex Andonian

A how-to walkthrough on training GANs using Jupyter notebooks

GANtidotes
Presented by: Hendrik Strobelt

Discouraging and mitigating antagonistic use of GANs