Drone Image generation using GAN

(Generative Adversarial Networks)

Tamotsu Tanabe
SightLine Applications inc.

What is GAN?

- Generative Adversarial Network
- Generates images using NN
- Ian Goodfellow, et al, (2014)

Variety of GANs: CycleGAN (2017)

zebra → horse

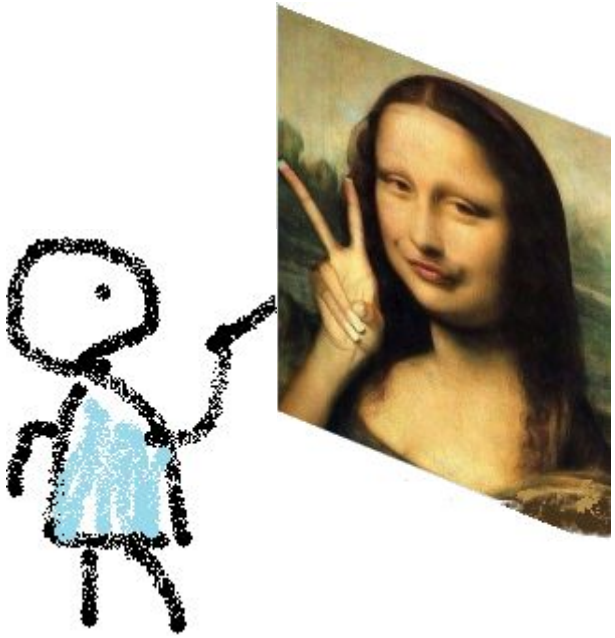
horse → zebra

Variety of GANs: DiscoGAN (2017)

(b) Handbag images (input) & **Generated** shoe images (output)

Variety of GANs: PGGAN (2018), StyleGAN (2019)

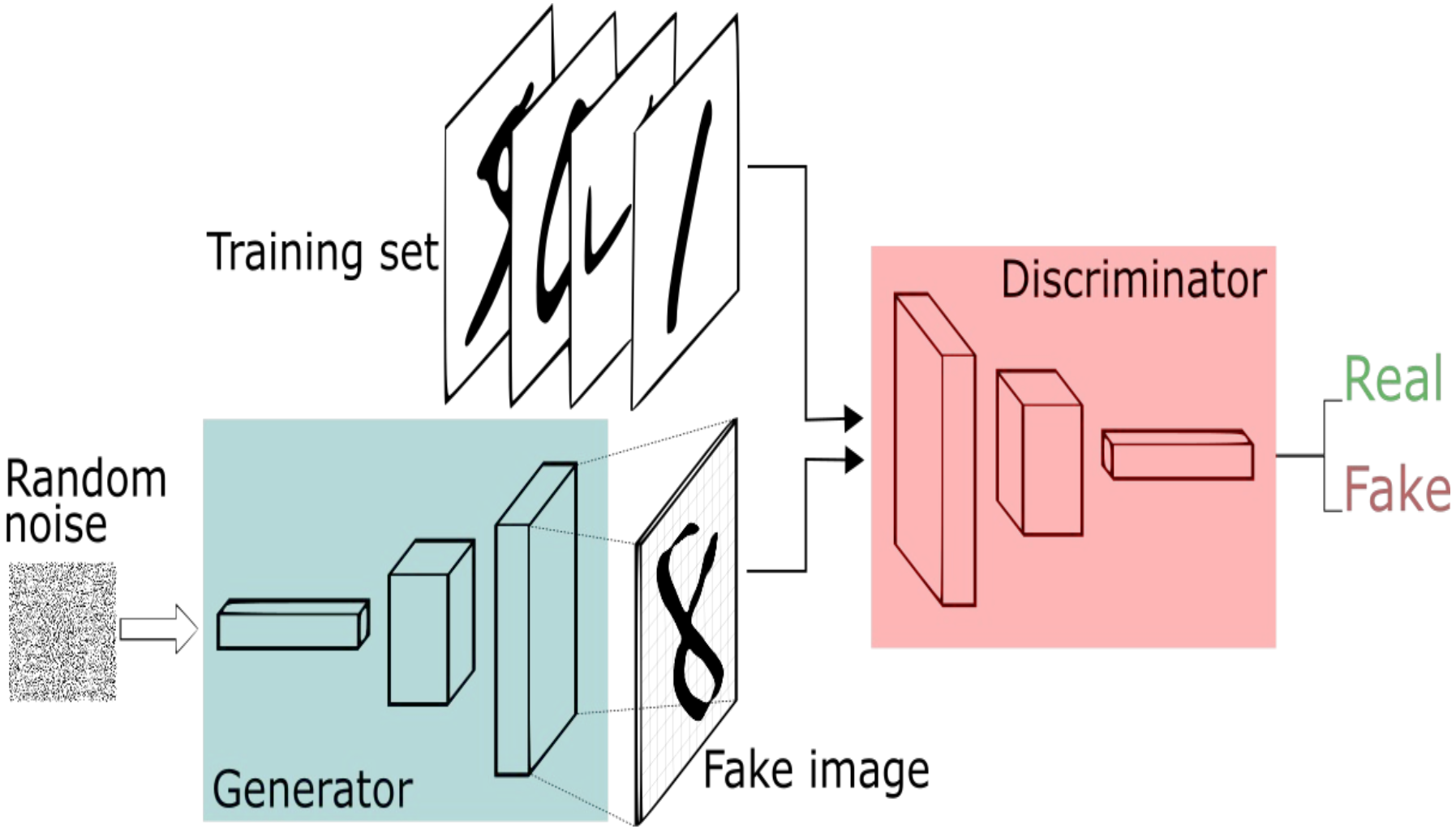
How does GAN work?



Forger
(Generator)

Detective
(Discriminator)

GAN Implementation

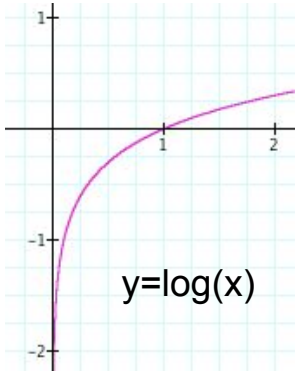


GAN Loss function

$$\min_G \max_D V(D,G)$$

$$V(D,G) = \mathbb{E}_{x \sim p_{data}(x)}[\log D(x)] + \mathbb{E}_{z \sim p_z(z)}[\log(1 - D(G(z))]$$

D(x) = probability that Discriminator judges x is real (0..1)
G(z) = image generated by Generator.



D gets better: → D(x) ⇗, D(G(z)) ⇘ → V ⇗

G gets better: → D(G(z)) ⇗ → V ⇘

My Project -- generates drone images with GAN

- Our company have a product to classify if an object in Video is a drone or not.
- It is based on a simple NN classifier (using Caffe)
- It works relatively well considering the limited number of training images.
- Having more images will improve the accuracy.

Implementation

- Python Keras + TensorFlow
- DCGAN : Deep Convolutional GAN -- Using Convolution layer

Training images (~800 images)

Training…

(another slide)