DEEP LEARNING FOR COMPUTER VISION

GAN

Generative Adversarial Networks

Introduction

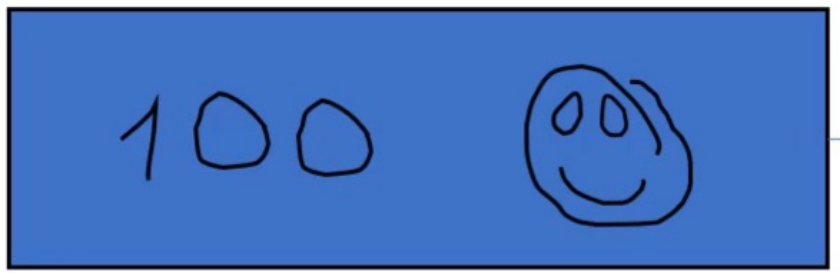
Early Training:

Real Money

Discriminator

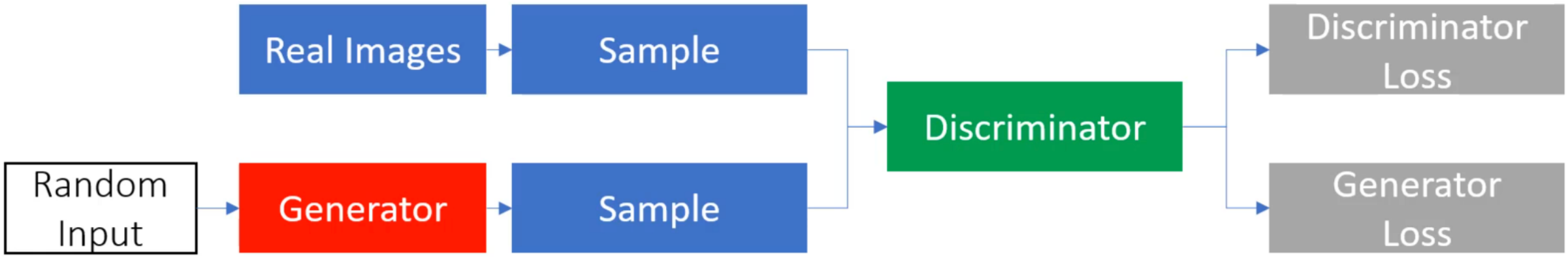
Real

Fake Money



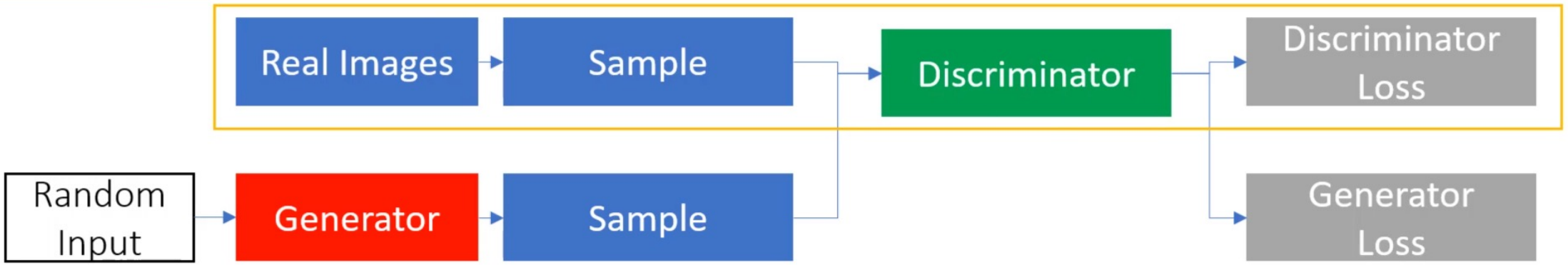
Discriminator

Fake


Real Images
Sample
Random Input
Generator
Sample
Discriminator
Discriminator Loss
Generator Loss

Generative Adversarial Networks

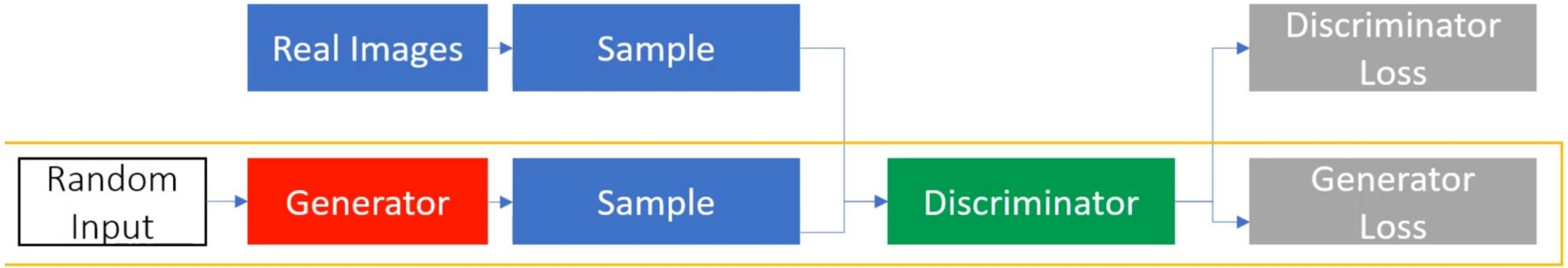
Discriminator



- Classifies fake from real data
- Training data comes from
  - Real images
  - Fake images from Generator
- Discriminator Loss
  - Discriminator loss penalizes Discriminator for wrong predictions

Generative Adversarial Networks

Generator



- learns to create better and better fake data, so that Discriminator classifies fake data as real
- takes Discriminator into account
- Generator loss depends on Discriminator

Generative Adversarial Networks

Training

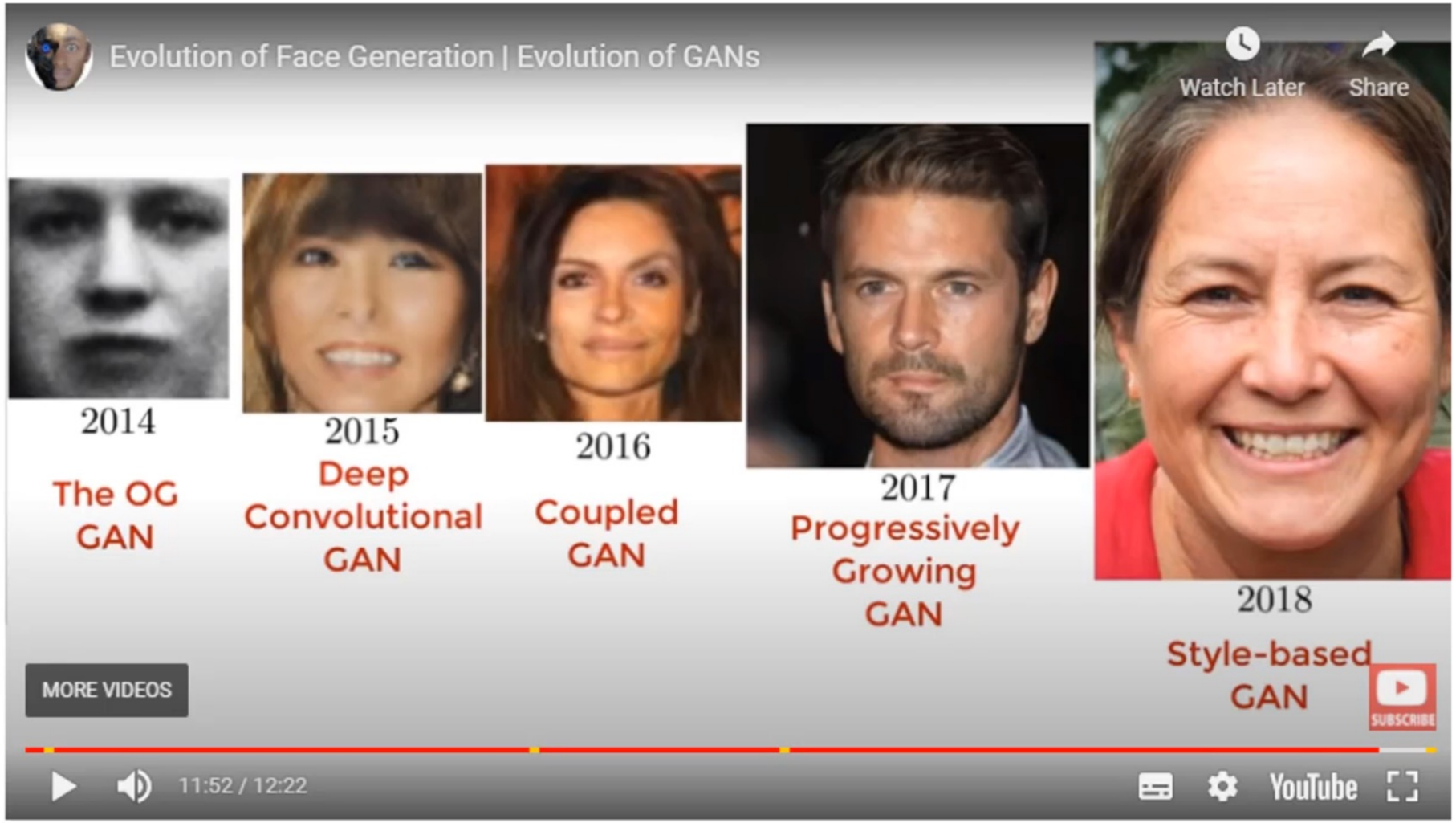
- Two networks are trained
- Learning speed of both networks should be similar

Training in alternating periods:

- Discriminator trains for some epochs
- then, Generator trains for some epochs

- Generator is constant during Discriminator training
- Discriminator is constant during Generator training

- Goal: better Generator performance leads to reduced Discriminator performance
- ideally, Discriminator accuracy of 50 % (pure guessing)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  - Produce data for rare diseases
- Video
  - Deep fake
  - Increase frame rate of videos (Dual Video Discriminator GAN)
- Music
- Artwork
  - Produce new artwork (SkeGAN, GANpaint)
- Speech
  - GAN based text-to-speech (GAN-TTS)
- Robotics