Facial Recognition with InfoGAN

Kastan Day & Tim Nguyen

- GAN vs. InfoGAN
- Goals & Motivation
- Theory
- Procedure
- Results
- Analysis
- Conclusions & Future Work

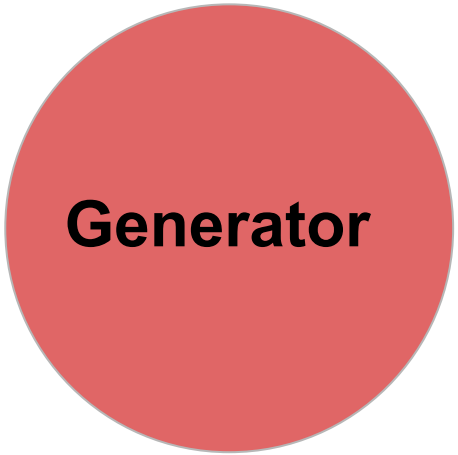
Generative Adversarial Network

- Coevolutionary Arms Race of two neural networks.

- Which image is real?

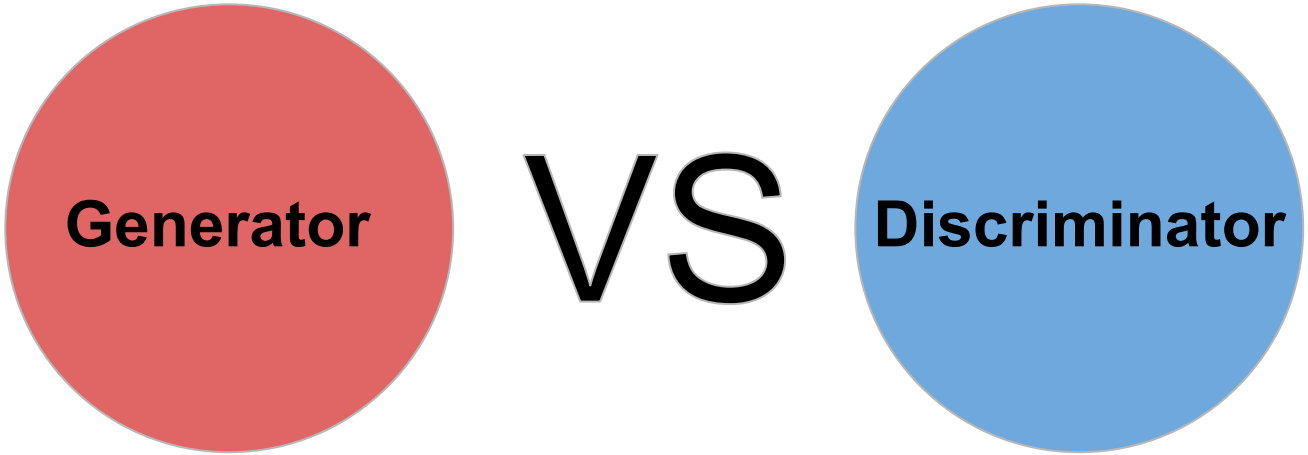
Generative Adversarial Network

- Coevolutionary Arms Race of two neural networks.



Generative Adversarial Network

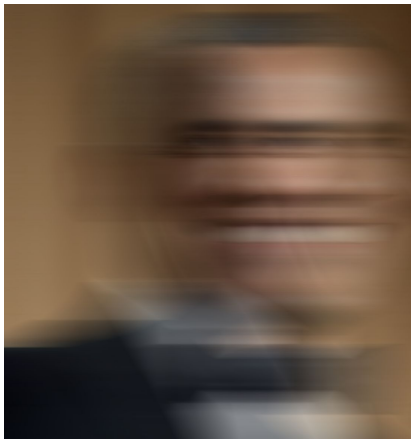
- Coevolutionary Arms Race of two neural networks.
- **But what about InfoGAN?**



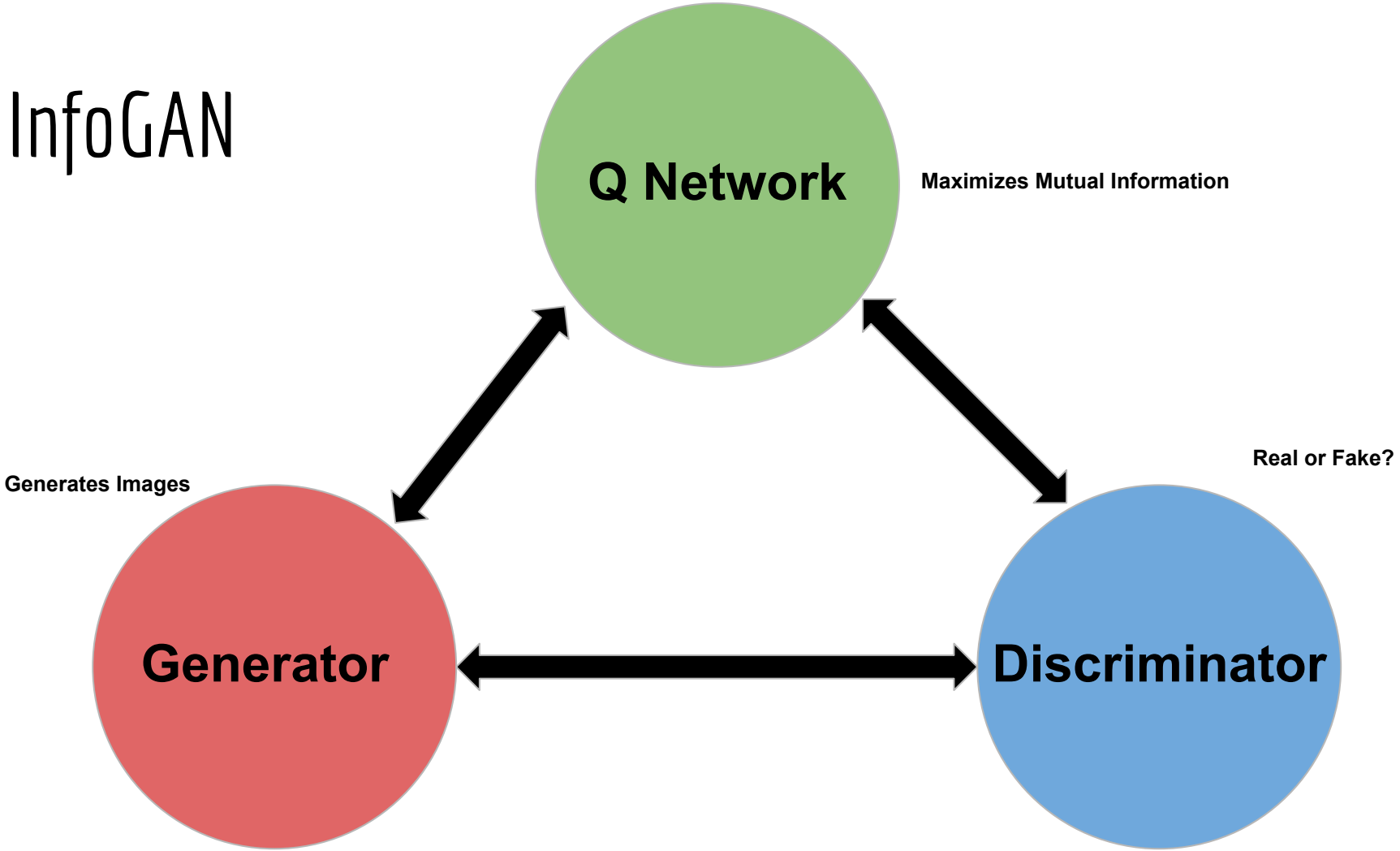
Generative Adversarial Network

- Coevolutionary Arms Race of two neural networks.

- Which image is real?



InfoGAN


Q Network
Maximizes Mutual Information
Generates Images
Real or Fake?
Generator
Discriminator

Goals & Hypothesis

Disentangled representation:

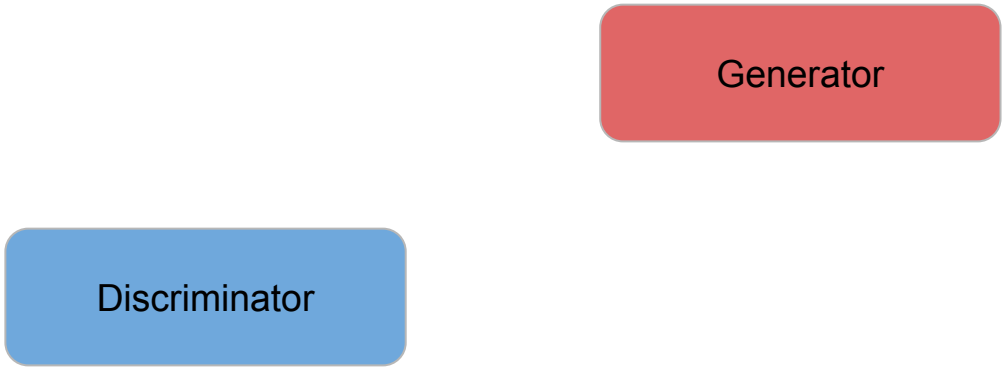
Simply: a **concept** like ‘dumbbells,’ or ‘a smile’ without arms or faces attached

Use general InfoGAN architecture to:

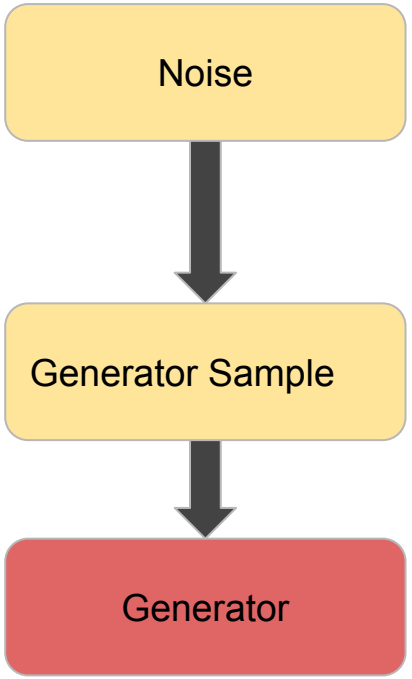
- Discover interesting disentangled representations on interesting data
- Perform unsupervised facial-recognition

Three Big Networks

Three Big Networks

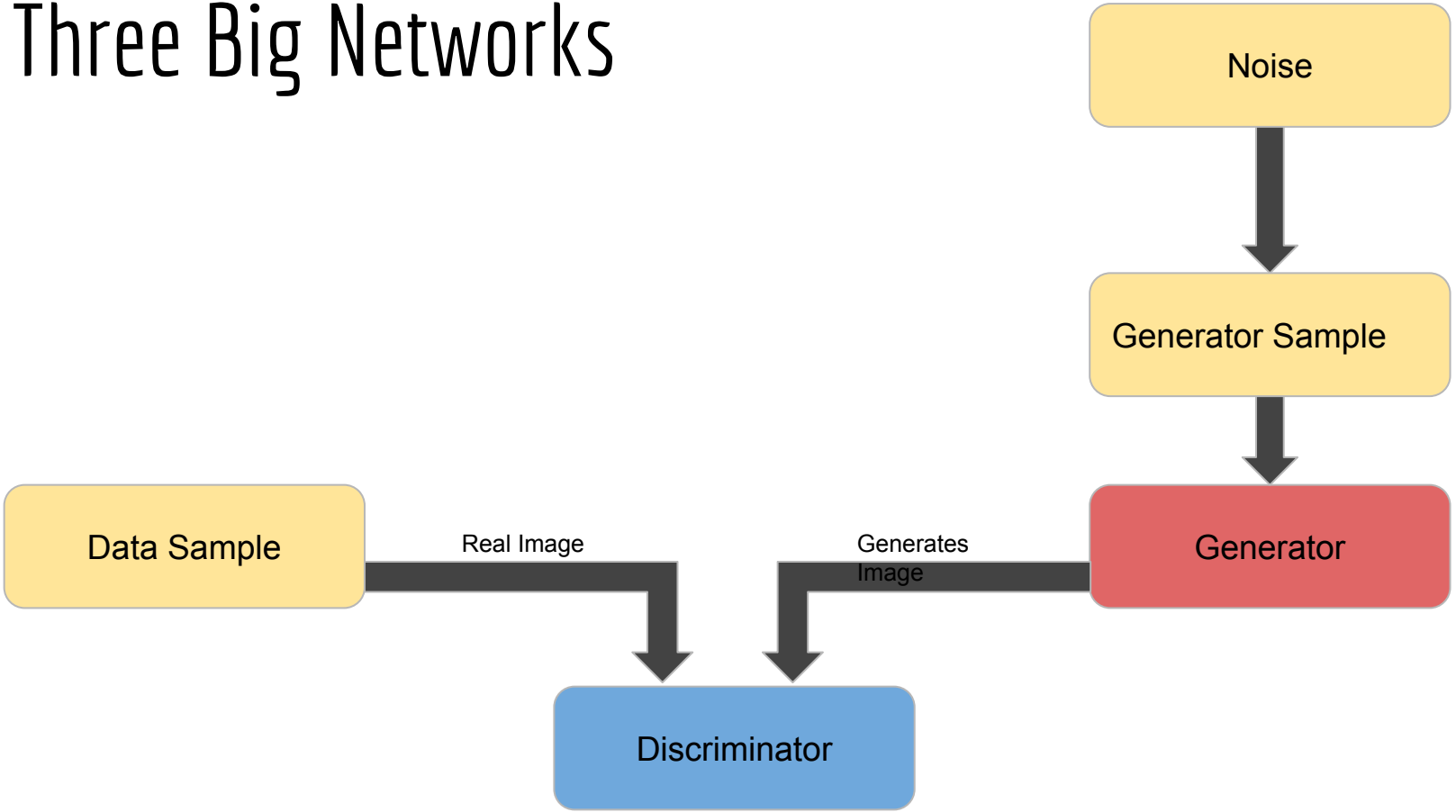


Three Big Networks

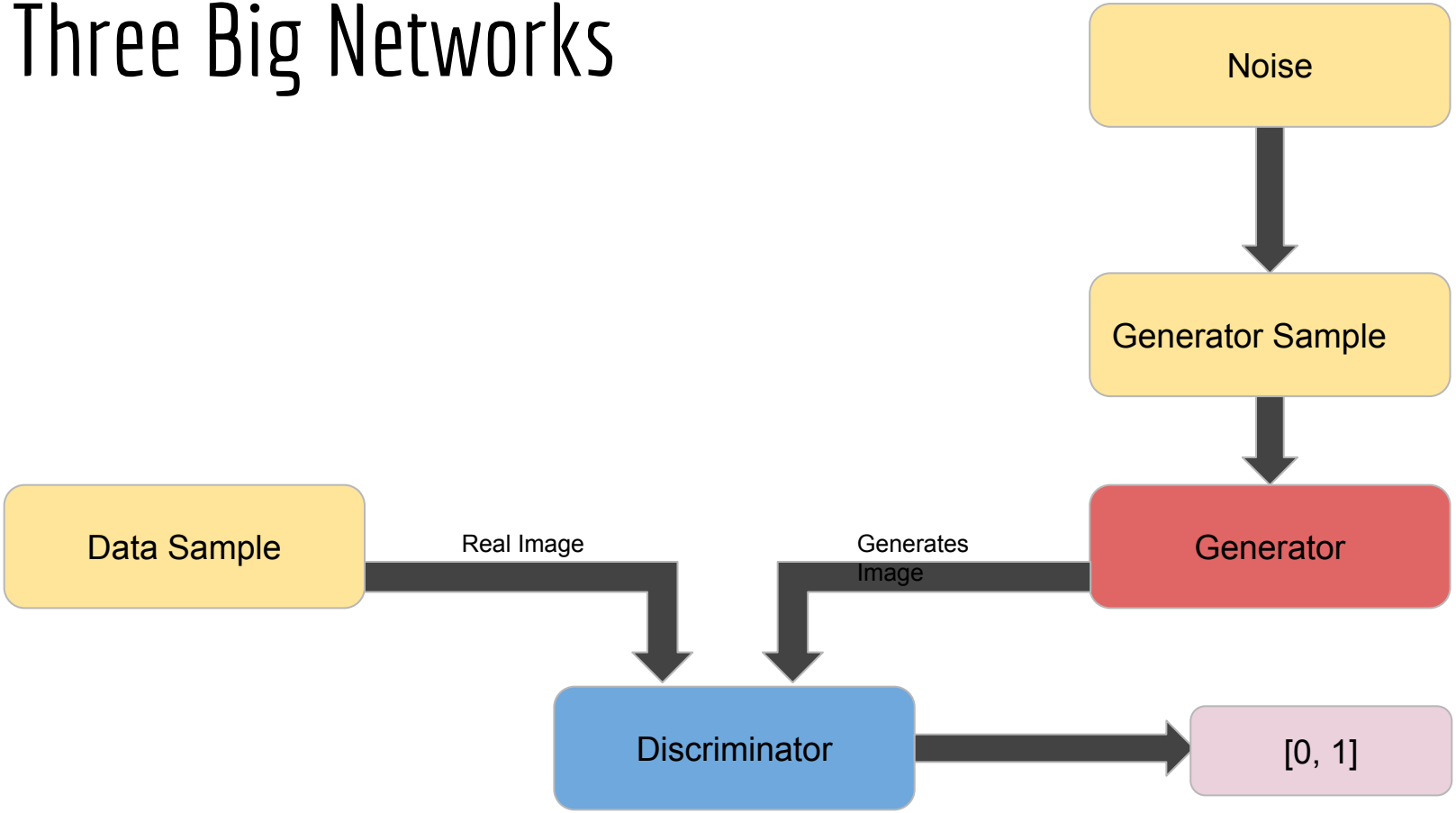


Discriminator

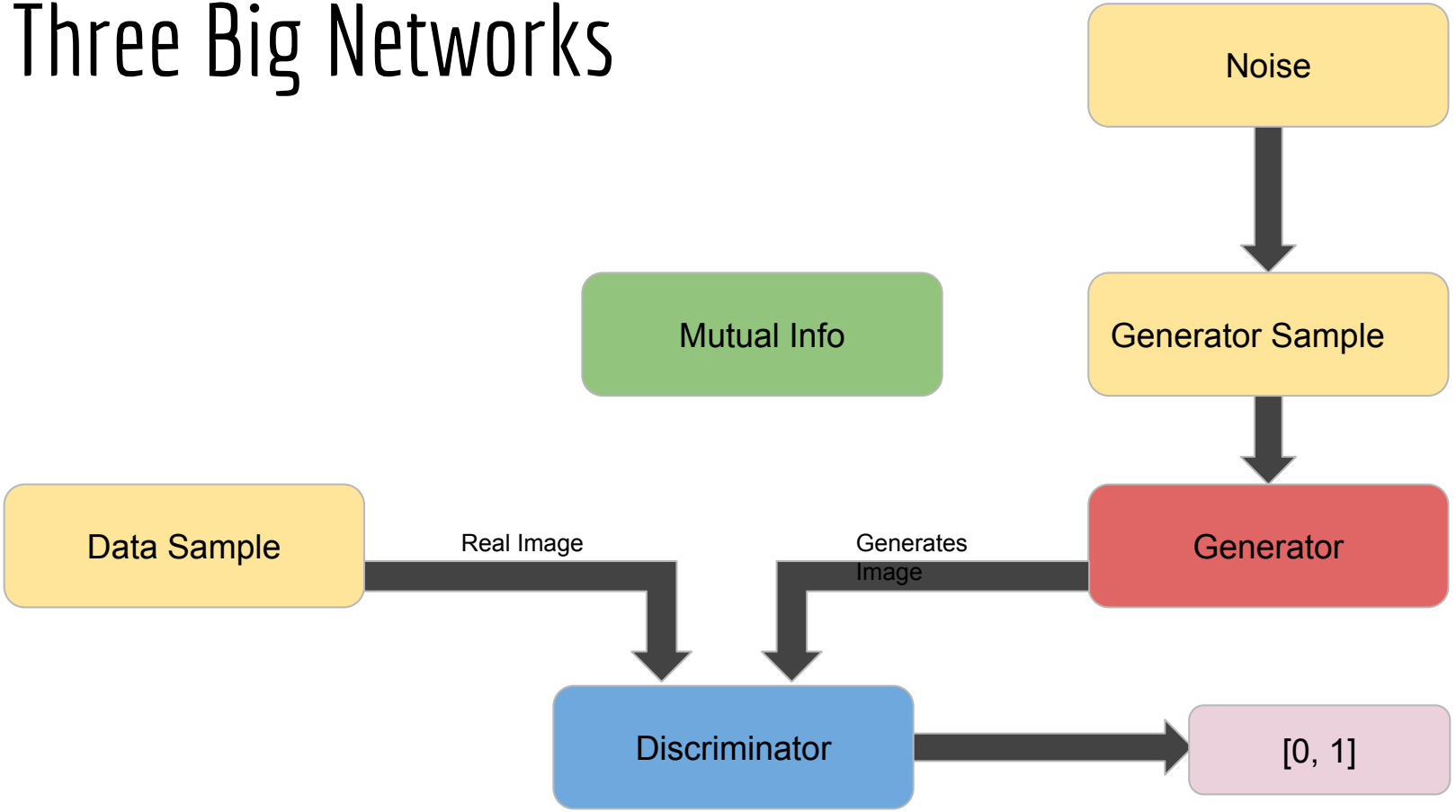
Three Big Networks



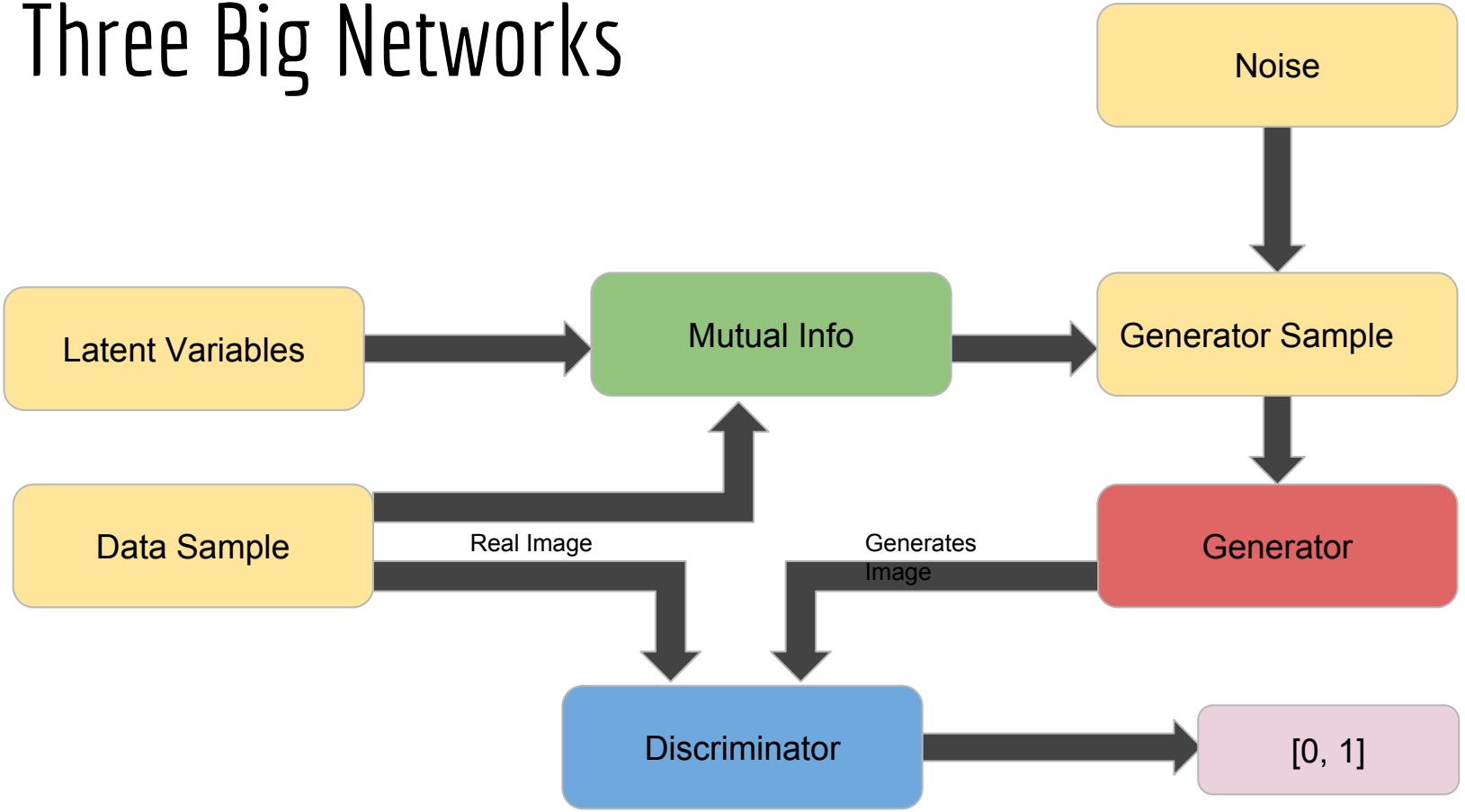
Three Big Networks



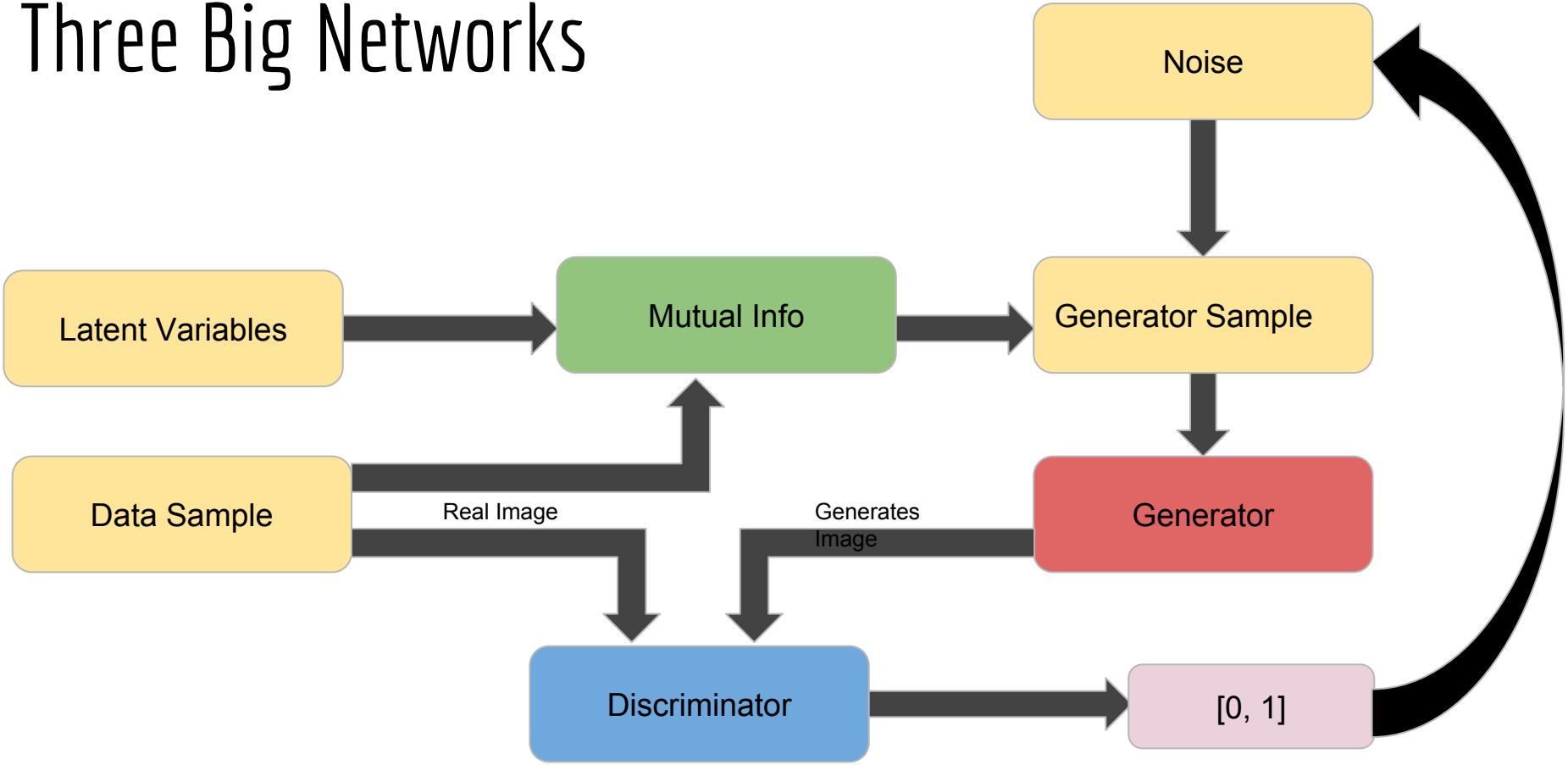
Three Big Networks



Three Big Networks



Three Big Networks



Procedure

- Constantly modify the network itself to accept all the different datasets.
- Decide on dimensions of categorical/continuous variables, the learning rates, image sizes, and colors.
- Train Network.

Datasets - Cats & Dogs

Sample Images of Cats

- 2,000 Epochs
- Categorical Dimensionality : 2, 4
- Continuous Variables : 3
- Learning Rate : 0.1, 0.1
- 15,000 Cats & 15000 Dogs
- Grayscaled

Sample Images of Dogs

Cats & Dogs - Results

Cats

Dogs

Cats & Dogs - Results

Cats

Dogs

Datasets - Five People

- 25,000 Epochs
- Categorical Dimensionality : 5, 2, 2
- Continuous Variables : 3
- Learning Rate : 1, 1

Tony Blair

Collin Powell

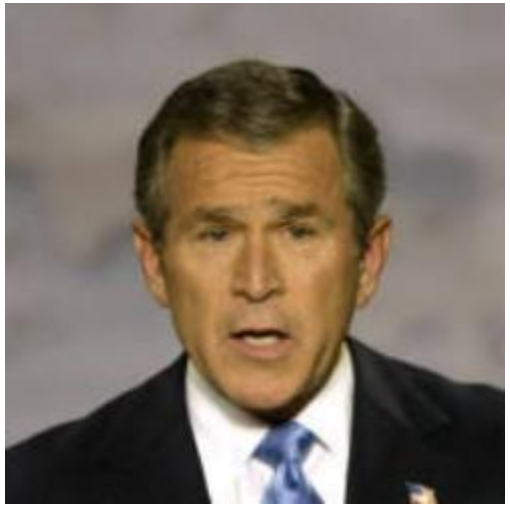
George W. Bush

Gerhard Schroeder

Hugo Chavez

Five People - Results

George W. Bush



Gerhard Schroeder

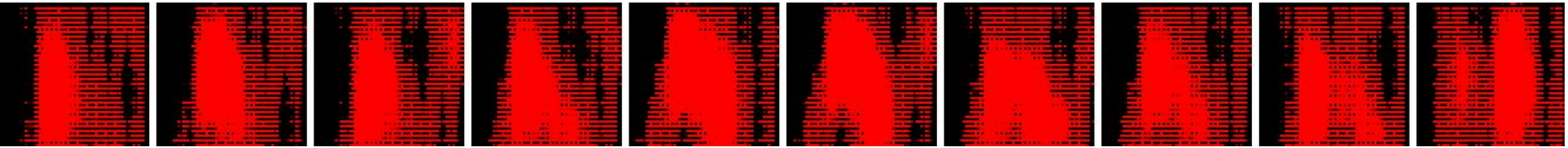
Tony Blair

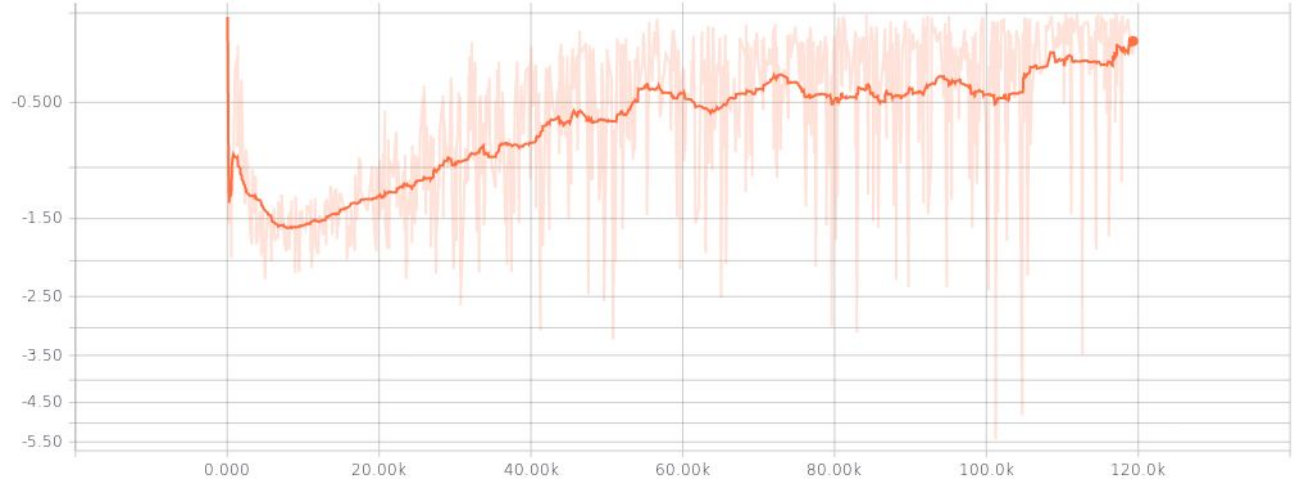
Collin Powell

Five People - Results

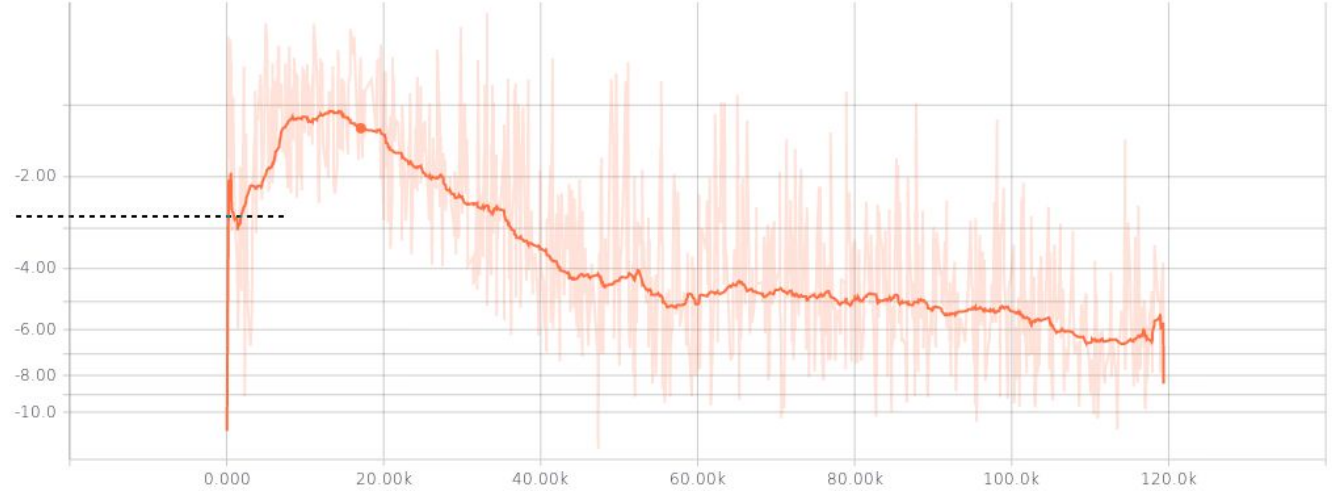
Continuous Variables

Where is Hugo Chavez?





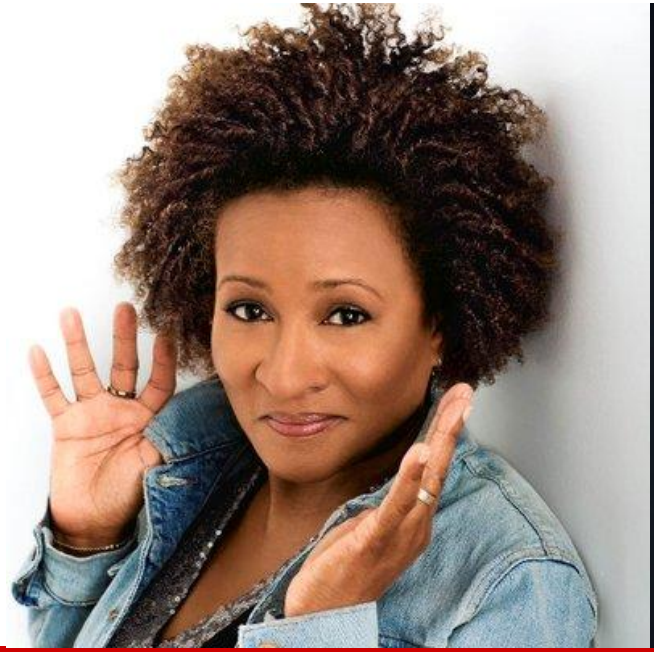
Discriminator's Objective



Generator's Objective

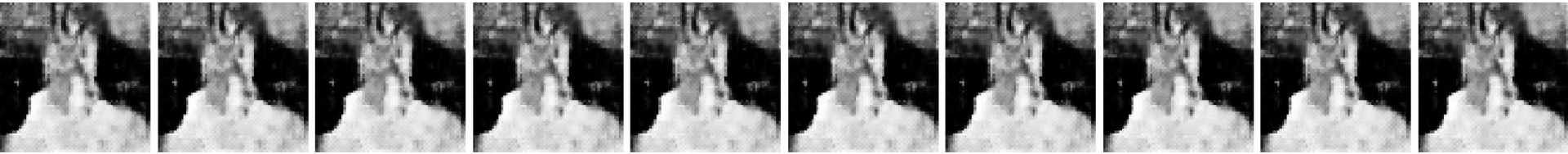
Datasets - Wanda Skyes/Sarah Paulson

- 10,000 Epochs
- Categorical Dimensionality : 2
- Continuous Variables : 3
- Learning Rate : 0.5, 0.5

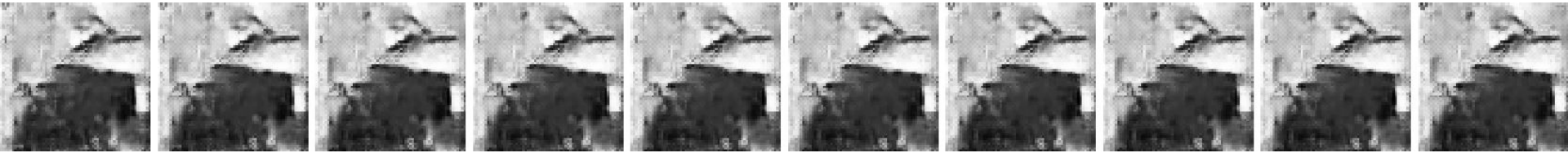


Sykes/Paulson - Results

Sarah Paulson



Wanda Sykes

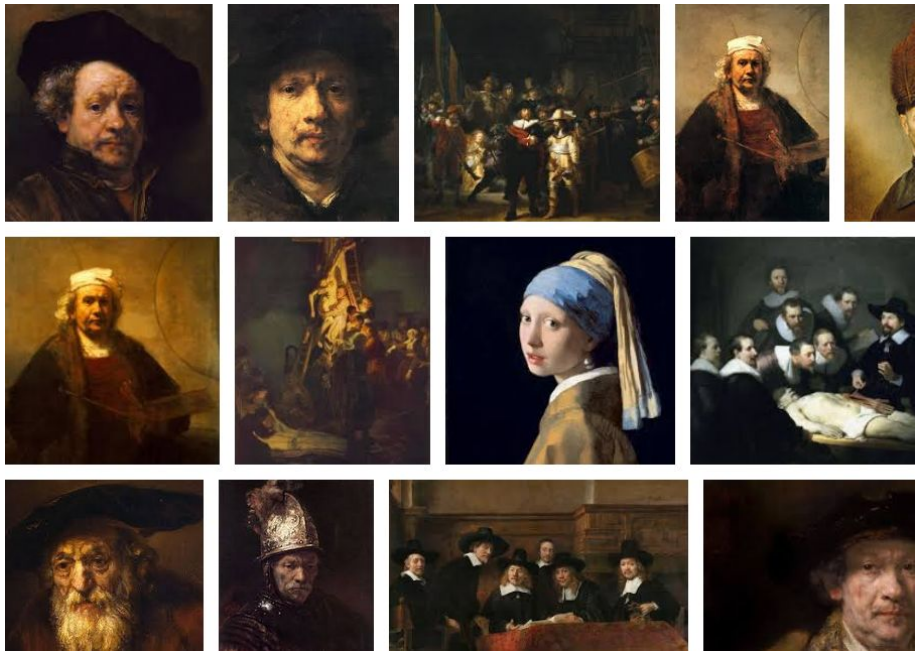


Datasets - Paintings

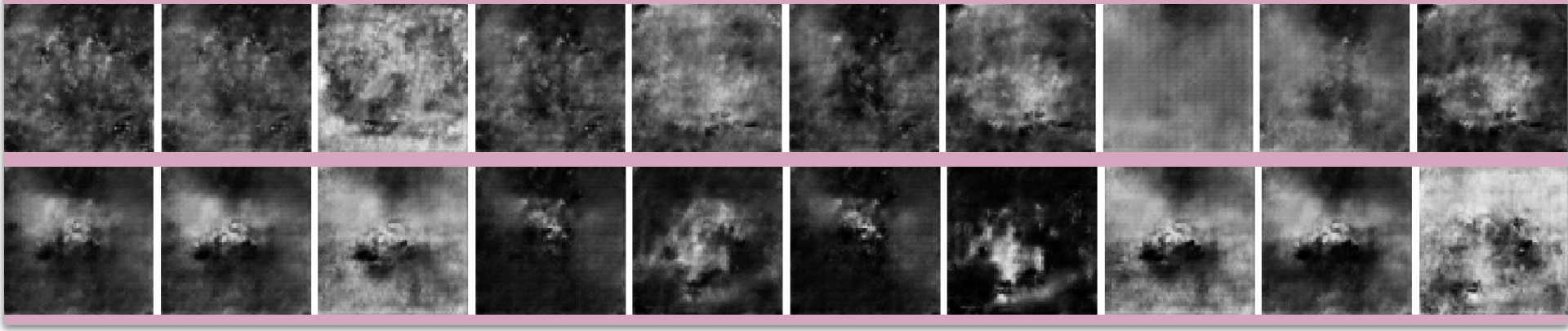
Style notes:

Swoopy vs harder lines
Texture vs realism

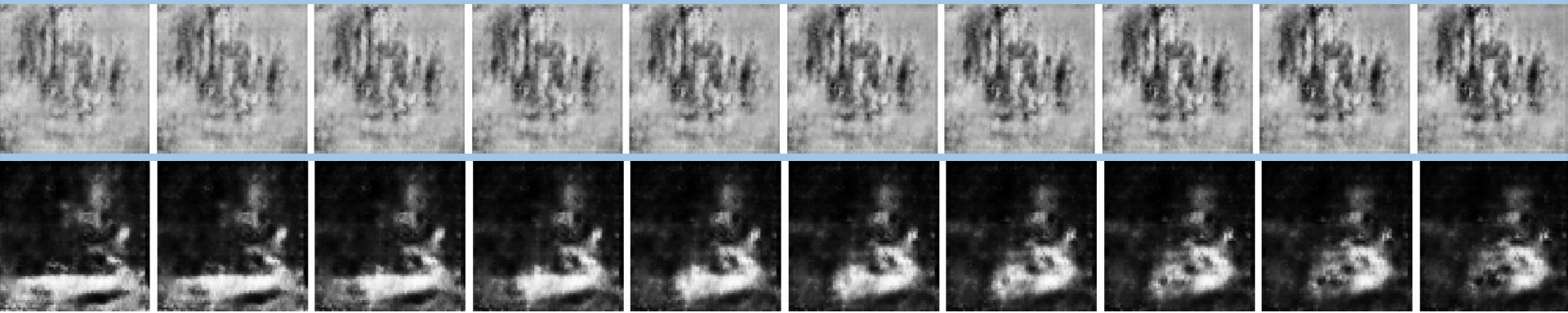
Van Gogh v.s. Rembrandt



Categorical



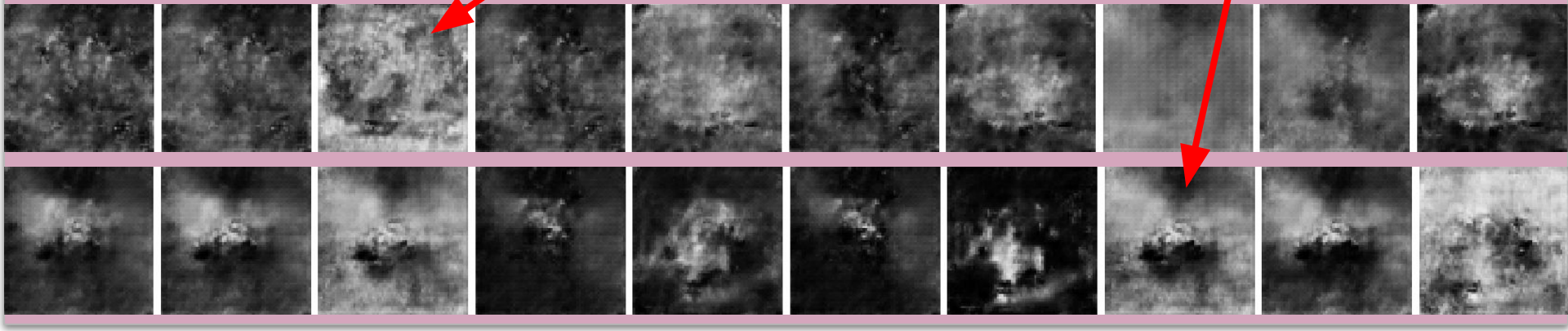
Continuous



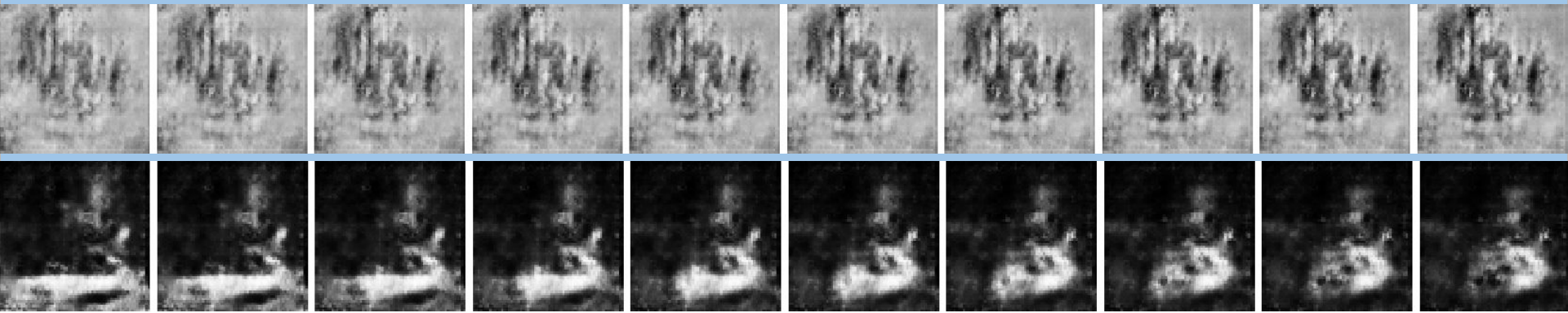
Categorical

Van Gogh swooping!

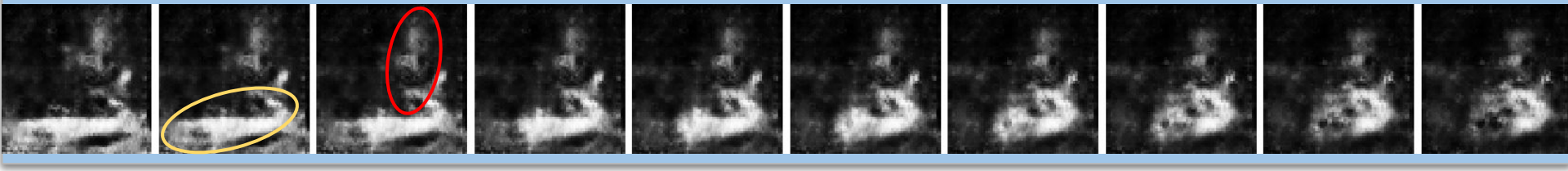
Hard Rembrandt lines

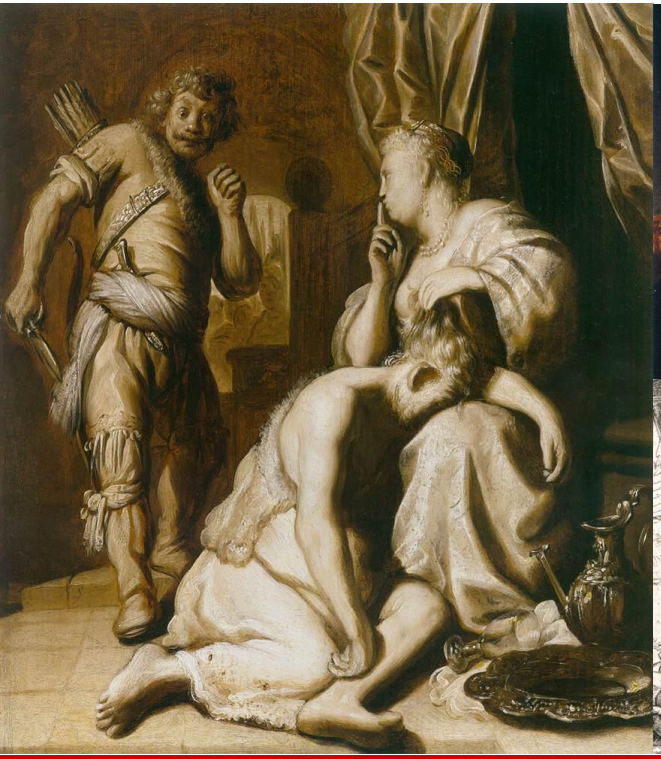


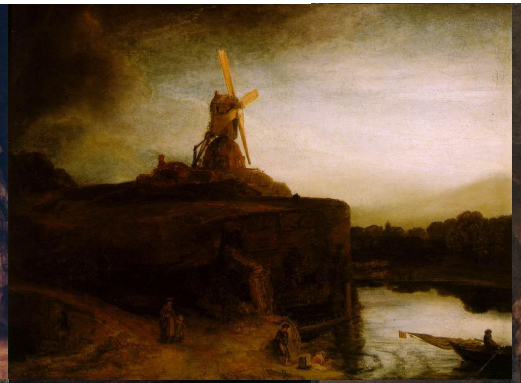
Continuous

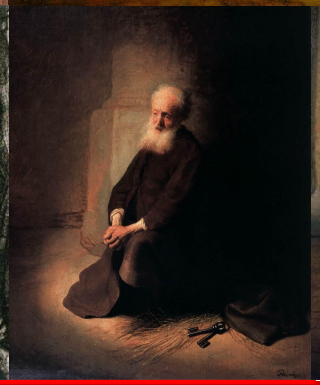


Continuous

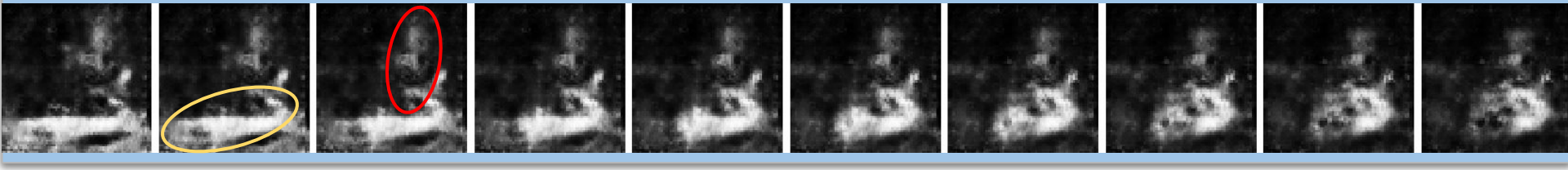


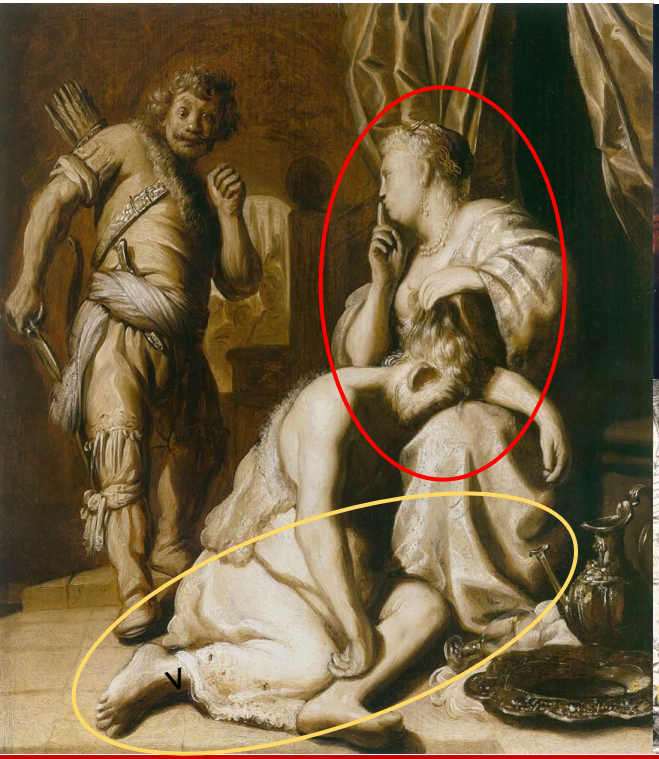


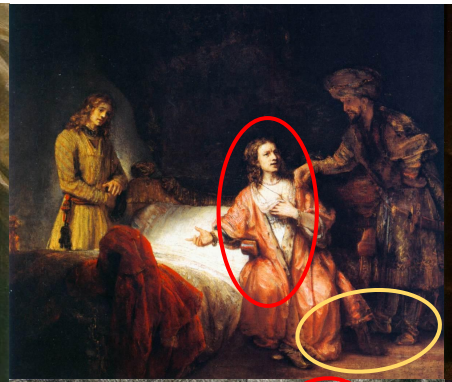


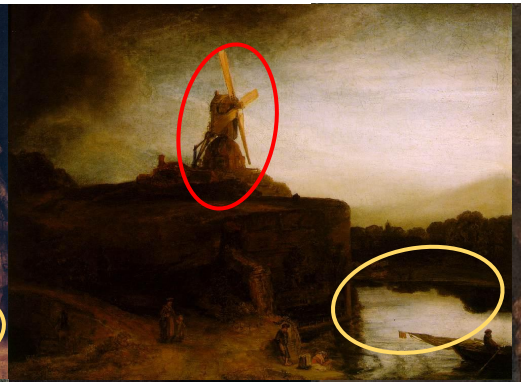


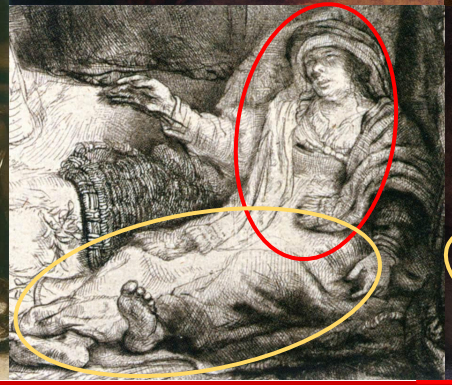
Continuous











Aside: State of Available Databases

- Databases we need are far and few.
- Needed: controlled setting, many photos of each subject
  - I’m sure Apple and Microsoft have these

Conclusions & Future Work

- InfoGAN - Success!
- Grayscale vs. Colored Photos : Dimensionality Issues.
- Personal Dataset for final paper.

Questions?

Fun Fact: 35,000 Watt-Hr / Day consumed by 8 graphics cards

Average american household (2016) = 30,000 Watt-Hr/Day