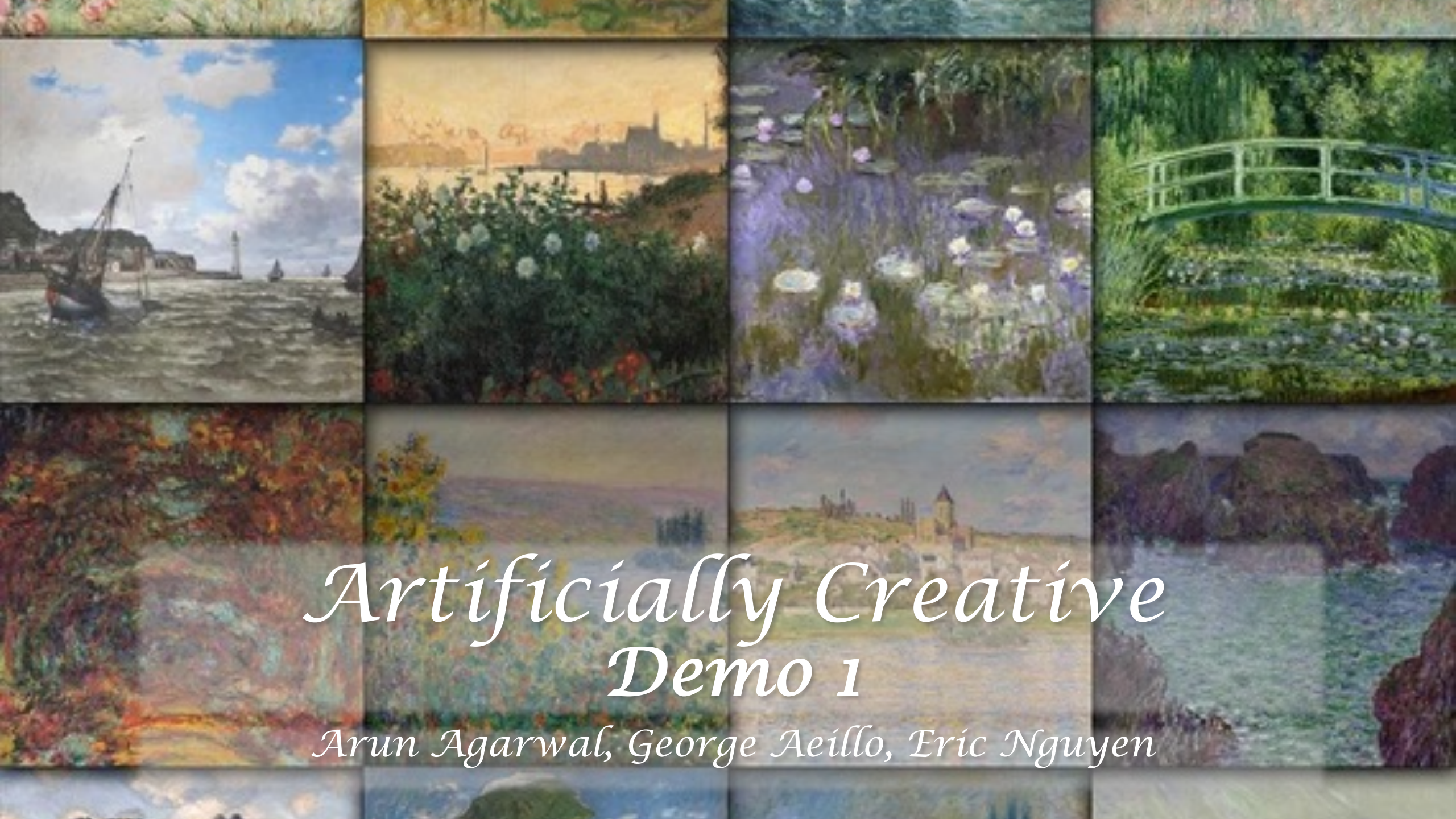


Artificially Creative

Demo 1

Arun Agarwal, George Aeillo, Eric Nguyen

Competition Introduction/ Business Understanding

After taking a picture of a beautiful scenery, have you ever wondered what would it look like if a famous painter was there and made a painting of it?

- Focus: **translating a photograph** to a **Monet** style painting
  - "Monet-ifying" an image
- **Style Transfer** - transfer an image from one style to another
  - Imitate **color choices** and **brush strokes**

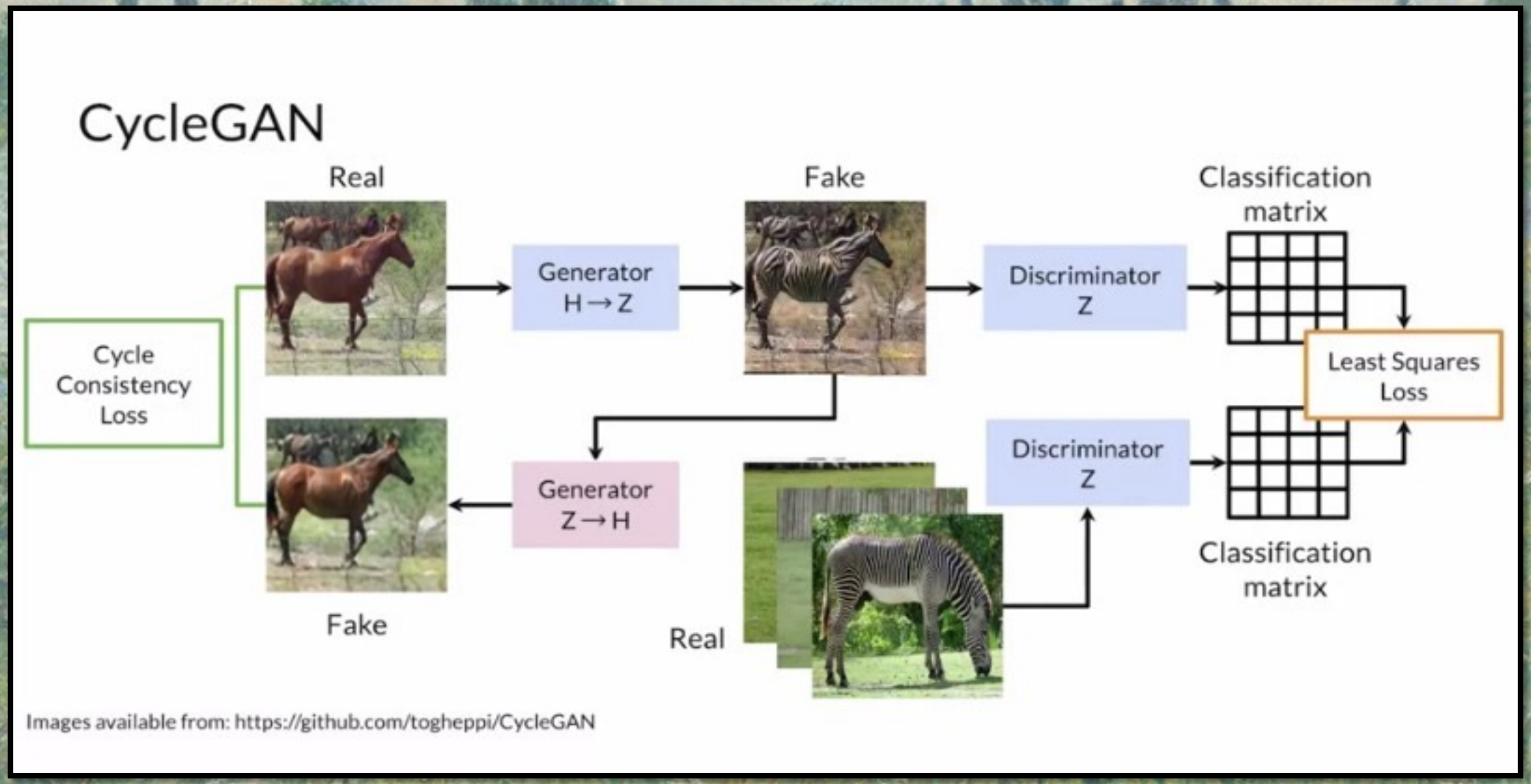
Data Acquisition

- Both the photos and the Monet data was given to us in files from Kaggle
  - **300 Monet paintings** sized 256x256 in JPEG and TFRecord formats
  - **7028 photos** sized 256x256 in JPEG and TFRecord formats
  - Size: 385.87 MB
- **Project Focus**: modeling and architectures of modern data science (rather than the data acquisition)

Monet Example

Photo Example

Model Description



Description/Deployment of Our Baseline Model

- CycleGAN
- 120 epochs
- Batch Size of 1
- Adam optimizer
  - Loss rate = 0.0002, Beta 1 = 0.5
- ~2 hours
  - Within 3-hour limit for TPU
- TPU v3-8
- Kaggle Notebook

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

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

Loss Function For Generator/ Discriminator

Performance Evaluation from Our Baseline Model

MiFID Score: 51.49337

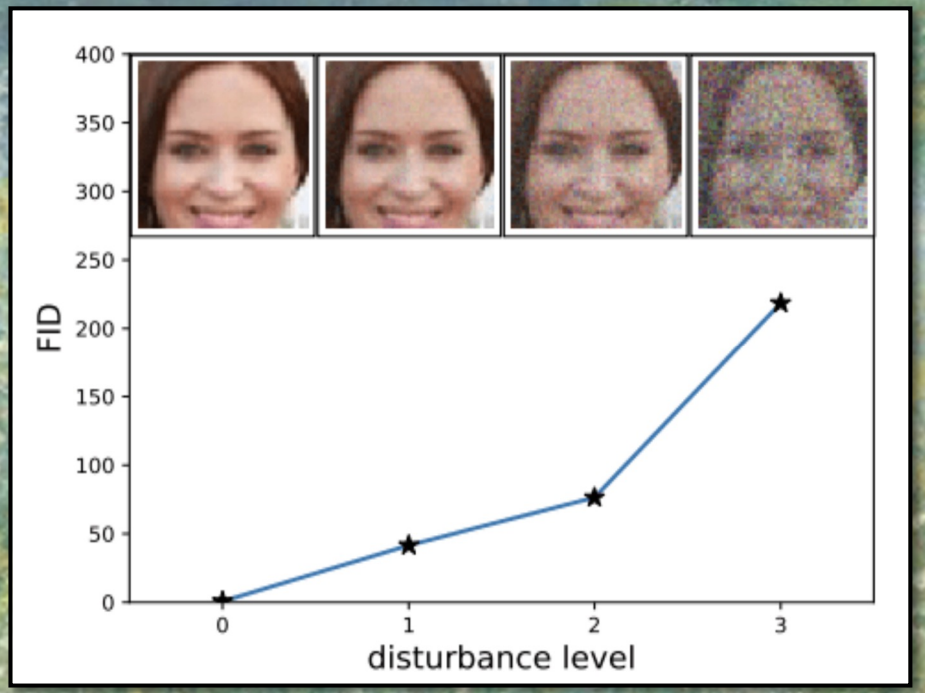
Leaderboard: 49/94

Best Scores are in mid 30s

FID: assesses the quality of images created by a generative model (ex: GAN)

- Finds the distance between feature vectors calculated for real and generated images

MIFID: Kaggle-created modification of FID



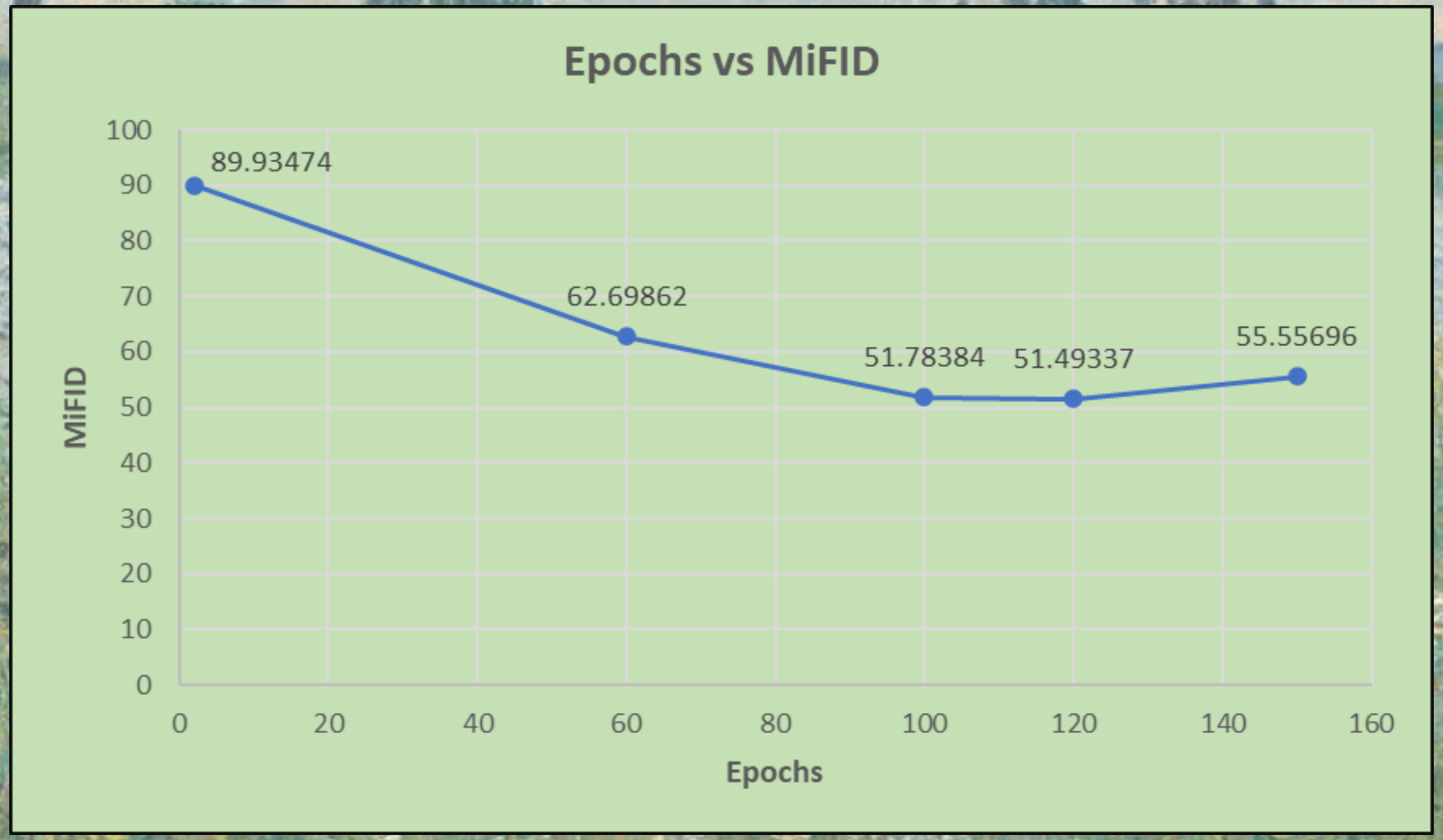
$$\text{FID} = ||\mu_r - \mu_g||^2 + \text{Tr}(\Sigma_r + \Sigma_g - 2(\Sigma_r\Sigma_g)^{1/2})$$

Mean μ, covariance Σ, real images r, generated images g, sum of diagonal elements Tr

$$MiFID = FID \cdot \frac{1}{d_{thr}}$$

d_{thr} is the memorization distance with a threshold applied

Performance Comparison



Line Graph Displaying Scores for Epochs Tested

Output Observations

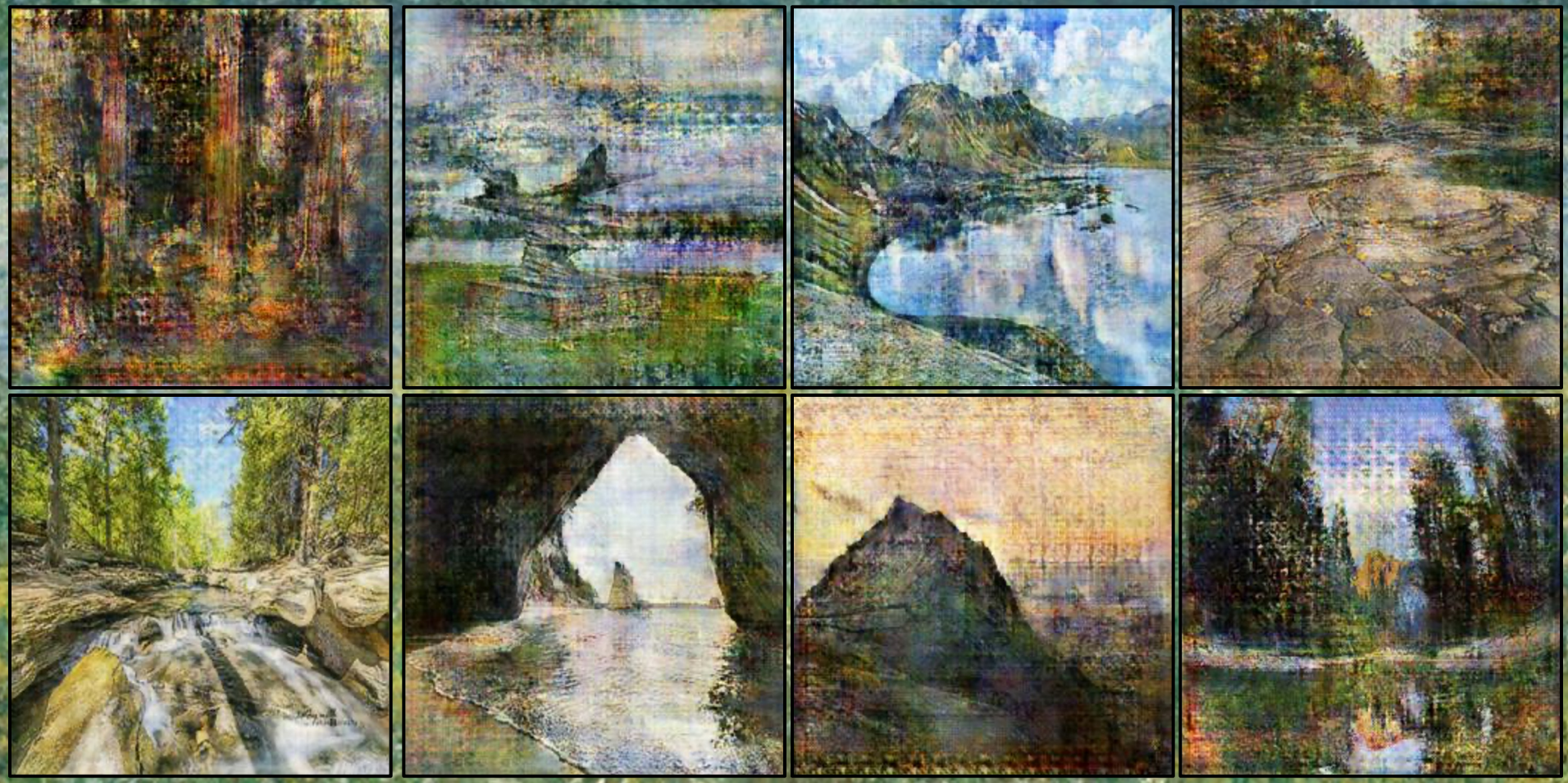
Pros:

- Good with nature

Cons:

- Bad with people, modern architecture, defined lines/boundaries
- For detailed photos, the paintings mostly become blurred and hard to discern
- Translation among photos varies
- Almost everything is pixelated
  - Good or Bad?

Good Example Outputs



Bad Example Outputs

Roadblocks

- Limited Data (in terms of Monet)
- Memory limits
- Time limits
  - Ex: couldn't play around with epochs
- Runtime limits
  - Will likely inhibit us from trying other models
- Understanding what "makes a Monet"

Road

(generated)

Block

(generated)

Possible Future Steps

- Adding more data samples
- Experimenting with other data augmentation
- Experimenting with other artists
- Building website to elaborate

Van Gogh

Homer

References

I’m Something of a Painter Myself | Kaggle

CycleGAN: a GAN architecture for learning unpaired image to image transformations (haikutechcenter.com)

This AI Can Convert Paintings Into Photos and Summer Into Winter | PetaPixel

Time Wallpaper (73+ images) (getwallpapers.com)

Van Gogh's Most Famous Paintings (thoughtco.com)

Homer Painting

Van Gogh Painting

Monet Painting

FID Explained

Generative Adversarial Networks (GAN)- An AI — 'Cat and Mouse Game' | by Pankaj Kishore | Towards Data Science