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GAN Gallery Project Proposal

In recent years, Generative Adversarial Networks (GANs) have been shown to be a promising method for generating photorealistic images, faces, and paintings. For the purposes of our project, we will focus primarily paintings. The basic GAN architecture involves two networks: a generator and a discriminator. The generator is fed random noise and attempts to spit out a "painting." These generated "paintings" are added to a dataset of real paintings which act as the training data for the discriminator. As the discriminator is trained to determine which paintings are real and which are generated, the generator is trained to better trick the discriminator. A deep learning arms race later and the result is a generator that can create passable "paintings" and a discriminator that can judge how "real" those paintings are.

For this project we will begin with setting up a repository in GitHub where we can access the program and update any changes. The main code for this project will be written in Python using the PyTorch machine learning framework. PyTorch also has large ecosystem of resources that help support, accelerate, and explore AI development that we can look into as the project moves forward. For this project's data, we will be using WikiArt. This free resource will give us access to over 250,000 labeled examples of artwork which we will use for training.

This project's main value to us is learning about the basics of deep neural networks. Our project will be focusing primarily on the architecture and training techniques necessary to implement a generative model. This is a new topic for both of us working on this project, so there will be a good amount of research. We will gain experience writing in Python, as well as using the PyTorch machine learning framework. As well, we will need to understand how to acquire and curate WikiArt's image data for use in the project via an API.

This project's four deliverables throughout the semester would look as follows. The first deliverable will be the domain analysis and backlog. The second deliverable in our machine learning project will be the aggregation and representation of data with a quality data set. The third deliverable will be a simple, proof of concept architecture that can generate some "paintings" of mixed quality. The fourth deliverable will be the final architecture and training

practices experimentally derived for “best practice.” Our final presentation will detail the source and curation of our data, the best practice architecture we used in the final project, and hopefully show off some interesting art.