Generation of Anime Faces using Generative Adversarial Networks (GANs)

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Overview

In June 2014, Ian Goodfellow and his colleagues created a class of Machine Learning frameworks known as Generative Adversarial Networks (GANs). A zero-sum game in which one agent's gain is another agent's loss is how two neural networks compete with one another. GANs are incredibly helpful for creating data, particularly images (DCGANs). They are advantageous for photo theme transferring, image generation, and data augmentation.

These robust models will be used in this project to produce fresh anime faces. The entertainment industry and the artists who spend hours attempting to develop new characters may both benefit greatly from this specific endeavor.

Goals

- ➢ **Collecting Dataset:** Despite the fact that we already have the Dataset[3] (Kaggle), our first task is to figure out how to load it so that we can continue processing it. Google Drive & Google Colab are one of the methods we are considering.
- ➢ **Data Preprocessing:** In order for our Model to get the most information out of our Data, we will scale it down from the range of 0-255 to 0-1 range.
- ➢ **The Model:** We will be implementing the architecture described in the DCGAN paper[1]. The implementation of GANs with Wasserstein Loss (WGANs paper[2]) is our next objective.
- ➢ **Training and Generation of Images:** We anticipate that this model's training will take a long time. As a result, we will devote a significant amount of time and resources to the training process. The A100 GPU, which is offered in Google Colab Pro, will be used.

About the Dataset

We downloaded the Dataset[3] from Kaggle. It has pictures of various anime faces. Note that our training photos only contain face images because we are just creating new faces and not the entire character. There are 21, 552 photos total that are 28*28 in size.

Methodology

The DCGAN architecture implemented in the paper Unsupervised Representation Learning with Deep Convolutional Generative Adversarial Networks written by Alec Radford, Luke Metz, and Soumith Chintala uses 5 layers with most of them being Convolutional Layers. Although the paper recommends using Adam Optimizer and Binary Cross Entropy, we will be trying out various other Optimizers like RMSprop, SGD and various losses like Wasserstein Loss, MSE etc.

If time permits we would like to try our model with higher resolution data to get better results.

References

[1] Unsupervised Representation Learning with Deep Convolutional Generative Adversarial Networks written by Alec Radford, Luke Metz, and Soumith Chintala (https://arxiv.org/abs/1511.06434)

[2] Wasseratein GAN written by Martin Arjovsky, Soumith Chintala and Léon Bottou (https://arxiv.org/abs/1701.07875)

[3] Dataset : https://www.kaggle.com/datasets/soumikrakshit/anime-faces