Members: Wensi Yang, Yujin Xiang, Zheng Wang

Introduction

In July 2015, Google Launched DeepDream, an AI technology which uses a [convolutional neural network](https://en.wikipedia.org/wiki/Convolutional_neural_network) to find and enhance patterns in [images](https://en.wikipedia.org/wiki/Image), and create over-processed pictures with a dream-like hallucinogenic appearance. It was art’s first big step into AI.

The popular deep learning processing is called Generative Adversarial Network (GAN), it relies on the interaction of two sub-process. First, the discriminator, it has the access to a collection of images and have the ability to justify the images. And second, the generator, which generates images starting from random. As an example, the French collective Obvious used a “training data set of more than 15,000 portraits created between the 14th and 20th centuries” to have their algorithm create *Portrait of Edmond de Belamy*.



However, what is the perfect the parameters to help the algorithm to learn how to draw an image, to generate the best image, to determine the fake image are still challenging.

Aim

The aim of the final project is to do something much like DeepDream, but with even more fun and entertainment. Firstly, we will teach the algorithm how to draw an image by giving it one picture. Secondly, we will feeding the computer with 100 images of cute little minions. The dataset of minions serves as the initial training data for the discriminator. Training the discriminator involves presenting it with images from the minion dataset, until it reaches some level of accuracy. Thereafter, samples synthesized by the generator are evaluated by the discriminator. The discriminator tries to excel in identifying real images from generated ones, while the generator tries to excel in generating images that fool the discriminator into believing that they are real.

Background Research

We learned a lot about image recognition from kaggle, and we also learned a lot about neural networks. Of course, applying neural networks to image recognition is a complicated task, so we refer to Siraj Raval's many videos on machine learning for image recognition on Youtube. As for the dataset, we collect it on data.gov and some database websites.

Planned Approach

We plan to use Tensorflow, Generative Adversarial Network and Variational Autoencoder as the main approach. TensorFlow is an open-source software library for dataflow programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks. It is used for both research and production at Google.

Variational autoencoder models inherit autoencoder architecture, but make strong assumptions concerning the distribution of latent variables. They use Variational approach for latent representation learning, which results in an additional loss component and specific training algorithm called Stochastic Gradient Variational Bayes.

Evaluation

Inside different learning cycle, the algorithm sometimes show different learning ability, we reduce the error of picture recognition by the number of self-learning of neural networks. Meanwhile, it also includes the problem of changing parameters. Different weights will have a great impact on the results. In order to ensure the good results of the final results, we will conduct a large number of experiments to find the best solution.

References

1. [DeepDream](https://en.wikipedia.org/wiki/DeepDream)
2. [DeepDream Generator](https://deepdreamgenerator.com/)
3. [Generative Adversarial Network](https://en.wikipedia.org/wiki/Generative_adversarial_network)
4. [Welcome to the Machine: Law, Artificial Intelligence and the Visual Arts](https://itsartlaw.com/2018/11/26/welcome-to-the-machine/)