GAN Research Resources

This document is a list of resources (articles, papers, blogs, video walkthroughs, etc) that demonstrate how different groups have implemented Generative Adversarial Networks. The list is to be used as a learning guide for the team members that will be implementing the GAN.

GAN Resources:

1. Re-introductions
    a. The following articles are (very) basic walkthroughs of GANs that discriminate images. Read these if you need a light introduction into GANs if you memory from last semester is a little fuzzy.
    b. Beginner's Guide to GANs (GAN implementations using MNIST)
    c. Datacamp GAN Intro Article (GAN implementations using MNIST)
        i. *Pay attention to the required packages in the Datacamp article (tensorflow, keras, matplotlib, etc)*
    d. Computerphile Intro Video
        i. Nice walkthrough that covers all aspects of the GAN
    e. The Original GAN paper by Ian Goodfellow (MUST READ)

2. Loss Functions & Optimizers
    a. Toward Data Science Article
        i. This article shows a GAN that makes human faces. Though the image creation doesn't apply to our project make sure the read the sections on **Loss Functions** and **Training**.
    b. Toward Data Science Article (2)
        i. This article has a small walkthrough on how the GAN to make human faces works BUT the most interesting part is the author implements the GAN using **3 different optimizers** and shows the different in end results with human faces and a graph.
            1. *This strategy of using 3 different optimizers and physically seeing the difference in results is something we should consider to prove that the optimizer we chose is the best one*

for our problem. GREAT IDEA FOR END OF SEMESTER PAPER.

ii. Safari Course (short) on Deep Learning

1. This is a good refresher on Neural Nets. The whole thing is no more than an hour and covers forward and backprop well. *Watch the part on loss functions.*

3. CNN for stock market prediction
    a. This video uses a CNN on stock market data for market prediction. We obviously will not be doing market prediction BUT what is very useful about this project is the creator converted his one year of stock data (open, close prices, etc) into an image and fed that into the CNN, which outputted whether the next day would be an "up day" or not. After reviewing a lot of the articles on GANs it may be a very useful strategy to convert our data into images.
    b. Pay attention to how he creates the stock images and that he is able to layer several features of stock on one image (stock price, open - close, moving average, etc)
    c. His accuracy is at highest 65% but he only used 30 stocks over one year.

4. Resources for Building a GAN using Keras, Pytorch, and Tensorflow
    a. Keras Tutorials (will be useful for the minimum viable product)
        i. Deep Learning w/Keras (intro stuff)
        ii. Advanced Deep Learning w/Keras (see CNN & GAN chapters)
        iii. Keras Projects
            1. Goes through several projects shortly. The point of this series is to understand the process of building different GAN's and CNN's using Keras.
    b. Pytorch Tutorials
        i. Deep Learning w/Pytorch
        ii. CNN's & Image Analysis using Pytorch
    c. Tensorflow Tutorials
        i. Hands-On Learning for Tensorflow
            1. Goes through different projects using tensorflow. The ones that stick out are the CNN and GAN project. The GAN project uses the GAN to make a synthetic dataset (ring ring, sounds like simulation??)