APPLIED MACHINE LEARNING (CSCI–P556) PROJECT PROPOSAL (MILESTONE – I)

Generating Realistic Images Using Generative Adversarial Network (GANs)

Team member and their background:

Prateesh Reddy Patlolla (prpatlol) : Data Enthusiast have done my bachelors in Computer Science where I did several courses online related to my field of interest like Deep Learning Specialization by Andrew Ng. I also worked on a few Deep Learning projects one of which was Sign Board recognition using Tensorflow Data Pipelines and Transfer learning.

Yaswanth Karri (yaskarr): I have done my bachelors in Electronics and communication and have almost 5 years of experience in the IT sector with experience on Data, Databases and advanced processing abilities . Programming skills include : Python, C, MYSQL. I have also done a few courses relating to Machine learning and Deep Learning and worked on a few projects as a part of the program.

Shubham Kumar Singh (shusingh) : I have done my bachelors in Computer Science & Engineering. My technical areas include Data Analysis, Data Mining, and Machine Learning. My programming background includes experience in Python, Java, SQL, C, C++. I have done different projects based on Machine Learning and Computer Vision. I have also completed different courses on the topics of Machine Learning, Data Visualization, Data Preprocessing, and Computer Vision.

Nrusimha Vihari Eyunni (neyunni): Have completed my undergraduate in Electrical and Electronics Engineering. After my undergrad, I have worked in the IT sector as a Data Analyst at Capgemini, India for 3 years. I have worked on Multiple tools and technologies like SQL, PLSQL, Tableau, MSBI Stack, Informatica , Data Warehousing and Machine Learning. I have done end-to-end Machine Learning projects and completed few online courses in Deep Learning and worked on related projects.

Proposed Project:

- Project Description: We as a team intend to generate realistic faces using GANs. Generator generates new data instances from random noise or numbers while the Discriminator evaluates them for its legitimacy until the discriminator has ½ probability that means it couldn't say if the generated image is real or fake. This generates new plausible data samples which could be used in data-limited situations.

- Motivation for the project: Several machine learning models, including neural networks, consistently misclassify adversarial examples (Research paper). The reason for such an adversary is that most ML models learn from a limited amount and poor data which is prone to overfitting. GANs was created by Ian Goodfellow (2014) to overcome this. This is also the technology behind face-swapping applications (aka deepfakes), Natural Voice Generation (Google Duplex), Music Synthesis, smart reply and others.

- Datasets we plan to use: We plan on combining multiple datasets for this project.

https://www.kaggle.com/jessicali9530/celeba-dataset

https://pan.baidu.com/share/init?surl=sSG4AXaCeAIywwaWkgkpAw

https://arxiv.org/abs/1911.05351

Scraped Images from https://thispersondoesnotexist.com/

The above link generates a new realistic image everytime you load the link. That is a very exciting project !

Potential Challenges :

1. Highly Unstable : Training two networks and converging is highly unstable as we have no gaurentee that gradient updates which are being competed will both reach the same stage. Mode collapse is also an issue i.e.. When generater produces samples that only fits one part of real distribution (Typically being Overfit to a share of data instead of whole data)

2. Computationally Expensive : Training such complex architecture of networks over and over is going to need high end GPUs we plan on using Carbonate for this.