CSE 801A Project Brief

Executive Summary

1. Detect human emotions – joy, sadness, fear, anger, disgust and surprise through facial feature recognition.
2. Develop a deep learning algorithm to identify the unique patterns in an image and thereby predicting the emotion on a human face.
3. Accurate results can help predict human emotions even in a live video.

Background

Human emotions are complex and subtle that fellow humans fail to interpret them time-to-time. But often, popular emotions have easy patterns so that even a machine also can identify. Computer vision extracts these patterns and identifies them by converting unstructured image data into structured tabular data.

There are some models and datasets pertaining to this problem available in the market. My goal is to improve the model performance by gathering data as clean as possible and building cutting-edge deep learning models.

Data Gathering

Images would be scraped from royalty-free website '*shutterstock.com*'. I will make sure that only 1 person images are used in the analysis to keep the data clean.

Data Analysis

Prior to model development, data will be pre-processed to remove unnecessary background patterns and extract eyes and mouth. Feature reduction techniques like PCA and NMF will be used to reduce dimensionality.

The most popular technique used in computer vision is Convolutional neural networks and I will be using the same technique to build a benchmark model. Hyperparameter tuning on convolutional layers filters, normalization layers, dropout rate of dropout layers, number of dense layers and activation function would be done extensively to increase the performance as much as possible.

Popular white papers on this topic would be replicated on the dataset I scraped to serve as a comparison.

Data Presentation

This project is focused on gathering and analysis primarily. But a small powerpoint presentation would be made to present the final model architecture and comparison of different model outputs.

The final model would be implemented using AWS SageMaker. A User Interface will be created for users to upload image and see the model output real-time.

Tools and Packages

Python and AWS SageMaker will be used during the model development and implementation. Microsoft Excel and Powerpoint would also be used whenever necessary. The important Python packages that would be used are numpy, pandas, scikit-learn, keras and dash (subjected to change).