CS 422
Human Computer Interaction

Project Report

Facial Emotion Detection

Instructor Name	Mr Rauf Malick
Group Members	Obaid ur Rehman (17k-3848) Areeka Aijaz (17k-3913) Tooba Shahid (17k-3731)
Submission Date	24th December 2020

Introduction

Humans communicate with each other via different ways such as speech , body gestures and expressions. Emotions in the form of facial expressions are an important part of communication.With the development of Human Computer Interaction and the concept of computer vision , more attention is being paid to the detection of expression through facial recognition. Our project focuses on one of the most interesting applications of CV that is Emotion Detection through facial expressions. CV can recognize and tell you what your emotion is by just looking at your facial expressions. It can detect whether you are angry, happy, sad, etc.

Methodology

The system takes a picture as an input , either it captures it through a webcam or a picture can also be imported directly from the computer. The system then detects the face and then recognizes the emotion through the facial expressions. The output shows the image with a box around the face(face detection) and the labels (emotion recognition) . We used OpenCV and webcam for real time emotion detection. We worked on Google Collaboratory using GPU as runtime to train , validate and test the model for better performance.

Data Files

The dataset we used was a publicly available dataset , named fer2013 , and was used for a kaggle competition. It contains 48 X 48-pixel grayscale images of the face. The data has 7 labels for facial emotions with each assigned an integer from 0-6. These facial emotions have been categorized as: 0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Sad, 5=Surprise, and 6=Neutral. The csv file has the dimensions 48000*3 . The columns in the dataset are pixels , emotion(labels) and usage (training , validation and testing).

Model

For our project we used Convolutional Neural Network with the help of a built in python library i-e Keras . CNN is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. It is basically a multi model network with two layers : filter layer and a classification layer. Also in all the layers, we used Rectified Linear Unit (ReLU) as the activation function and also used softmax in the last and final layer. Pooling layer is used to decrease the computational power required to process the data through dimensionality reduction. We have used max pooling which returns the maximum value from the portion of image covered by the kernel. We used 128 as batch size with 150 epochs.