Machine Learning Nanodegree

Capstone Proposal
Attendance using Facial Recognition

Syed Shakeeb
May 14, 2019

Proposal

Domain Background

Attendance using Facial Recognition is the recognition of the individuality upon the face and then attendance is given for the particular subject at the specified time by the system.

It was widely recognised as a research area in the field of the Computer Vision for the recognition of the face and then later it was easily trained using Neural Network rather than using Support Vector Machine that was earlier used for face recognition. With proper training and testing using CNN's, the model can classify the face of the individuality.

There are many applications of face recognition such Attendance using Facial Recognition, Detecting Criminal using Facial Recognition, Detecting using Facial Recognition,etc.

Problem Statement

Attendance in the organization or school have either biometric system or register system which is time-consuming and requires manual work but in this case of the Attendance using Facial Recognition does not require any Biometric System or manual work of calling each person name for Attendance.
Face Recognition can help reduce the time and the users will find it very easy as it only requires the face for recognizing and then adding the attendance in the database.
Attendance using Facial Recognition can be done using Keras, openCV, sklearn, numpy, etc.

Datasets and Inputs

Datasets which I will be using for this project will be generated by my own webcam which later does preprocessing and then divide the datasets into training and testing datasets for training and predicting in CNN.

Creating own datasets can be done with the help of the OpenCV which later detects my face in the shape of the rectangle and store it in the particular folder after cropping the image into rectangle.

Input given to the CNN will be preprocessed after the data is generated and the datasets also include other data which is downloaded from Google Images.

Datasets which I will generating by using webcam and also downloading from the google Images contains around 25 images of each faces in the seperate folder and if the dataset contains more images of one person than other then the model will overfit.

The datasets contains few of the famous people such as Bill Gates, Steve Jobs, Elon Musk, Warren Buffet, etc.

Solution Statement

The solution to this problem can be done by training CNN and then later predicting using webcam to recognize the individuality which can add the attendance in the database for checking the attendance.

The dataset used here in this project is first pre-processed whether it is an image or the image captured by the camera and then the dataset is divided into training and testing.

Convolutional Neural Network is used in this project for classifying the images and then predicting the given image for recognizing and it is developed using Keras as Convolutional Neural Network is widely used for classification of the image.

After training, the accuracy can be calculated by testing whether the model can classify and recognize the image or not.

After achieving at a certain accuracy in a testing model, we can use the trained for predicting of an individuality. After predicting of how it is, then the attendance is added in the database in.csv file which can be later retrieved for checking the attendance.

Benchmark Model

Benchmark Model for this project is Convolutional Neural Network classifying and OpenCV for detecting the face.

OpenCV is the open Software which is widely used in Computer Vision for detecting the face in the form of the rectangle or square etc.

Convolutional Neural Network is the Neural Network which can be used for training the model later to classify the identity of the person to add the attendance after detecting the face through OpenCV.

The model can be compared to the SVC which is also used for classifying the images by testing how well the model have predicted by the value of the accuracy.

Also the model can also be compared to a single Convolutional Layer or the Multiple Perceptron Layer which we can see the accuracy will not be very good when testing the model.

Evaluation Metrics

The evaluation metrics used in this project are as follows:-

- Accuracy
  - Accuracy is the evaluation used to determine how well the model have predicted the face of the person and also how well the model have trained.
  - Using accuracy we can determine the how well the model have predicted using testing data.
  - It is represented in acc.
- Categorical Cross Entropy
  - Using Categorical Cross Entropy we can determine how well the model have been trained and learned the dataset and also classified the model when testing.
  - Larger the Entropy value, the model did not learn very well and is not good for classification.
  - Smaller the Entropy value, the model did learn very well and can used for classification.
  - It is represented using val_acc, val_loss.
- Optimizers
  - In this project, I will using rmsprop for optimization.
- F1-score
  - Through F1-score we can evaluate the dataset is balanced or not.

Project Design

The outline of the project is as follows:-
- Importing all the third-libraries required to train the Neural Network and detecting the face in the image.
    - Third-Libraries include:
        - Keras to train the Convolutional Neural Network and preprocessing.
        - OpenCV for detecting the face
        - Numpy for preprocessing
        - Sklearn to divide the datasets into training and testing.
- Creating the datasets from the images captured from the webcam of the laptop and detecting the face using openCV.
- Image Augmentation using OpenCV.
- Preprocessing the dataset and dividing the dataset into training and testing.
- Creating a Convolutional Neural Network model in a Sequential Manner and training the model using fit() method.
- Testing the model how well model can classify using accuracy evaluation.
- Predicting and recognising the face of the image from the webcam.
- Adding the attendance in the .csv file by either updating or adding a new entry.
- .csv file can later retrieved from the database to check the attendance.