FACE RECOGNITION BASED ATTENDANCE SYSTEM USING CONVOLUTIONAL NEURAL NETWORK (CNN) FOR HUMAN BEHAVIOR ANALYSIS

[1]Ashish Dusane, [2] Mrs. Vineeta Tiwari, [3] Mr. Manish Nirmal, [4] Dr. Bhushan Chaudhari

[1] M.Tech. Department of Computer Science Engineering, [2] Department of ACTS, [3] Department of ACTS, [4] Department of CS
[1] Sandip University, Nashik,
[1] CDAC ACTS – PUNE, INDIA

Abstract : **Future Smart Classroom that we envision will significantly enhance learning experience and seamless communication among students and teachers using real-time sensing and machine intelligence. In that, we research a Smart Classroom system that consists of these components like Student Attendance using Facial Recognition algorithms, human behavior, such as hand gestures, facial expressions and body language, Sentiment Analysis based of Student behavior.**

We base our suggested system components on existing research in deep learning-based Emotion / Behavior recognition. In this paper comprehensive study of the process of deep learning-based Emotion / Behavior recognition has been done and determining the computational requirements of a system that incorporates these technologies. Based on these requirements, we research a study of the system like: i) Smart classroom automatic attendance system by using two deep learning facial recognition algorithms Convolutional Neural Network (CNN). ii) Behavior Analysis Model Based on Facial Recognition using Convolutional Neural Network (CNN).

Keywords : Face Detection, Face Recognition, Face Identification, Behavior Analysis, CNN.

I. INTRODUCTION

To analyse the advantages and disadvantages, problems encountered and solutions found, when using face detection and recognition in an academic environment to keep track of the attendance of students, where in this process we use a CCTV camera to be fixed at the entry point of a classroom, which automatically captures the image of the person and checks the observed image with the facial database using proposed system. It is typically used for two purposes. Initially marking the attendance for a student by comparing the face images produced recently which does recognition of human who are new or strange to the environment i.e. an unauthorized person. For identification and verification of image, a newly emerging trend 3-Diemention Face Recognition is used which claims to provide more accuracy in matching the image databases and has an ability to recognize a subject at different views.

Also from that face detection we capture the student's emotion just like Happy, Sad, Neutral, Angry, Disgusted, Surprised, etc. from that emotion we analyse it and from that analysis we get the final overall students behavior for particular lecture. So from that students behavior we get the result in form of teacher feedback also and students feedback also. Subsequently, detailed description of the three main parts Student attendance system by using two deep learning facial recognition algorithms Convolutional Neural Network (CNN). ii) Behavior Analysis Model Based on Facial Recognition using Convolutional Neural Network (CNN).

MOTIVATION :

Face recognition has been a sought after problem of biometrics and it has a variety of applications in modern life. The problems of face recognition attracts researchers working in biometrics, pattern recognition field and computer vision. Several face recognition algorithms are also used in many different applications apart from biometrics, such as video compressions, indexing etc. They can also be used to classify multimedia content, to allow fast and efficient searching for material that is of interest to the user. An efficient face recognition system can be of great help in forensic sciences, identification for law enforcement, surveillance, authentication for banking and security system, and giving preferential access to authorized users i.e. access control for secured areas etc. The problem of face recognition has gained even more importance after the recent increase in the terrorism related incidents. Use of face recognition for authentication also reduces the need of remembering passwords and can provide a much greater security if face recognition is used in combination with other security measures for access control. The cost of the license for an efficient commercial Face recognition system ranges from 30,000 $ to 150,000 $ which shows the significant value of the problem. Though face recognition is considered to be a very crucial authentication system but even after two decades continuous research and evolution of many face recognition algorithms, a truly robust and efficient system that can produce good results in real time and normal conditions.

II. RELATED WORK

❖ Face Detection :

Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images. Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene.

Face detection can be regarded as a specific case of object-class detection. In object-class detection, the task is to find the locations and sizes of all objects in an image that belong to a given class. Examples include upper torsos, pedestrians, and cars.

Face-detection algorithms focus on the detection of frontal human faces. It is analogous to image detection in which the image of a person is matched bit by bit. Image matches with the image stores in database. Any facial feature changes in the database will invalidate the matching process.

Firstly, the possible human eye regions are detected by testing all the valley regions in the grey-level image. Then the genetic algorithm is used to generate all the possible face regions which include the eyebrows, the iris, the nostril and the mouth corners.

Each possible face candidate is normalized to reduce both the lightning effect, which is caused by uneven illumination; and the shirring effect, which is due to head movement. The fitness value of each candidate is measured based on its projection on the Eigen-faces. After a number of iterations, all the face candidates with a high fitness value are selected for further verification. At this stage, the face symmetry is measured and the existence of the different facial features is verified for each face candidate.

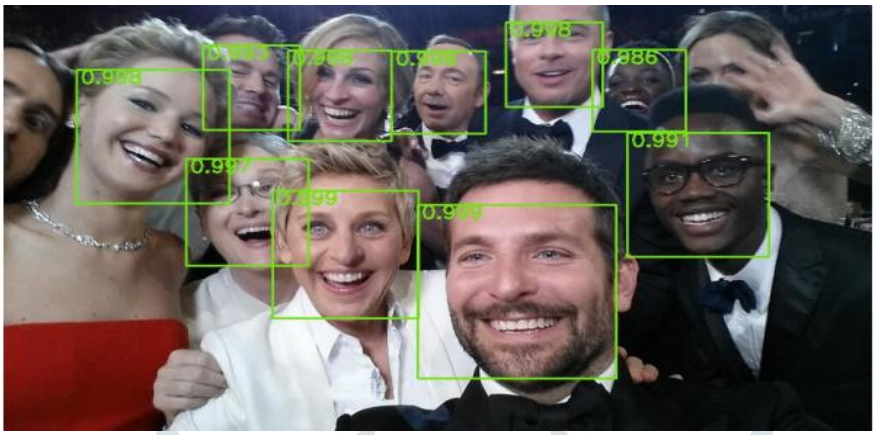


Fig. 1 : Face Detection in Images

❖ **Face Recognition** :

A **facial recognition** is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected features from given image with faces within a database. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shape. While initially a form of computer application, it has seen wider uses in recent times on mobile platforms and in other forms of technology, such as robotics.

It is typically used as access control in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Although the accuracy of facial recognition system as a biometric technology is lower than iris recognition and fingerprint recognition, it is widely adopted due to its contactless and non-invasive process. Recently, it has also become popular as a commercial identification and marketing tool.[4]

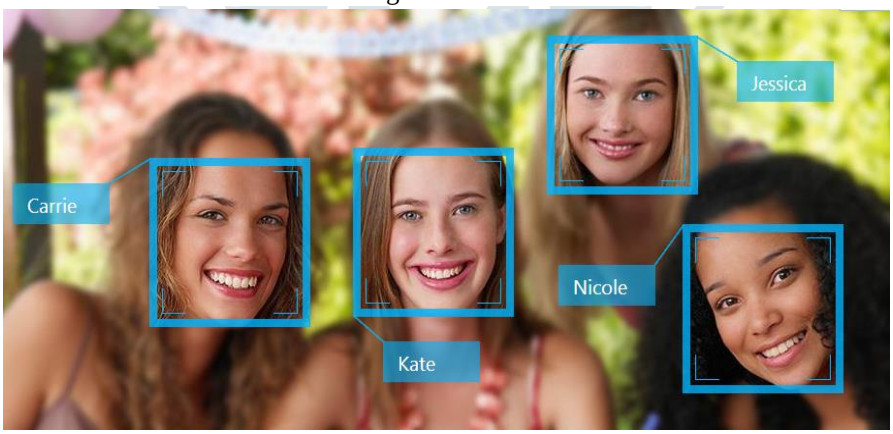


Fig 2 : Face Recognition in Image

III. DEEP LEARNING

Deep learning uses layered architecture for building computational models which mainly contains input layer, hidden layer which extract features from image and output layer which classifies objects. It mainly working like human brain.

❖ **Convolutional Neural Network :**

The typical use of convolutional networks is on classification tasks, where the output to an image is a single class label. However, in many visual tasks, especially in biomedical image processing, the desired output should include localization, i.e., a class label is supposed to be assigned to each pixel. Moreover, thousands of training images are usually beyond reach in biomedical tasks. One of the most popular types of deep neural networks is known as convolutional neural networks

(CNN or ConvNet). A convolutional neural network (CNN) is a class of deep, feed-forward networks, composed of one or more convolutional layers with fully connected layers (matching those in typical Artificial neural networks) on top. A CNN convolves learned features with input data, and uses 2D convolutional layers, making this architecture well suited to processing 2D data, such as images.

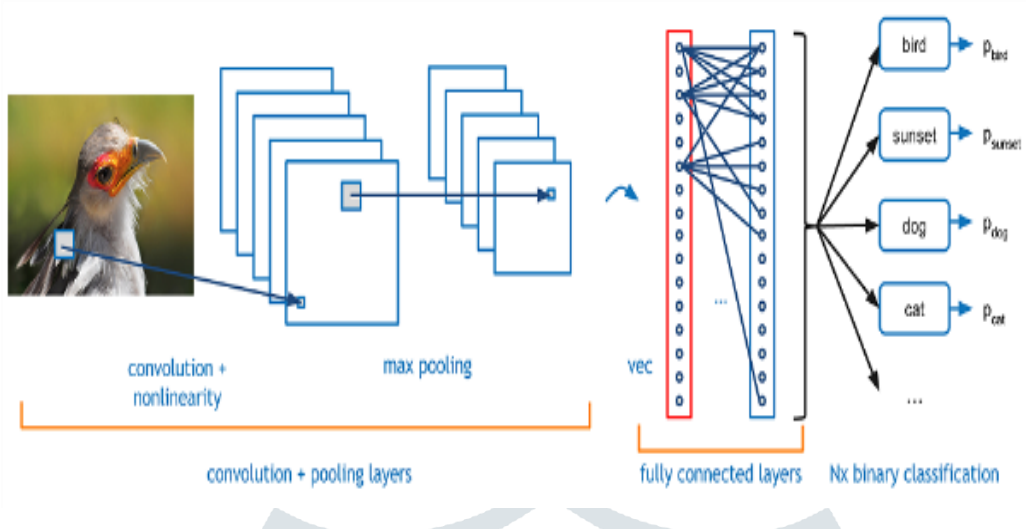


Fig 3 : CNN Architecture

CNNs eliminate the need for manual feature extraction, so you do not need to identify features used to classify images. The CNN works by extracting features directly from images. The relevant features are not pre trained; they are learned while the network trains on a collection of images. This automated feature extraction makes deep learning models highly accurate for computer vision tasks such as object classification. CNNs learn to detect different features of an image using tens or hundreds of hidden layers. Every hidden layer increases the complexity of the learned image features. For example, the first hidden layer could learn how to detect edges, and the last learns how to detect more complex shapes specifically catered to the shape of the object we are trying to recognize. Regular Neural Networks transform an input by putting it through a series of hidden layers. Every layer is made up of a set of neurons, where each layer is fully connected to all neurons in the layer before. Finally, there is a last fully-connected layer—the output layer—that represent the predictions.

Why Deep learning?

Deep learning take huge amount of data and gives output with good performance. The network automatically learn features and do not need to do it manually. It try to learn low level features first such as edges, corners and contours then high level features such as recognize objects in image.

IV. PROPOSED ARCHITECTURE

The CCTV camera is fixed at the entry of the class room and used to observe the face of the students. The observed image of the person is sent to the system which is connected to the CCTV camera.

System are enriched with the face recognition technique which actually produces the possibilities of the human expression variations. The use of 3D face technology enables the work of identifying, verifying and detecting the match images in the face database.

The diagram illustrates how the phases of the system are carried out :

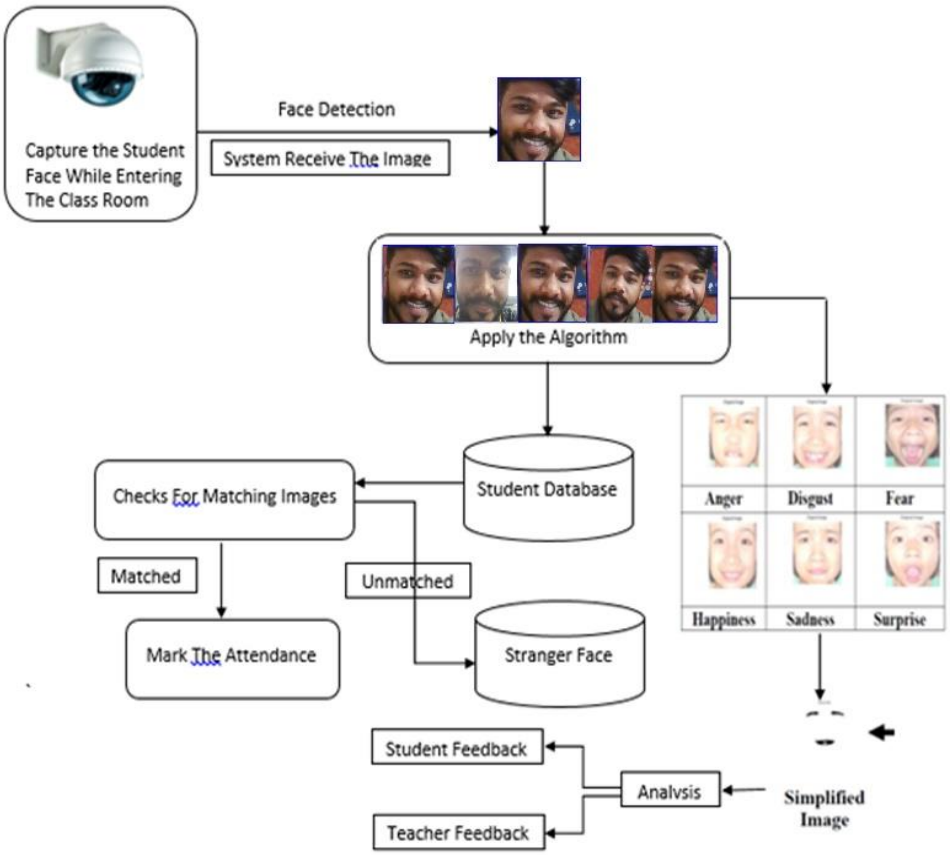


Fig 4 : Proposed Architecture

Attendance System using Face Recognition is a software developed for daily student attendance in schools, colleges and institutes**.** If facilitates to access the attendance information of a particular student in a particular class. The information **is** sorted by the operators, which will be provided by the teacher for a particular class. This system will also help in evaluating attendance eligibility criteria of a student.

Purpose :

The purpose of developing Attendance System using Face Recognition is to computerized the tradition way of taking attendance. Another purpose for developing this software is to generate the report automatically at the end of the session or in the between of the session.

Scope :

The scope of the project is the system on which the software is installed, i.e. the project is developed as a desktop application, and it will work for a particular institute. But later on the project can be modified to operate it online.

Technology Used :

Language : Python
Database : MongoDB

System Requirement :

Minimum RAM : 4 GB
Operating System : Windows 8 or 10, Ubuntu 14/16

Overview :-

Attendance System using Face Recognition basically has two main phase for proper functioning :

- First phase is admin which has right for creating space for new batch. Any entry of new faculty, Updating of students face dataset and student information.
- Second phase is handled by the admin, in that mainly we analysis of students behavior in each lecture and on that each lecture students behavior we getting and at finally we got students behavior regarding subject and from that analysis we improve their result based on weekly or monthly behavior and also we get the teacher and students feedback also.

V. IMPLEMENTATION

Phase – I :~

i) Registraion :

First phase of the system, actually deals with registering the information of the student in a particular classroom. The information includes

(1) Name of the student

(2) Register or Roll number

(3) Image of the student (taken by camera).

These details are placed in the student database from which the actual comparison will be done.

ii) Image Capturing :

The CCTV cameras are used for capturing the images of the student which will be in active mode during the hours of college. The camera will be placed at the entry point of the classroom when the student enters it automatically captures the image and send to the android mobile to which it has been connected with.

The use of CCTV camera is that it is capable of capture the image of high quality and also at different angles view.

iii) Identification :

To identify the student image, smart phone which holds the image database of the student, checks for the match using 3D face recognition software technique.

In 3D face recognition technique 3D sensors are used to capture information about the outline of a face surface. The obtained information is then used to identify the distinct features on the face surface, such as the axis of the eye sockets, nose, and Chin.

Steps followed in 3D face recognition technique are:

1. Obtained image is cropped.
2. To the cropped image a 3D Face algorithm of canonical face matching is applied to get different face reactions of the particular image.

iv) Verification :

By the time of verification, dual process is done. One, the images of the students that are captured recently is compared for the match in student database. In two of the probabilities the images are checked. If the captured image matches with the image that has been registered before are processed for attendance management.

Second, if it is observed to be unmatched with student database then the image of the person will be consider as new and saved in the separate database called stranger database. The separation of the database will provide some information about the stranger who is new to the environment and gives the information about the person who has been entered. It not only ensure security but also make some fear to the people who needed to be entered without any authority.

RESULSET / IMPLEMENTATION :~

In that Attendance System using Face Recognition system we create first UI for our project.

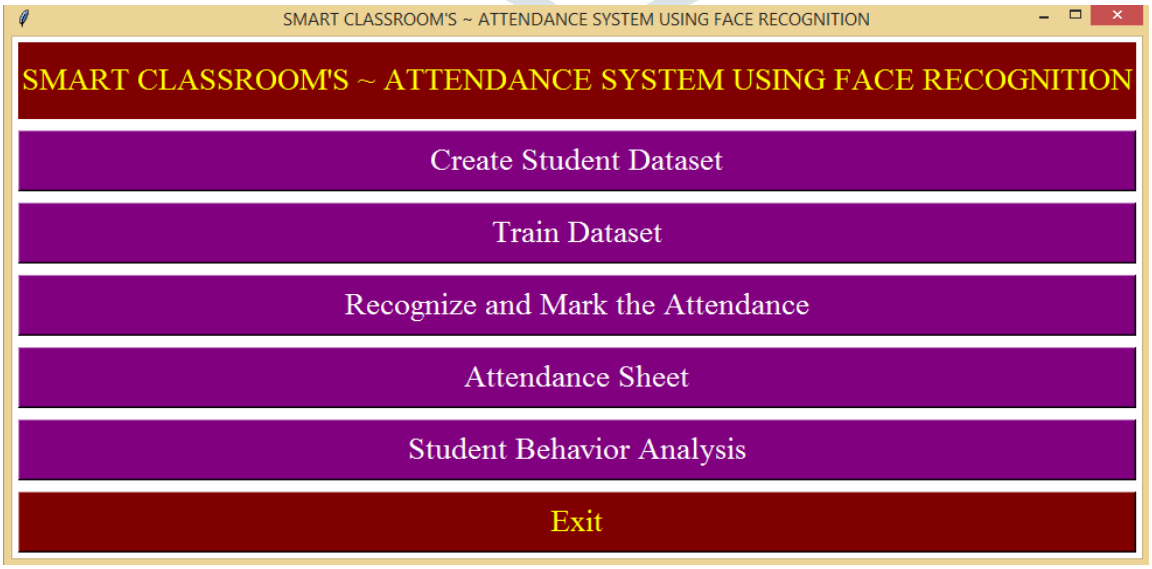


Fig 5 : UI of Attendance System

Then we / admin create the database of students face images. And then we train that dataset.

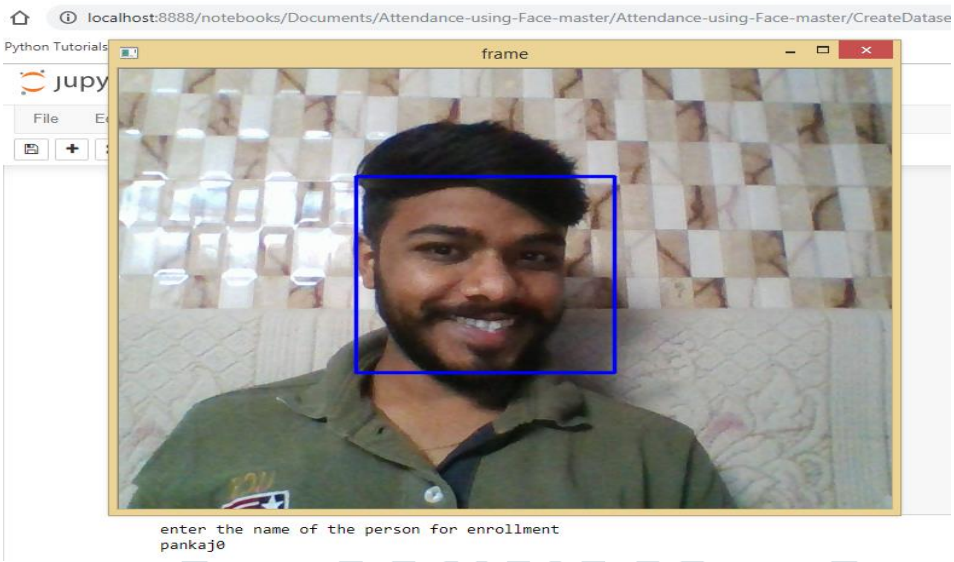


Fig 6 : Creating Student Dataset

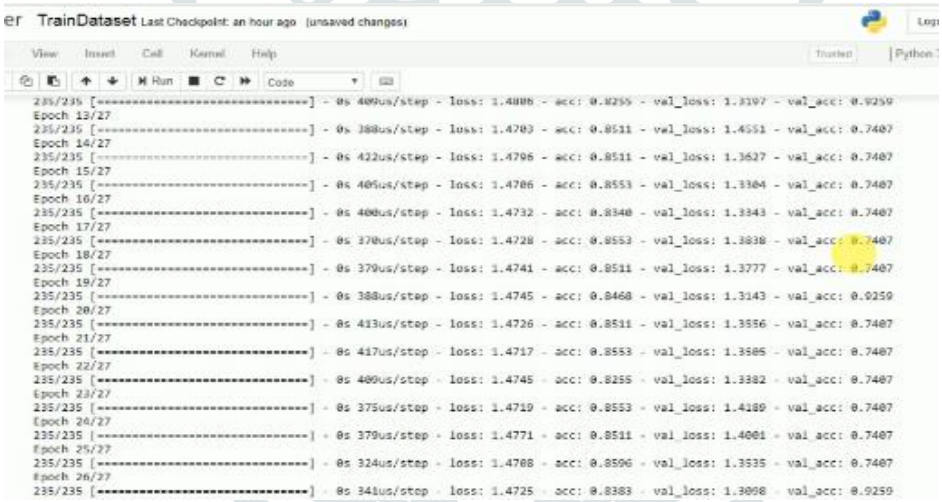


Fig 7 : Training Dataset

After successful completion of training the dataset we get the accuracy upto 92. This is the highest accuracy until now.

After completed the train dataset, then we recognizing the faces from given dataset. For that purposed in that system we are using MongoDB database. After successful completion of creation of dataset in MongoDB we run the recognizer file to get the result.

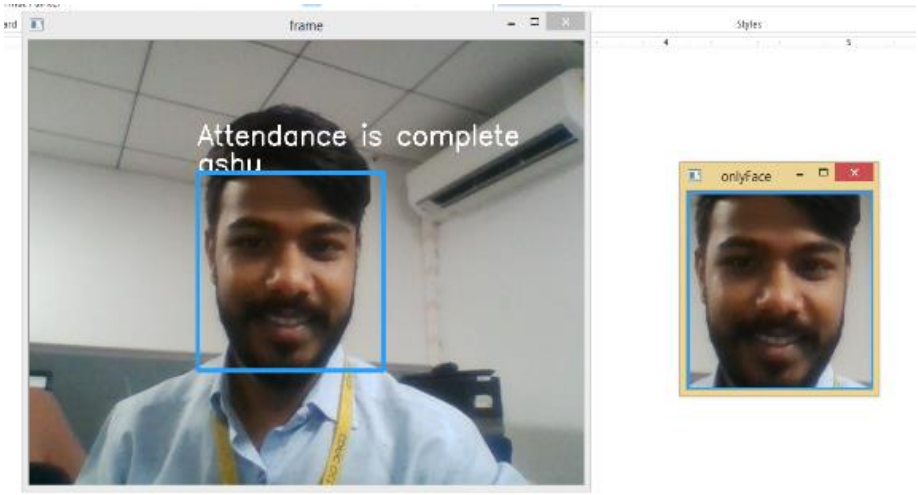


Fig 8 : Creating Database in MongoDB

Then after creating the dataset in MongoDB that dataset we link with the recognition file this file is basically jupyter file. So, then we compiling recognition jupyter and at last we got the following result :

	Name	Attendance			
		30-05-19	01-06-19	02-06-19	03-06-19
0	ram	1	1	0	0
1	john	0	1	1	1
2	pankaj	1	1	1	0
3	ashish	0	0	1	1
4	ash	0	1	1	1
5	ashu	1	1	1	0
6	shamu	0	1	1	1

Fig 9 : Final Result of Student Attendance

At lastly after all this result gets coming, we get one attendace.csv file is generated and in that csv file actual student attendance is seen. In that csv file all that we created the student database that students name is there along with automatic students attendance carried out like mark 1 as student is present on that day and mark 0 as student absent on that day.

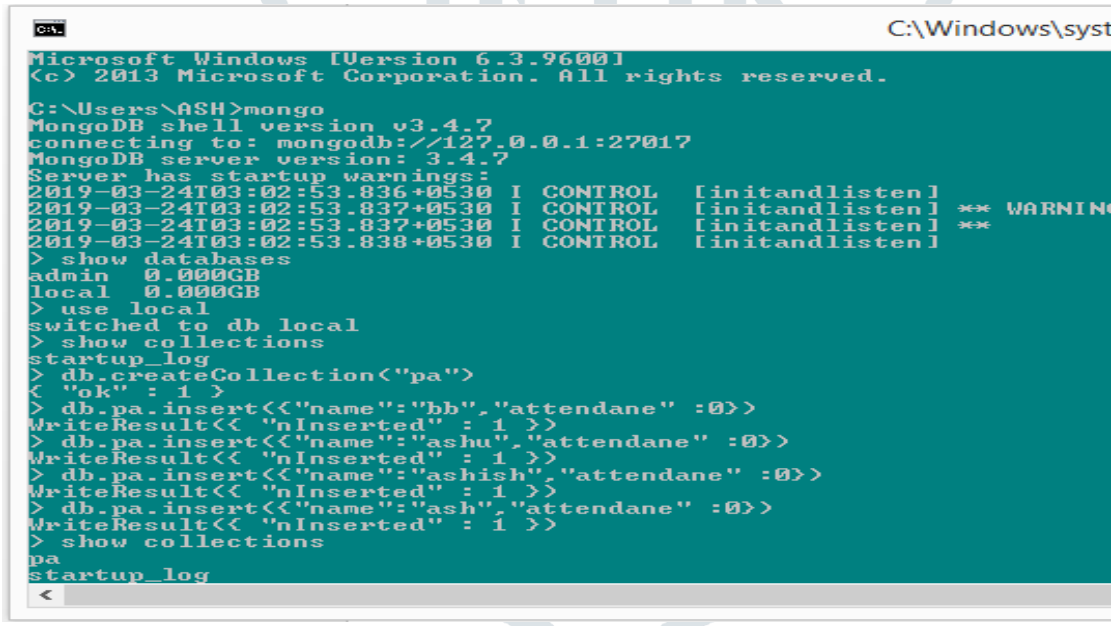


Fig 10 : Student Attendance in csv file

Phase – II :~

❖ Behavior Analysis / Emotion Clssification :

Emotion also known as mood, and has always been used for showing human's feeling. Human's emotion state can be detected by some methods such as physiological measurement (heart rate, blood volume, blood pressure, skin resistance or conductance level, electroencephalogram, papillary response, electroculogram, gastrointestinal motility, electromyogram, skin temperature, brain potentials, and respiration rate), facial expression and vocal recognition also indicate that a human's emotion state generally can be expressed by facial expression. The human's emotion can be quantified since all human has the same facial muscles during expressing an emotion.

Since emotion has become an important interface for the communication between human and machine, it plays a basic role in rational decision-making, learning, perception, and various cognitive tasks. In this study, six primary emotions such as anger, disgust, fear, happiness, sadness and surprise were classified using Neural Network. Real dataset of facial expression images were captured and processed to prepare for Neural Network training and testing.

Emotion can also be detected by some facial components such as eyebrows and lip. This is in line with the study detecting the facial expression by the distinctive clues on the appearance of the mouth, eyes, and eyebrows.

Facial expressions are one of the most natural, powerful, and immediate means by which people communicate their emotions. Many facial expression studies were based on the Facial Action Coding System that was developed. Facial Action Coding System is used for measuring and describing the facial behaviors. All visually distinguishable facial movement can be explained by referring FACS which has the code of facial expression clues.

Many set of possible facial expressions can be created by the combination of these action units. The human face expresses emotions faster than people verbalize or even realize their feelings. Many psychologists have studied human emotions and there are

many possible facial expressions, the same expression may have radically different meanings in different cultures. However, it is widely accepted that there are six universal expressions that do not change too much from culture to culture. These universal emotion expressions are happiness, sadness, disgust, anger, surprise and fear.


```
In [3]: 1 train_csv = pd.read_csv('/home/mtech/Documents/Emotion/facial_expressions-master/facial_expressions-master/data/legend.
        2 print(train_csv)
```

	user.id	image	emotion
0	628	facial-expressions_2868588k.jpg	anger
1	628	facial-expressions_2868585k.jpg	surprise
2	628	facial-expressions_2868584k.jpg	disgust
3	628	facial-expressions_2868582k.jpg	fear
4	dwdii	Aaron_Eckhart_0001.jpg	neutral
5	302	Aaron_Guiel_0001.jpg	happiness
6	302	Aaron_Patterson_0001.jpg	neutral
7	302	Aaron_Peirsol_0001.jpg	happiness
8	302	Aaron_Peirsol_0002.jpg	happiness
9	302	Aaron_Peirsol_0003.jpg	happiness
10	302	Aaron_Peirsol_0004.jpg	neutral
11	302	Aaron_Pena_0001.jpg	neutral

Fig 11 : Emotions Recognition of Student

RESULSET / IMPLEMENTATION :~

We start by loading our csv file that contains both image filename and its corresponding emotion. When checking the csv file, we noticed that some images have a corresponding emotion in lower case whereas others in upper case as shown in the execution below :

13664	jhamski	SharmilaTagore_57.jpg	HAPPINESS
13665	jhamski	SharmilaTagore_6.jpg	HAPPINESS
13666	jhamski	SharmilaTagore_60.jpg	HAPPINESS
13667	jhamski	SharmilaTagore_61.jpg	HAPPINESS
13668	jhamski	SharmilaTagore_62.jpg	HAPPINESS
13669	jhamski	SharmilaTagore_63.jpg	HAPPINESS
13670	jhamski	SharmilaTagore_65.jpg	HAPPINESS
13671	jhamski	SharmilaTagore_66.jpg	HAPPINESS
13672	jhamski	SharmilaTagore_67.jpg	HAPPINESS
13673	jhamski	SharmilaTagore_68.jpg	HAPPINESS
13674	jhamski	SharmilaTagore_69.jpg	HAPPINESS
13675	jhamski	SharmilaTagore_70.jpg	HAPPINESS
13676	jhamski	SharmilaTagore_71.jpg	HAPPINESS
13677	jhamski	SharmilaTagore_72.jpg	HAPPINESS
13678	jhamski	SharmilaTagore_73.jpg	HAPPINESS
13679	jhamski	SharmilaTagore_74.jpg	HAPPINESS
13680	jhamski	SharmilaTagore_75.jpg	HAPPINESS
13681	jhamski	SharmilaTagore_76.jpg	HAPPINESS
13682	jhamski	SharmilaTagore_77.jpg	HAPPINESS
13683	jhamski	SharmilaTagore_79.jpg	HAPPINESS
13684	jhamski	SharmilaTagore_8.jpg	HAPPINESS
13685	jhamski	SharmilaTagore_80.jpg	HAPPINESS
13686	jhamski	SharmilaTagore_81.jpg	HAPPINESS
13687	jhamski	SharmilaTagore_82.jpg	HAPPINESS
13688	jhamski	SharmilaTagore_83.jpg	HAPPINESS
13689	jhamski	SharmilaTagore_9.jpg	HAPPINESS

[13690 rows x 3 columns]

Fig 12 : Reading the CSV file

Before moving forward, we need to normalize the emotions in the csv file. We will thus convert all emotions into lower case :

```
train_csv['emotion'] = train_csv['emotion'].str.lower()
train_csv.groupby('emotion').count()
```

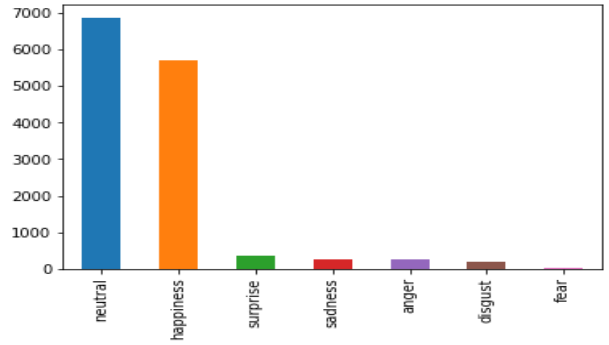
emotion	user.id	image
anger	252	252
contempt	9	9
disgust	208	208
fear	21	21
happiness	5696	5696
neutral	6868	6868
sadness	268	268
surprise	368	368

As we can see in the plot below, the contempt emotion doesn't have much records in the dataset. Therefore, it will not be as useful as the others. That's why we will remove it by adding its images into the angry category :

```
train_csv.replace("contempt", "anger", inplace=True)
train_csv.groupby('emotion').count()

train_csv['emotion'].value_counts().plot(kind='bar')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f9aa3c15e80>
```

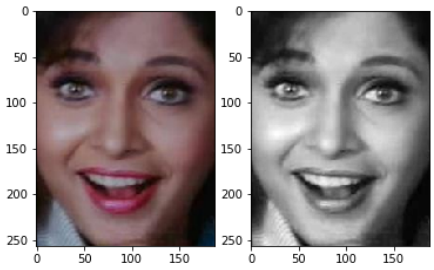


```
img_colored = cv.imread('/home/mtech/Documents/Emotion/facial_expressions-master/facial_expressions-master/test/RamyaKr
#plt.imshow(cv2.cvtColor(img_colored, cv2.COLOR_BGR2RGB))

gray_image = cv.cvtColor(img_colored, cv.COLOR_BGR2GRAY)
#plt.imshow(gray_image,cmap='gray')

plt.subplot(1,2,1)
plt.imshow(cv.cvtColor(img_colored, cv.COLOR_BGR2RGB))
plt.subplot(1,2,2)
plt.imshow(gray_image,cmap='gray')
```

```
<matplotlib.image.AxesImage at 0x7f9aa3b15588>
```



Now that we have our dataset normalized, we can proceed with the processing step. The training set is a collection of images where some are colored and others are converted to gray scale. The same is valid for the test set that also contains both colored and grayscaled images. Thus, we need to perform a grayscale conversion on the training set.

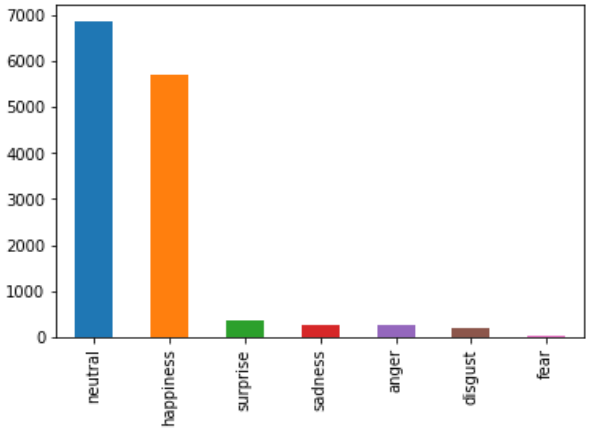
Let's first have a look at the training set. we will import the necessary libraries and then display a sample image of the training dataset that contains only grayscaled images. Colored images contain some information that is considered as noise in the image processing work. That's why we need to convert them to gray scale.

Down below is the colored image after being converted to

```
train_csv.replace("contempt", "anger", inplace=True
train_csv.groupby('emotion').count()

train_csv['emotion'].value_counts().plot(kind='bar'
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f9aa3c15e80
```



Build a

```
In [119]:
H = model.fit_generator(
    aug.flow(trainX, trainY, batch_size=BS),
    validation_data=(valX, valY),
    steps_per_epoch=len(trainX) // BS,
    epochs=EPOCHS, verbose=1)
print('[INFO] Done!')
```

```
0.0132
Epoch 8/50
22/22 [==============================] - 17s 785ms/step - loss: 1.1826 - acc: 0.4631 - val_loss: 1.2305 - val_acc:
0.5033
Epoch 9/50
22/22 [==============================] - 17s 780ms/step - loss: 1.1821 - acc: 0.4517 - val_loss: 1.0915 - val_acc:
0.4276
Epoch 10/50
22/22 [==============================] - 16s 749ms/step - loss: 1.1648 - acc: 0.4788 - val_loss: 1.1419 - val_acc:
0.5033
Epoch 11/50
22/22 [==============================] - 16s 709ms/step - loss: 1.2113 - acc: 0.4470 - val_loss: 1.0701 - val_acc:
0.5033
Epoch 12/50
22/22 [==============================] - 14s 628ms/step - loss: 1.1471 - acc: 0.4810 - val_loss: 1.0919 - val_acc:
0.5033
Epoch 13/50
22/22 [==============================] - 14s 641ms/step - loss: 1.1845 - acc: 0.4399 - val_loss: 1.1203 - val_acc:
0.5033
```

Convolutional Neural Networks Model Total images in dataset around 13718 images are there In that only we test the images around 213 images only and based on that it will be give result.

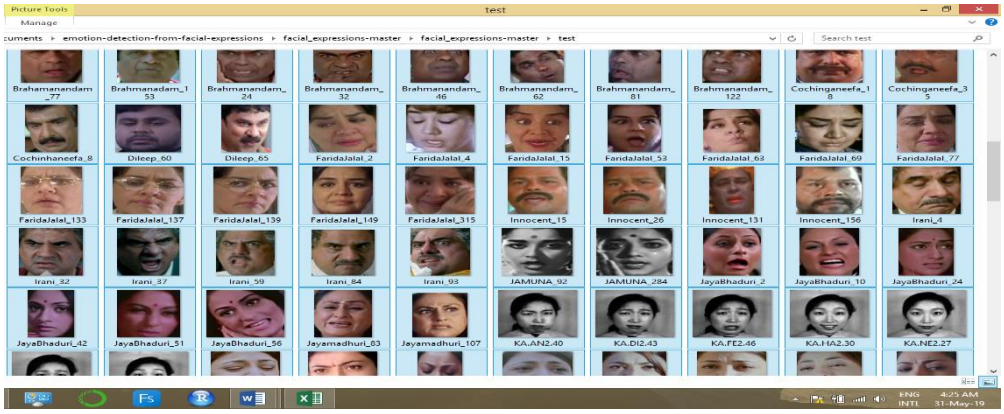
```
def buildModel(width, height, depth, classes):
    # initialize the model along with the input shape to be
    # "channels last" and the channels dimension itself
    model = Sequential()
    inputShape = (height, width, depth)
    chanDim = -1

    # if we are using "channels first", update the input shape
    # and channels dimension
    if K.image_data_format() == "channels_first":
        inputShape = (depth, height, width)
        chanDim = 1

    # CONV => RELU => POOL
    model.add(Conv2D(64, (3, 3), padding="same",
        input_shape=inputShape))
    model.add(Activation("relu"))
    model.add(BatchNormalization(axis=chanDim))
    model.add(MaxPooling2D(pool_size=(3, 3)))
    model.add(Dropout(0.25))

    # (CONV => RELU) * 2 => POOL
    model.add(Conv2D(64, (3, 3), padding="same"))
    model.add(Activation("relu"))
    model.add(BatchNormalization(axis=chanDim))
    model.add(Conv2D(64, (3, 3), padding="same"))
    model.add(Activation("relu"))
    model.add(BatchNormalization(axis=chanDim))
    model.add(MaxPooling2D(pool_size=(2, 2)))
```

Fit the model and getting the accuracy we getting the accuracy upto 75 accuracy.



Final emotion classification result in csv file

```
In [126]:
data_predict = {}
for key,value in data_test.items():
    predict = model.predict(value)
    idx = np.argmax(predict)
    l= lb.classes_[idx]
    data_predict[key] = l
```

```
In [127]:
final_data = pd.DataFrame(list(data_predict.items()),
                          columns=['Image','Emotion'])
```

```
In [128]:
mapping_emotion = {0:'anger', 1:'disgust', 2:'fear', 3:'happiness', 6:'neutral', 4:'sadness', 5:'surprise'}
final_data['Emotion'] = final_data['Emotion'].map(mapping_emotion)
```

```
In [129]:
final_data.to_csv('submissions.csv')
```

```
:
train_csv = pd.read_csv('/home/mtech/Documents/Emotion/submissions.csv')
print(train_csv)
```

```
     Unnamed: 0                Image    Emotion
0             0             180b.jpg  happiness
1             1             108a.jpg    neutral
2             2         MK.FE2.132.jpg  happiness
3             3  MallikarjunaRao_10.jpg    neutral
4             4     KajalAgarwal_19.jpg    neutral
5             5       FaridaJalal_2.jpg    neutral
6             6          KA.HA2.30.jpg  happiness
7             7             y37.jpg    neutral
8             8    KajolAggarwal_21.jpg    neutral
9             9             y10.jpg    neutral
10           10          KM.SA2.10.jpg    neutral
11           11             183a.jpg    neutral
12           12       BhanuPriya_97.jpg  happiness
13           13             y01.jpg    neutral
14           14      JayaBhaduri_56.jpg  happiness
15           15          NM.FE2.111.jpg    neutral
16           16             138b.jpg  happiness
17           17          TM.FE2.197.jpg    neutral
18           18          UY.HA2.138.jpg    neutral
19           19     Brahmanandam_46.jpg    neutral
20           20             y32.jpg    neutral
21           21             y18.jpg    neutral
22           22              6a.jpg    neutral
23           23          TM.NE2.178.jpg    neutral
24           24            NTR 143.jpg    neutral
235         235              37a.jpg    neutral
236         236         KA.SA2.34.jpg    neutral
237         237             141b.jpg  happiness
238         238    Brahamanandam_77.jpg    neutral
239         239     FaridaJalal_139.jpg    neutral
240         240    Cochinganeefa_18.jpg    neutral
241         241         KL.NE2.156.jpg    neutral
242         242          JAMUNA_92.jpg    neutral
243         243      FaridaJalal_63.jpg    neutral
244         244             y09.jpg  happiness
245         245     FaridaJalal_137.jpg    neutral
246         246     FaridaJalal_315.jpg  happiness
247         247             83b.jpg  happiness
248         248         KL.AN2.168.jpg    neutral
249         249             y15.jpg    neutral
250         250      FaridaJalal_53.jpg    neutral
251         251         KL.DI2.171.jpg    neutral
252         252           Prema_16.jpg    disgust
253         253      JayaBhaduri_24.jpg  happiness
254         254        RimiSen_167.jpg  happiness
255         255             y16.jpg    neutral
256         256             y31.jpg    neutral
257         257           Irani_4.jpg    neutral
258         258             110b.jpg  happiness
259         259     KajalAgarwal_48.jpg    neutral
260         260       BhanuPriya_15.jpg  happiness
261         261             y14.jpg    neutral
262         262      FaridaJalal_77.jpg    neutral

[263 rows x 3 columns]
```

VI. CONCLUSION

Based on the literature survey on this topic of Face Detection using Neural Network, different aspects of how face detection & recognition works are studied. Various survey papers are reviewed and analysis is done for each paper. The purpose of this research is to provide an overview of the functionality of Face Detection using Deep Neural Network for Analyzing the Emotion and Behavior of Student. This proposed work can enhance the overall performance of Face Detection process and moreover focus on student's behavior thoroughly.

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