A
Project Report
On
"FACE RECOGNITION BASED AUTOMATED STUDENT ATTENDANCE SYSTEM**"**

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Submitted at

CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

CE

DEPSTAR

At: Changa, Dist: Anand – 388421

NOV 2020

CERTIFICATE

This is to certify that the report entitled "**FACE RECOGNITION BASED AUTOMATED STUDENT ATTENDANCE SYSTEM**" is a bonafied work carried out by **Mr. Parthiv Patel (18DCE084),** under the guidance and supervision of **Assistant Prof. Atufaali Saiyed** for the subject **CE352 Software Group Project-III** of 5th Semester of Bachelor of Technology in **DEPSTAR** at Faculty of Technology & Engineering – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfills the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

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ACKNOWLEDGEMENT

I, the developer of a application "Face Recognition based Automated student attendance system", with immense pleasure and commitment would like to present the project assignment. The development of this project has given me wide opportunity to think, implement and interact with various aspects of management skills as well as the new emerging technologies.

Every work that one completes successfully stands on the constant encouragement, good will and support of the people around. I hereby avail this opportunity to express my gratitude to number of people who extended their valuable time, full support and cooperation in developing the project.

I express deep sense of gratitude towards our Head of the CE Department, Dr. Dweepna Garg and project guide Atufaali Saiyed for the support during the whole session of study and development. It is because of him/her, that I was prompted to do hard work, adopting new technologies.

I am sincerely thankful to all the people of my group who helped me complete the project in one way or the other.

They altogether provided me favorable environment, and without them it would not have been possible to achieve my goal.

ABSTRACT

Face is the representation of one's identity. Hence, we have proposed an automated student attendance system based on face recognition. Face recognition system is very useful in life applications especially in security control systems. The airport protection system uses face recognition to identify suspects and FBI (Federal Bureau of Investigation) uses face recognition for criminal investigations. In our proposed approach, firstly, video framing is performed by activating the camera through a user friendly interface. The face ROI is detected and segmented from the video frame by using Viola-Jones algorithm. In the pre-processing stage, scaling of the size of images is performed if necessary in order to prevent loss of information. The median filtering is applied to remove noise followed by conversion of colour images to grayscale images. After that, contrast-limited adaptive histogram equalization (CLAHE) is implemented on images to enhance the contrast of images. In face recognition stage, enhanced local binary pattern (LBP) and principal component analysis (PCA) is applied correspondingly in order to extract the features from facial images. In our proposed approach, the enhanced local binary pattern outperforms the original LBP by reducing the illumination effect and increasing the recognition rate. Next, the features extracted from the test images are compared with the features extracted from the training images. The facial images are then classified and recognized based on the best result obtained from the combination of algorithm, enhanced LBP and PCA. Finally, the attendance of the recognized student will be marked and saved in the excel file. The student who is not registered will also be able to register on the spot and notification will be given if students sign in more than once. The average accuracy of recognition is 100 % for good quality images, 94.12 % of low-quality images and 95.76 % for Yale face database when two images per person are trained.

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1.1 PROJECT OVERVIEW

Face recognition being a biometric technique implies determination if the image of the face of any particular person matches any of the face images that are stored in a database. This difficulty is tough to resolve automatically because of the changes that several factors, like facial expression, aging and even lighting can affect the image. Facial recognition among the various biometric techniques may not be the most authentic but it has various advantages over the others. Face recognition is natural, feasible and does not require assistance. The expected system engages the face recognition approach for the automating the attendance procedure of students or employees without their involvement. A web cam is used for capturing the images of students or employees. The faces in the captured images are detected and compared with the images in database and the attendance is marked.

- In Face detection and recognition first of all faces are captured through a high definition camera
- Then the program first detects the faces inside a given image.
- After then it matches them with the photos inside our database folder and recognizes them.

1.2 PROBLEM STATEMENT

Traditional student attendance marking technique is often facing a lot of trouble. The face recognition student attendance system emphasizes its simplicity by eliminating classical student attendance marking technique such as calling student names or checking respective identification cards. There are not only disturbing the teaching process but also causes distraction for students during exam sessions. Apart from calling names, attendance sheet is passed around the classroom during the lecture sessions. The lecture class especially the class with a large number of students might find it difficult to have the attendance sheet being passed around the class. Thus, face recognition student attendance system is proposed in order to replace the manual signing of the presence of students which are burdensome and causes students get distracted in order to sign for their attendance. Furthermore, the face recognition based automated student attendance system able to overcome the problem of fraudulent approach and lecturers do not have to count the number of students several times to ensure the presence of the students.

Hence, there is a need to develop a real time operating student attendance system which means the identification process must be done within defined time constraints to prevent omission. The extracted features from facial images which represent the identity of the students have to be consistent towards a change in background, illumination, pose and expression. High accuracy and fast computation time will be the evaluation points of the performance.

1.3 OBJECTIVE

The main objective of this project is to develop face recognition based automated student attendance system. In order to achieve better performance, the test images and training images of this proposed approach are limited to frontal and upright facial images that consist of a single face only. The test images and training images have to be captured by using the same device to ensure no quality difference. In addition, the students have to register in the database to be recognized. The enrolment can be done on the spot through the user-friendly interface.

CHAPTER 2: DESCRIPTION

2.1 PROJECT PLANNING

- In this project we will use python language and OpenCV (Open Source Computer Vision Library).
- Here we will compare the image from webcam with image of database.
- Then some details are extracted from the captured faces, which are unique and compared with the database faces.
- Finally whichever face distance match is lesser means better match.

2.2 PROJECT WORK SCHEDULING

Gantt chart:

ACTIVITY	PLAN DURATION	START	Finish	PERCENT COMPLETE
Research & Design Prototype	2 week	17-Aug	31-Aug	80%
How to impliment(tools & technology use)	1 week	01-Sep	08-Sep	75%
Setup softwares	1 week	09-Sep	15-Sep	100%
Implimentation	2 week	16-Sep	30-Sep	80%
Testing	1 week	01-Oct	07-Oct	85%

Fig 2.1 Gantt Chart

CHAPTER 3: SOFTWARE & HARDWARE REQUIREMENTS

3.1 HARDWARE SPECIFICATIONS

- 500 GB Hard Disk
- Standard LED Monitor
- Min. 4gb ram Laptop/PC with Webcam and keyboard
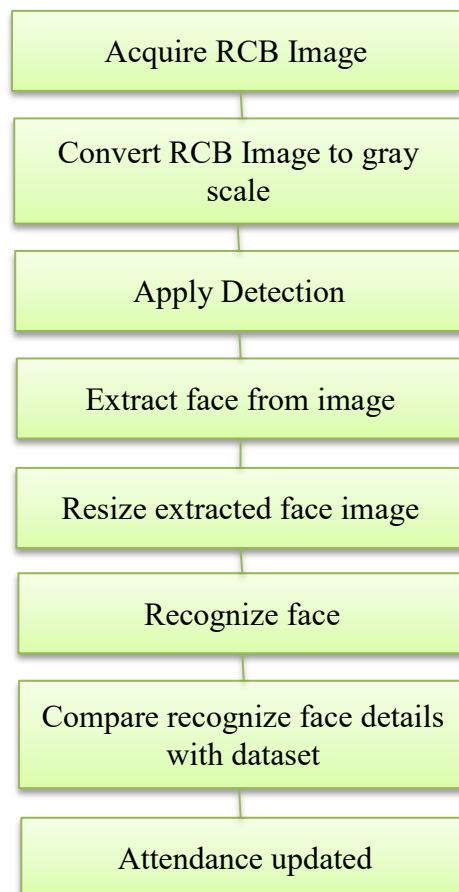
3.2 SOFTWARE REQUIREMENTS
- Windows 7/8/10
- Python (Coding Language)
- Pycharm(IDE)
- Desktop developer for C++
- Libraries Used:
  1. cmack
  2. dlib
  3. numpy
  4. facedetection
  5. openCV
- Framework Used:
  1. Streamlit

CHAPTER 4: MAJOR FUNCTIONALITY

- Face Detection
- Face Recognition
- Automatically Updating of Attendance sheet

CHAPTER 5: SYSTEM FLOW CHART

```
┌─────────────────────────────┐
│      Acquire RCB Image      │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│  Convert RCB Image to gray  │
│            scale            │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│      Apply Detection        │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│   Extract face from image   │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│  Resize extracted face image│
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│      Recognize face         │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│ Compare recognize face      │
│ details with dataset        │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│     Attendance updated      │
└─────────────────────────────┘
```
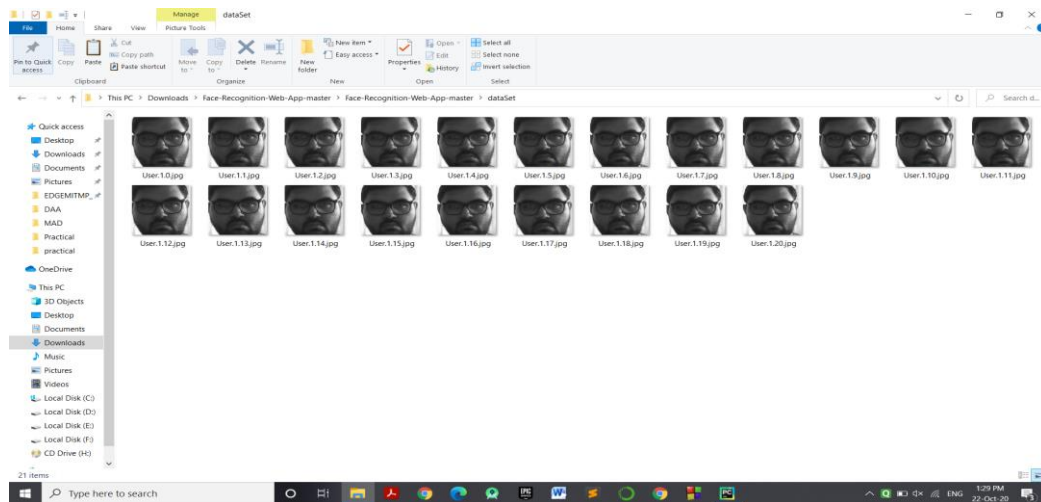
CHAPTER 6: SCREENSHOTS

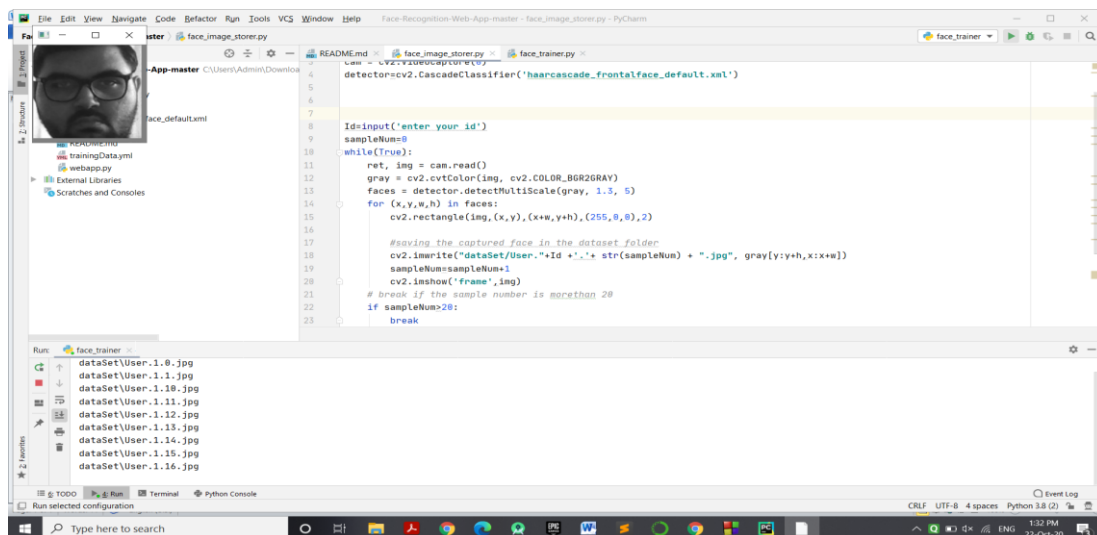Fig 6.1 dataset folder (captured images are converted into greyscale and then stored)

Fig 6.2 Face Training
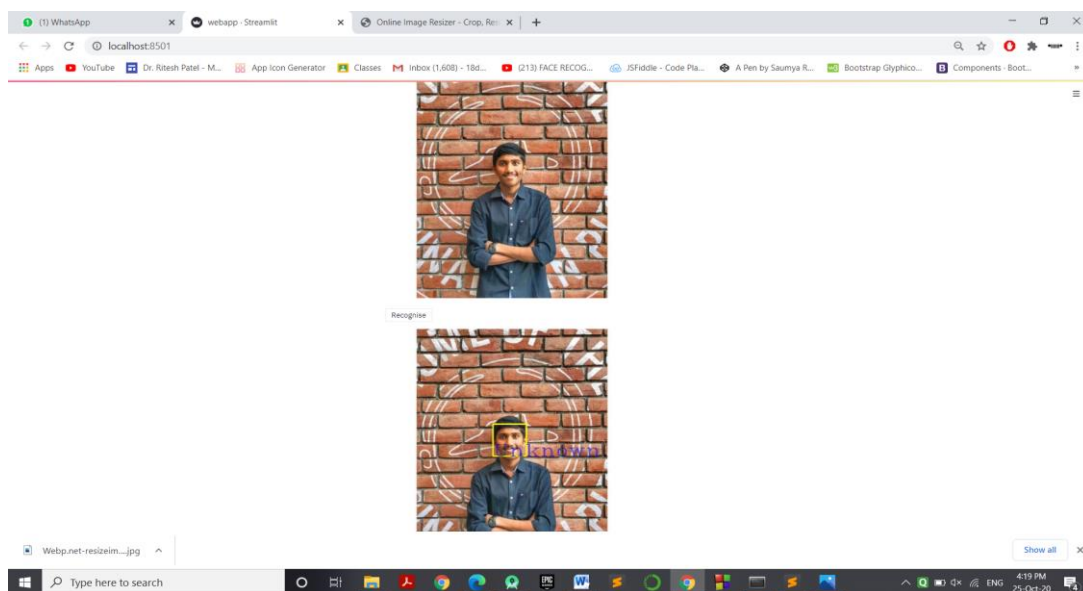

Fig 6.3 Webapp, Face is detected but not recognized, so unknown

CHAPTER 7: LIMITATIONS

- The input image for the proposed approach has to be frontal, upright and only a single face. Although the system is designed to be able to recognize the student with glasses and without glasses, student should provide both facial images with and without glasses to be trained to increase the accuracy to be recognized without glasses. The training image and testing image should be captured by using the same device to avoid quality difference. The students have to register in order to be recognized. The enrolment can be done on the spot through the user-friendly interface. These conditions have to be satisfied to ensure that the proposed approach can perform well.
- Different level of brightness or lighting could be a challenging problem for face recognition.
- One of the problems in real-time face recognition is the difficulty to obtain sufficient and suitable images for training and testing purpose. It is hard to obtain in real-time databases with a variety of variables, and it is hard to obtain publicly available databases.

CHAPTER 8: PROJECT OUTCOMES

- Database of students are stored for future enhancements
- Automatically attendance taken, so less load on paper work
- Less paper work gives environmental effect

CHAPTER 9: FUTURE ENHANCEMENTS

Further improvement can be undertaken on this project for better enhancement: a webcam can be integrated into the system to monitor the person who swaps the card, thus avoiding the problem of a person scanning in for another person. The attendance system can be enhanced to biometric technology which is a full proof technique that captures a person's unique biological or physical features and prevents unauthorized activities.

CHAPTER 10: REFERENCES

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