

PBL - 4: REPORT

Problem Statement: Attendance Management System Using Face Recognition



SUBMITTED

TO

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BY

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1. INTRODUCTION

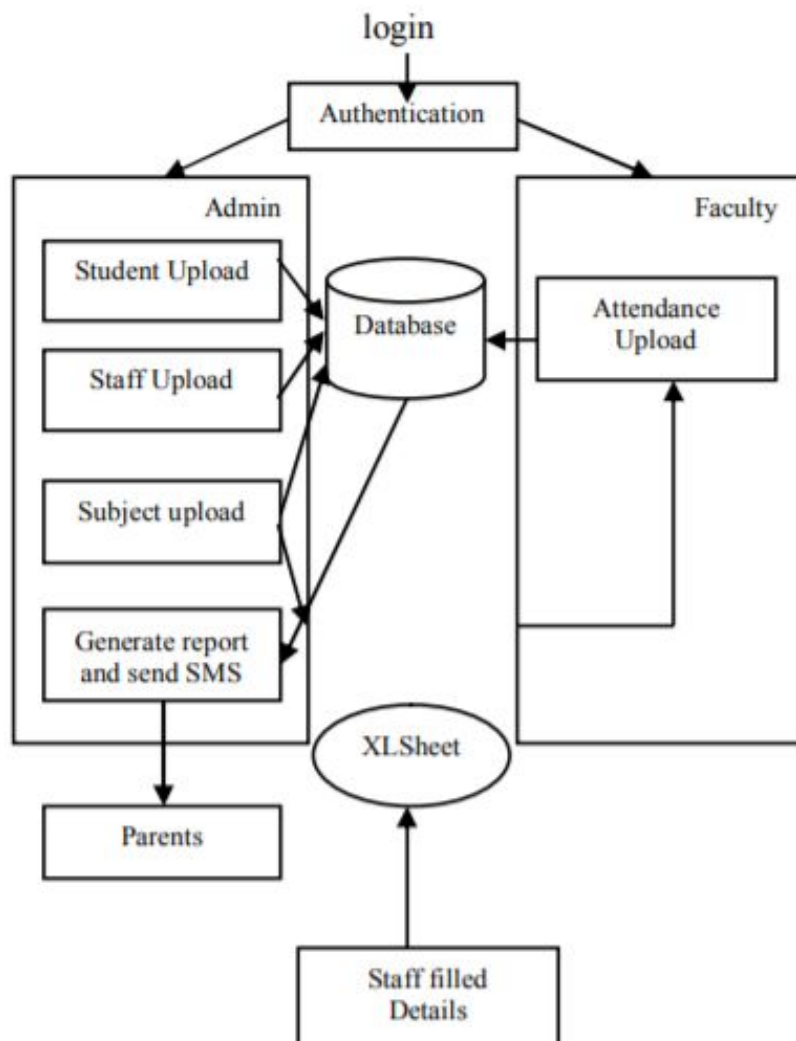
Attendance is prime important for both the educator/professor and student of educational associations. In the older method we took attendance using pen and paper & there is a possibility of proxy. Calling the name or roll number of the student for attendance isn't just an issue of time utilization yet additionally it needs energy. This increases manual work of teachers such as attendance calculation and keeping their records.

So, a programmed or automatic attendance management system using face recognition can tackle every above issue. There are some automatic attendance making frameworks which are presently utilized by many organizations. One of such frameworks is the biometric method. Despite the fact that it is programmed and a stride in front of conventional technique it neglects to meet the time requirement. The students need to hang tight in line for giving attendance, which is time taking. This task presents an automatic attendance management system using face recognition framework, without any sort of obstruction with the ordinary educating strategy. The framework can be additionally executed during test meetings or in other instructing exercises where participation is exceptionally fundamental. This framework of attendance management system using face recognition takes out traditional students ID, for example, calling name and roll number of the students, or checking individual recognizable proof cards of the students, which can meddle with the continuous showing measure, yet in addition can be distressing for understudies during assessments.

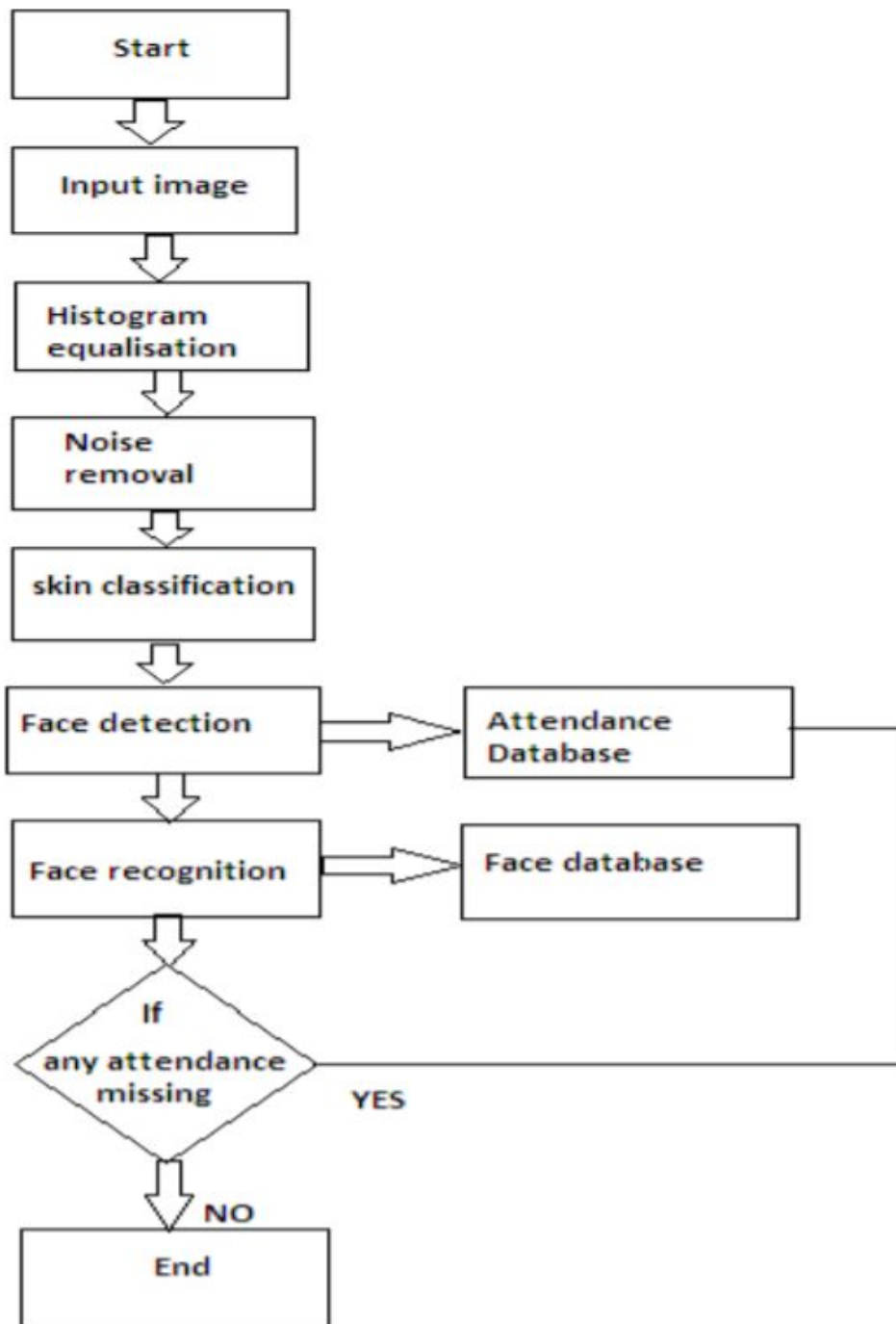
Designing a better attendance management system for students so that records are maintained with ease and accuracy was an important key behind motivating this project.

This would improve accuracy of attendance records because it will remove all the manual work of teachers and will save valuable time for the students as well as teachers.

2. ARCHITECTURE

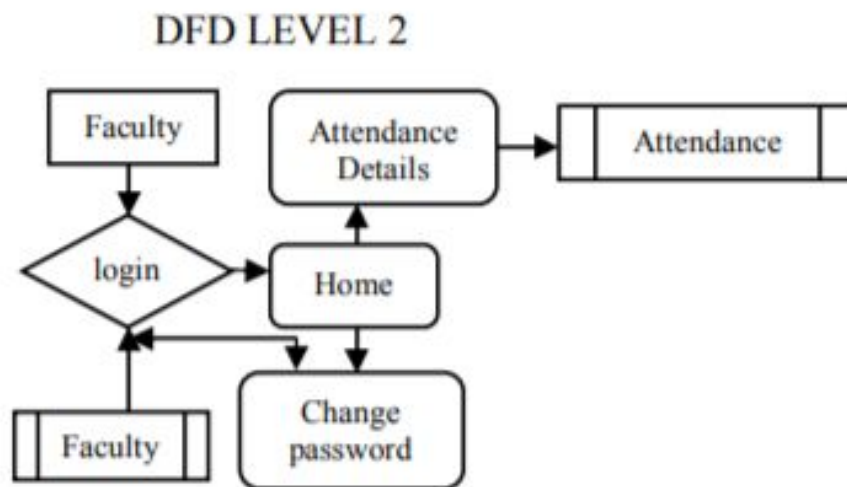


3. BASIC FLOWCHART



4. ACTIVITY DIAGRAM

4.1 Activities of faculty



5. STUDIED ‘LITERATURE SURVEY’s SUMMARY

Research Paper 1:

Attendance is considered as an important factor for both the student as well as the teacher of an educational organization.

The two common Human Face Recognition techniques are, Feature-based approach

Brightness-based approach

Viola-Jones Algorithm has been used for face detection which detects human faces using a cascade classifier and PCA algorithm for feature selection and SVM for classification.

Continuous observation helps in estimating and improving the performance of the attendance.

The task of the proposed system is to capture the face of each student and to store it in the database for their attendance. The face of the student needs to be captured in such a manner that all the features of the students' face needs to be detected, even the seating and the posture of the student need to be recognized.

The main working principle of the project is that the video captured data is converted into image to detect and recognize it. Further the recognized image of the student is provided with attendance, CNN algorithm can be implemented to detect the faces. The completion of

detecting and processing the face, is compared to the faces present in the students' database to update the attendance of the students.

Post-processing mechanism involves the process of updating the names of the students into an excel sheet.

Research Paper 2:

The research paper on “Smart Attendance management system” is designed to remedy the issue of existing manual structure and solve the issue of existing manual systems. This system is simple and works efficiently. The system works automatically once the registration of individual students is done by the administration. They have used face recognition concept or face popularity concept to mark the attendance of college students and make the machine higher.

This system performs satisfactory in distinct poses and versions. In future this system needs to be improved and to be stepped forward due to the fact those structures occasionally fail to understand students from a long way, additionally they have some processing obstacles. because these systems sometimes fail to recognize students from some distance, also they have some processing limitations. They conclude that If this device runs with a device of high processing may also bring about even higher overall performance of this system.

Research Paper 3:

Our face is the unique part of the human body that uniquely identifies a person. Using the face as a key characteristic, the automatic attendance system using face recognition can be implemented. The most demanding task in any educational organization is attendance marking. In the traditional attendance system, the students are called out by the teachers when students roll no and their presence or absence is marked accordingly. These traditional techniques are taking too much time and tedious.

In this project, we used OpenCV (Open Source Computer Vision) library for face recognition. In this model integrated camera captures video as an input, and after that separate image by frame a then algorithm is applied for detecting faces from an image, encoding and identifying the face, marking the attendance accordingly in a spreadsheet and finally converting it into a xlsx file. The training dataset is created by adding students' images in proper format to the system. The cropped(formatted) images are then stored as a database with the student's name as labels. In all this process features of images are extracted using LBPH algorithm.

Research Paper 4:

Daily attendance marking is a common and important activity in schools and colleges for checking the performance of students. Manual Attendance maintenance is a difficult process, especially for a large group of students. Some automated systems developed to overcome these difficulties, have drawbacks like cost, fake attendance, accuracy, intrusiveness. To overcome these drawbacks, there is a need for a smart and automated attendance system. Traditional face recognition systems employ methods to identify a face from the given input but the results are not usually accurate and precise as desired. The system described in this we aim to deviate from such traditional systems and introduce a new approach to identify a student using a face recognition system, the generation of a facial Model. This describes the working of the face recognition system that will be deployed as an Automated Attendance System in a classroom environment.

6. METHODOLOGY

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Modules:

1. Uploading and processing data.
2. Describe the structure of the Model.
3. Model training.
4. Performance measurement.

1. Uploading and processing data.

Good data in relation to in-depth learning models. Photo segmentation models have the best chance of doing well if you have good photo numbers on the training set. Also, the structure of the data varies depending on the technique / framework we use.

Our database contains a variety of pictures of students that give them a name so that they can distinguish themselves correctly. With these pictures we train a database with images ranging from 0 - 100 and different types of viewing.

2. Describe the structure of the Model.

This is another very important step in our model building process. We have to explain what our model will look like. To model, we build a neural network, various types of neural networks are available but after going through some research papers we have come to the conclusion that we will work with the LBPH algorithm. (Histories of Binary Patterns Local)

Using LBP combined with histograms we can represent face images with a simple data vector.

3. Model training.

Parameters: LBPH uses 4 parameters:

- Scope: radius is used to create a local binary pattern pattern and represents radius around the center pixel. The frequency is set to 1.
- Neighborhood: the number of sample points to form a circular area of a binary. Keep in mind: the more points you enter, the higher the computer cost. The frequency is set to 8.
- Grid X: the number of cells on the horizontal side. The more cells, the better grid, the vector size of the emerging element. The frequency is set to 8.

- Grid Y: the number of cells in a straight line. The more cells, the better grid, the vector size of the emerging element. The frequency is set to 8.

4. Performance measurement.

At this point, the algorithm is already trained. Each created histogram is used to represent each image from the training database. So, when we are given an image to insert, we perform steps again for this new image and make a histogram representing the image.

7. REQUIREMENT ANALYSIS

Functional Requirements:

Functional requirements are features that the system will need in order to deliver or operate. In the case of this project, it was important to gather some requirements that will be needed to achieve the objectives set out previously. With client (user) story a use case analysis was implemented which resulted in the following functional and non-functional requirements were captured. The functional requirements have been gathered from the user story developed from the minutes collected during meetings with the client and are outlined here.

- ☐ Capture face images via webcam or external USB camera.
- ☐ A professional HD Camera
- ☐ Faces on an image must be detected.
- ☐ The faces must be detected in bounding boxes.
- ☐ Compute the total attendance based on detected faces.
- ☐ Crop the total number of faces detected.
- ☐ Resize the cropped faces to match faces the size required for recognition.
- ☐ Store the cropped faces to a folder.
- ☐ Load faces on the database.
- ☐ Train faces for recognition.
- ☐ Perform recognition for faces stored on the database.
- ☐ Compute recognition rate of the system.
- ☐ Perform recognition one after the other for each face cropped by Face Detector.
- ☐ Display the input image alongside the output image side by side on the same plot.
- ☐ Display the name of the output image above the image in the plot area.

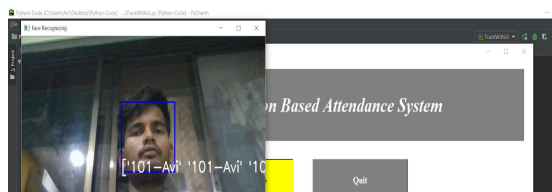
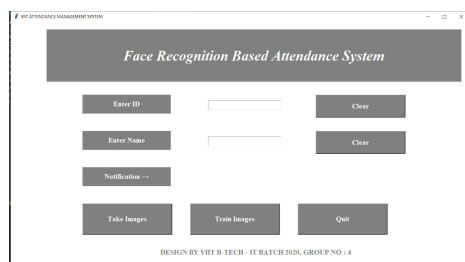
Non-Functional Requirements:

Non-functional requirements are a set of requirements with specific criteria to judge the system's operation. These requirements have been collected based on the following after meetings with the client. They cover ease of use to the client, security, support availability, operational speed, and implementation considerations.

- ☐ The user will find it very convenient to take photos.
- ☐ The user will inform the students when taking a photo with clear instructions on how to position their faces.
- ☐ The system is very secure.
- ☐ The system will have a response time of 10 seconds.
- ☐ The system can be easily installed.
- ☐ The system is 100% efficient.
- ☐ The system must be fast and reliable.

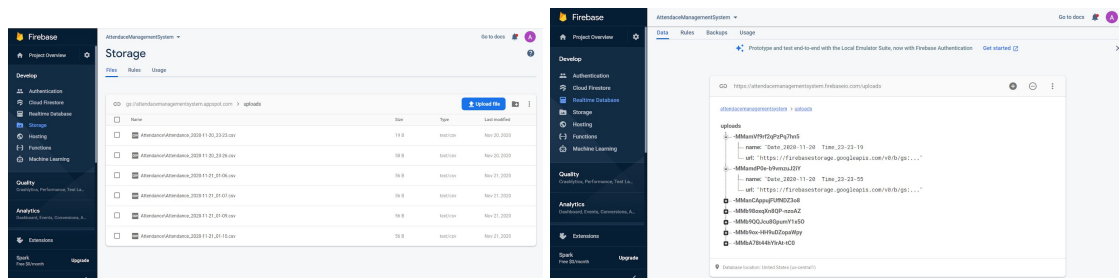
Implementation :

1. dataset training and recognition:



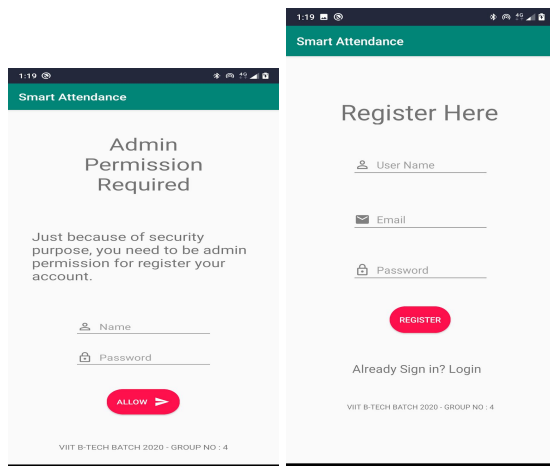
to train the dataset and recognize the face we have written code .py file with the use of haarcascade for frontal face and lbph algorithm.

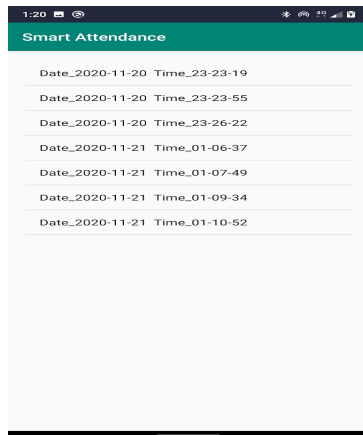
2. database storage :



to store data of attendance we have connected the database to firebase ,all files of attendance are stored directly into it .

3. Mobile Application





We have deploy mobile application with the help java in android studio so that it can facilitate teachers to manage and view attendance easily .

8. FUTURE SCOPE

A login feature would be implemented on the system for security purposes.

Further work can be done on this project is SMS alert to the student by sending SMS regarding the attendance. SMS alerts can be given to the parents of the student. A login functionality would be implemented on the system for security purposes.

However, in order to develop a dedicated system which can be implemented in an educational institution, a very efficient algorithm which is insensitive to the lighting conditions of the classroom has to be developed. Also, a camera of the optimum resolution has to be utilised in the system. Another significant viewpoint where we can work after is making an online information database of the attendance and programmed updating of the attendance into the developing notoriety of the Internet of Things. This should be possible by making an independent module which can be installed in a classroom approaching the web, ideally an automatic system.

9. CONCLUSION

The System framework we have developed is effectively ready to achieve the task of attendance marking in the classroom automatically. And output is obtained in an excel sheet as desired in real-time.

It saves time and manual effort, especially if it is a lecture with a huge number of students. Automated Attendance System has been anticipated for the purpose of reducing the drawbacks in the traditional attendance marking system.