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Smart Attendance Monitoring (SAM) Using Collective Face Detection

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ABSTRACT: This paper presents a computerised student attendance monitoring system, which will integrate with the face detection and face recognition technology using Haar Cascade and PCA (Principal component Analysis) algorithms, respectively. In this system, two set of intervals are provided as a restriction for the camera to capture the images during the clock-in and clock-out time of the class hours. Various image views of students will be captured collectively through the camera and captured views will be matched against the training data set for authentication purpose. The image of the students which matches with the trained data set is marked present for the particular lecture. Besides, it maintains a log file in order to keep record of every individual with respect to subjects and generates a report of attendance.

KEYWORDS: SAM (Smart Attendance Monitoring), Face detection, Haar cascade algorithm, Face recognition, PCA (Principal Component Analysis).

I. INTRODUCTION

Every educational organization has to maintain a proper record of attendance of students for effectualoperation of the institution.Attendance of students in class can be considered as one of the initial point towards attaining a good education. In the current scenario, attendances are taken by hand which is troublesome. Moreover, it is an inconvenient task to verify one by one student in a large classroom to know whether the authenticated students are actually responding ornot. In order to counterbalance the above mentioned drawback, we proposed a model i.e., Smart Attendance Monitoring (SAM) to computerize the traditional way of taking attendance.

Basically this paper is aimed for implementing a system that is capable of identifying the students in an institution, marking their attendance and generating the report.Hence face recognition technique is used to mark the attendance of the students. SAM provides flexibility to identify several students at the same time separately rather than identifying one by one. This system will save the valuable time of students as well as teachers by improving the accuracy of attendance records, reduces the amount of work the management has to do and will replace the paperwork with electronic apparatus. To increase the precision level, proficiency and dependability of the recognition, algorithms are required. Principle Component Analysis (PCA) and Haar cascade are used to address those tasks [1]. The PCA is one of the most efficaciousmethods that had been used in image recognition and dimensionality reduction.

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II. RELATED WORK

Many automated systems were proposed in order to overcome the limitations of manual attendance system.
One among those systems is an Automatic Attendance management system using RFID tags [7], in which student can visually see their names as they enter the classroom on the display and they are assured that their existence has been entered in the instructor's database. However avitaldownside of this system is the RFID tag read rates degrade tremendously as it comes closer to electronic devices.
Authors in [8] reviewed and projected biometric system using fingerprint identification for attendance automation of employees in an administration. Though it requires small storage space, easy to use and provides high accuracy, it can make mistakes with the dryness or dirty of the finger's skin, as well as the age (since the size of the children's fingerprint keeps changing).
An Automatic Attendance System Using Image ID[6], in this paper the system is intended for detecting faces of staff and students and marking their attendance and sending a message to relevant person who passes through camera's vision. Although this system has improved the ability to identify each subject present in area, this system is not precise and there is still trivial room for enhancement.

III. PROPOSED SYSTEM

Designing a better attendance monitoring system for students so that the records are generated easily with a greater precision was an important key behind motivating our project.
The proposed model for SAM is as shown in Fig.1

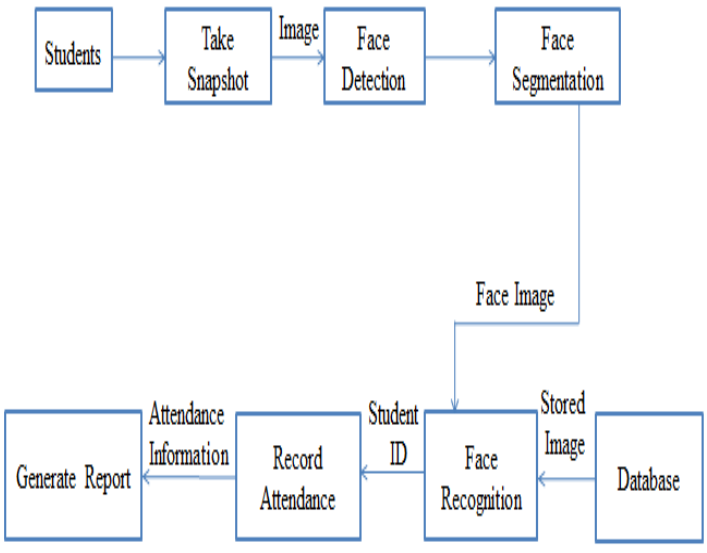

Fig.1. Block diagram of SAM

There are three main modules in this system:
Module 1: Registration and Generation of Database
Initially during the admission process of a student, the admin logins into the database and enters the student details along with the student ID. Later the student is ready for the registration process in the designed attendance system (SAM), wherein the student can complete the process only when the ID provided to the system matches with the ID given in the database. If not the registration process is incomplete and student should get back to the admin in order to re-enter the proper details.

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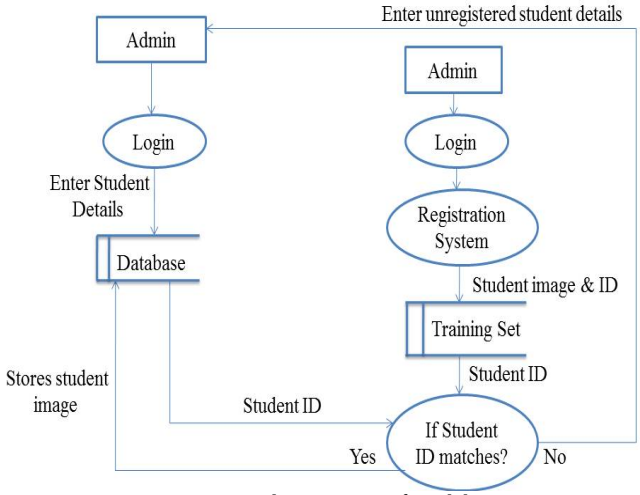

Fig.2. Data Flow Diagram of Module 1

Module 2: Input to the system

There will be well positioned cameras in the classroom that will capture the image of the entire classroom during the lecture that will serve as the input. Further from these images, frontal faces will be extracted and Haar Cascade algorithm will be performed. The system needs to beworking at optimum performance at every lecture.

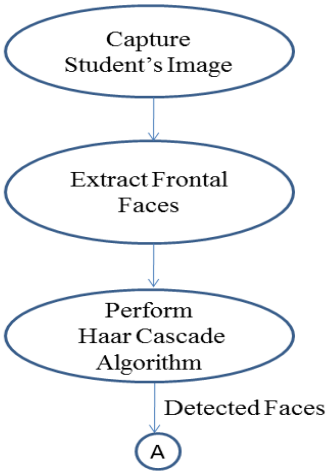

Fig.3. Data Flow Diagram of Module 2

Module 3: Recognition and Report Generation

The detected faces are marked and the recognition phase begins by performing dimensionality reduction using the PCA algorithm [4].These detected faces will be cropped and compared with the saved faces of the database. Then student whose image matches the most with the trained data set is marked present for the meticulous lecture, thenthedatabase is updated with the attendance and a report is generated.

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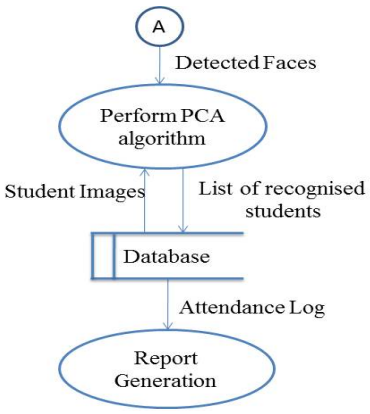

Fig.4. Data Flow Diagram of Module 3

IV. RESULT

A. The given screenshot displays the web pagewhereadmin at the college level can login to the system. Only authorised users are allowed to login. Once the admin logs in to the system, he/she will be able to enter the student details.

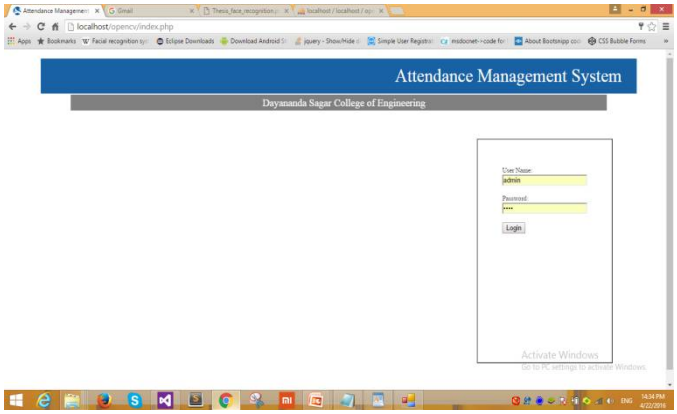

Fig.5. System Login Page

B. This screenshot shows how student details are entered by the admin during the admission time. In case any modifications are required in the entered details, admin can edit as per the requirements.

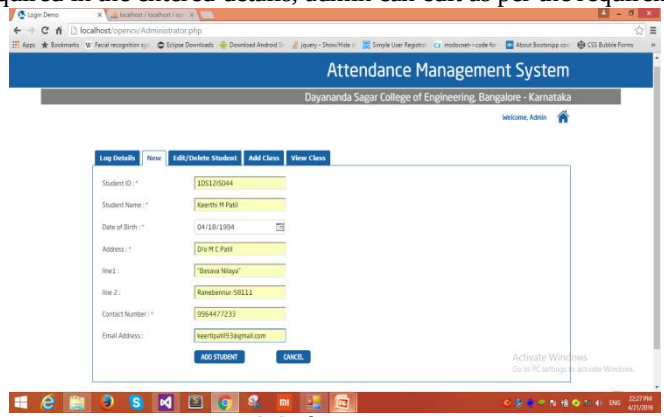

Fig.6. Student Registration

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C. Below given screenshot shows how the entered details are stored in the database.

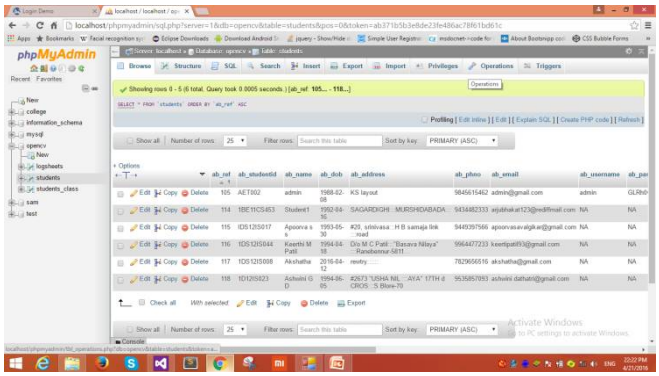

Fig.7. Student Database

D. Students must get registered to the attendance monitoring system as shown below in the screenshot. During registration, only the faces are cropped and saved on to the training dataset. This process is done only for those students whose ID is present in the database.

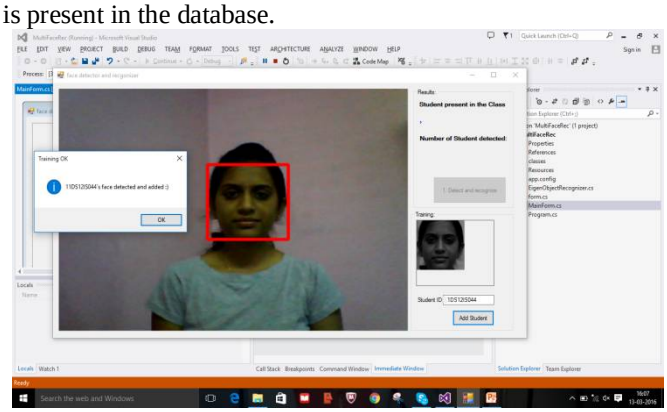

Fig.8. Face Detection and Training Dataset

E. This particular screenshot shows how the cropped faces obtained during the registration process are saved on to the training set along with their IDs.

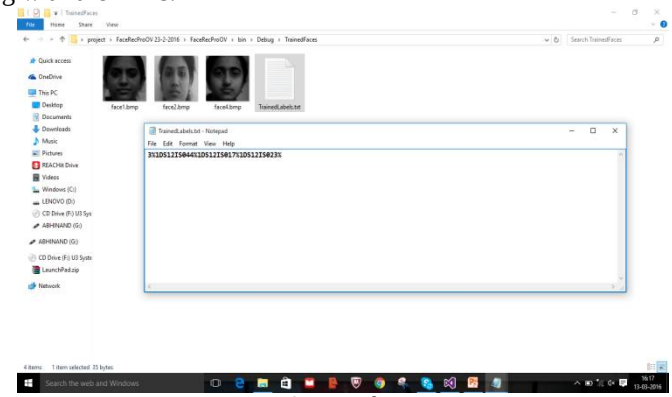

Fig.9. Trained Faces

F. Well positioned camera in the classroom will capture the digital image of the entire classroom during the lecture. In this screenshot, collective face detection process is shown.

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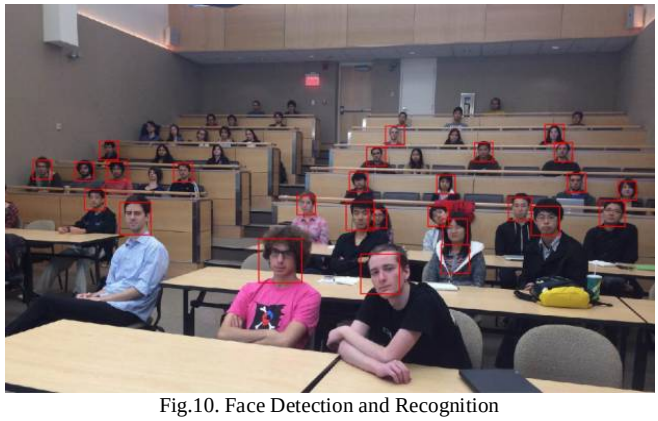

Fig.10. Face Detection and Recognition

G. This screenshot displays the subject wise log details along with the attendance report of the particular student. This report can be downloaded in either PDF/Excel format.

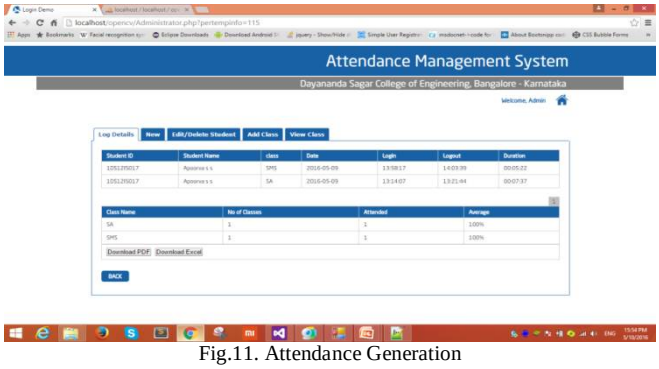

Fig.11. Attendance Generation

V.CONCLUSION AND FUTURE SCOPE

Smart Attendance Monitoring system has been envisioned for the intention of reducing the errors that occur in the manual attendance taking system. The aim is to computerise and make a system that is useful to an institute thereby saving the time, reducing the amount of work the admin has to do and will put back the paperwork with electronic tools. The image quality and performance of the camera in real-time scenario must be tested thoroughly before actual implementation. This method is secure enough, reliable and available for use. Since we implement a modular approach we can improve different modules until we reach an acceptable detection and identification rate. Another issue that has to be considered in the future is a method to ensure users privacy. Whenever an image is stored on our servers, it must be impossible for a person to use that image.

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BIOGRAPHY

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