

Online Attendance System Using CCTV

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Abstract: The online attendance system is a project that aims to create a more efficient and secure method for recording attendance at educational institutions, offices, and other organizations. The main objective of the project is to develop a system that can accurately identify individuals based on their facial features, and record their attendance automatically. One of the main problems that the face recognition attendance system aims to solve is the issue of manual attendance recording, which is often time-consuming and prone to errors. By automating the attendance process, we eliminate the need for annual attendance registers and reduce the burden on staff. The online attendance system uses advanced algorithms to analyze and compare facial features, and can accurately identify individuals even if they are wearing masks or have changed their appearance. The system can also be integrated with other software, such as payroll systems, to provide a more streamlined and efficient process for managing attendance and payroll. Overall, the face recognition attendance system is a valuable tool for improving attendance management and security at educational institutions, offices, and other organizations. It offers a more accurate and efficient method for recording attendance, and can significantly reduce the workload and costs associated with manual attendance recording.

Keywords: Face recognition, Attendance system, Machine learning, Integration, Automation

I. INTRODUCTION

Attendance systems of old practices are not quite efficient now a day for keeping track on student's attendance. Student enrollment in schools and colleges increasing every year and taking each student attendance plays a very vital role. So, it is necessary to discuss the effective system which records the attendance of a student. Maintaining the attendance is very important in all the schools/colleges for checking the performance of students. Every school/college has its own method in this regard. Some are taking attendance of students manually using attendance registers or marking attendance sheets or file-based approach and some have adopted the methods of automatic attendance using some biometric techniques. But in these methods, students have to wait for a long time in making a queue at the time they enter inside the classroom. Many biometric systems are available in the market but the key authentications are same in all of the techniques. Every biometric system consists of enrollment process in which the unique features of a person is stored in the database and after that, there are some processes of identification and verification of the person. These two processes compare the biometric feature of a person with previously stored template captured at the time of enrolment of a student. Biometric templates can be of many types like Finger prints, Eyelris, voice etc. Our system uses the face recognition approach for the automatic attendance of the students in the classroom environment without student intervention. The purpose of developing the new attendance management system is to computerize the traditional methods of taking the attendance. Therefore, in order to drag the attention of students and make them interactive in observing technologies, we try to move on to the latest upcoming trends on developing attendance systems. This is the reason for college/school attendance management system to come up with an approach that ensures a strong contribution of students in classrooms.

II. SCOPE

It can be easily implemented at any institute or organization. A method could be proposed to illustrate robustness against the variations that is, in near future we could build a system which would be robust and would work in undesirable conditions too. Here it is proposed for an institute to take the attendance of the students but in future it can be used to do the same work at entry as well as exit points. I am working to improve the face recognition effectiveness to build more efficient systems in near future.

In further work, authors intend to improve face recognition effectiveness by using the interaction among our system, the users and the administrators. On the other hand, our system can be used in a completely new dimension of face recognition application, mobile based face recognition, which can be an aid for common people to know about any person being photographed by cell phone camera including proper authorization for accessing a centralized database.

III. RELATED WORK

"Automatic Attendance Management System Using Face Recognition" by S.K. Singh et al. (2018): This proposes an attendance management system that uses face recognition to automatically mark attendance. The system detects and recognizes faces from live video streams and matches them with the pre-enrolled faces to record attendance. "Automated Attendance System Using Facial Recognition" This automated attendance system that utilizes facial recognition to mark attendance in educational institutions. The system captures and processes facial images, compares them with the enrolled dataset, and records attendance accordingly.

"Real-Time Attendance Management System Using Face Recognition" This study proposes a real-time attendance management system that employs face recognition techniques. The system utilizes a deep learning-based face recognition algorithm and integrates it with a web-based interface for attendance tracking.

"Automated Attendance System Based on Face Recognition in Educational Institutes" The research work presents an automated attendance system based on face recognition for educational institutes. It uses a combination of OpenCV and the LBPH (Local Binary Patterns Histograms) algorithm for face detection and recognition. Real-world Implementations: Several organizations and institutions have implemented face recognition attendance systems. For example, some universities and schools use such systems to automate attendance tracking. Similarly, companies and workplaces have deployed face recognition attendance systems to streamline employee attendance management.

IV. PROPOSED METHODOLOGY

4.1 System Architecture

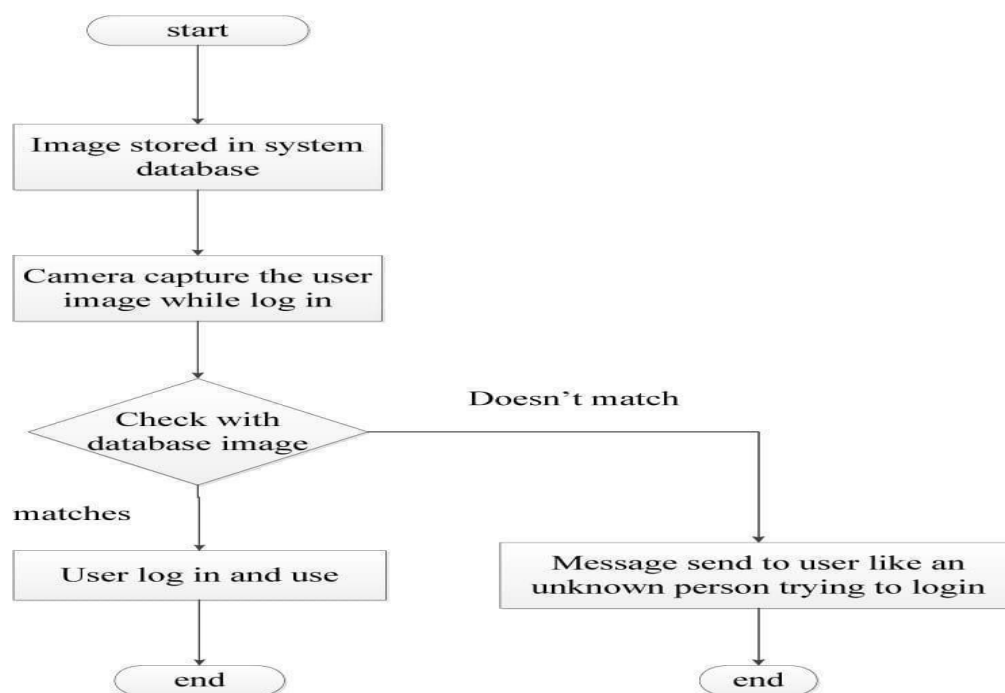


Figure 1: System Architecture

The Proposed systems are divided into five modules such as:

- Input image / Image Capture
- Face detection
- Pre-Processing
- Database development
- Post processing

5.1 Input Image

Although our own database should be used to design real time face recognition student attendance system, the databases that are provided by the previous researchers are also used to design the system more effectively, efficiently and for evaluation purposes. Yale face database is used as both training set and testing set to evaluate the performance. Yale face database contains one hundred and sixty-five grayscale images of fifteen individuals. There are eleven images per individual; each image of the individual is in different condition. The conditions included center-light, with glasses, happy, left-light, without glasses, normal, right-light, sad, sleepy, surprised and wink.

These different variations provided by the database is able to ensure the system to be operated consistently in variety of situations and conditions.

Limitations of the image

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

Face Detection

Face detection is a process of locating a face inside an image frame, regardless of the identity of that face. Before recognizing a face, it is first essential to detect and extract the faces from the original pictures. Face Detection target on finding the faces (area and size) in an image probably extract them to be used by the face recognition algorithm. In recent years, many methods are proposed for detecting the face. In face detection methods, those who are depending on training sets to capture the huge unevenness in facial features have enticed much attention and given the best results. Generally, these methods scan the input picture at all potential area and scales then as the sub windows either as non-face or face. Viola and Jones presented an effective detection technique using Haar-like features and Ada Boost as a quick training algorithm. For recognizing a face, the algorithms compare only faces. Any other element in the picture that is not part of a face deteriorates the recognition. There are several existing algorithms for detecting faces. Prior to year 2000 there were many techniques for face detection, however they were mostly unreliable, slow and require manual inputs. In 2001 Viola and Jones invented the Haar-based-cascade a Classifier that revolutionize the face detection method. It can detect objects in real time with an accuracy of 95%. It works not only for frontal face view but it can detect faces from side view as well.

Face Recognition

Here the detected cropped faces are compared with the trained images from the database using correlation. if any of the cropped image is recognized then that Id would be marked present in the attendance datasheet.

Face Preprocessing

Testing set and training set images are captured using a camera. There are unwanted noises and uneven lighting exists in the images. Therefore, several pre-processing steps are necessary before proceeding to feature extraction. Pre-processing steps that would be carried out include scaling of image, median filtering, conversion of colour images to grayscale images and adaptive histogram equalization. Any of the previous methods can be used for extracting faces from input pictures. The next step is to pre-process these faces in order to make the training phase easier and improve the probability to recognize a person correct. The training data will be standardized. Not all the pictures have the same zoom on the face and have maybe not all the same size. Most of the algorithms for facial recognition require the same size for the entire training set. Pre- processing includes different modifications. First of all, the faces need to be centered in the picture in the same way. The location of the two eyes and the nose is often used as a land mark for centering faces. The aim is to have the eyes at the same level and the nose at the same position for all images. To apply these modifications, the coordinates of the landmarks are needed. For that, it is possible to use a Haar-cascade classifier for detecting nose and eyes. After detecting a face in the frame, we can now process the face inside the green rectangle. Face recognition is susceptible to changes in lighting conditions, face orientation, and face expression, so it is paramount to diminish these differences as much as possible. There are numerous techniques to eliminate those issues. Some of these techniques are:-

- **Geometrical transformation and cropping:** This procedure includes resizing of the image and rotating the image as well as removing back ground.
- **Histogram equalization:** This process standardizes the brightness and contrast of the image.
- **Smoothing:** In this process, the image noise is eliminated by applying some filters.
- **Elliptical mask:** The elliptical mask removes some remaining back ground.

Database Development

In this Biometric based system collection of every individual is required. This database development phase consists of image capture of every individual student and extracting the Bio-metric feature for every individual, in our proposed system it is face, and after it is enhanced using pre-processing techniques and to be stored in the database. To develop an online attendance system using CCTV and database, you can follow these general steps:

- 1) Choose a suitable database management system (DBMS)- there are several options available like MySQL, PostgreSQL, MongoDB, etc. that you can choose from depending on your requirements.
- 2) Create a database schema - A database schema is a blueprint of how the database is organized. You can create a schema that includes tables for students, teachers, courses, classes, and attendance records.
- 3) Create a table for storing attendance records - This table will store the attendance records captured by the CCTV. It should include fields like the date, time, student/teacher ID, course/ class ID, and the status (present/absent).
- 4) Configure the CCTV system to capture attendance- You can configure the CCTV system to capture images of the students/teachers as they enter the class and store them in a designated folder.

V. IMPLEMENTATION

In this system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant can record students' attendance. It saves time and effort, especially if it is a lecture with huge number of students.

Automated Attendance System has been envisioned for the purpose of reducing the drawbacks in the traditional (manual) system. This attendance system demonstrates the use of image processing techniques in classroom. This system cannot only merely help in the attendance system, but also improve the good will of an institution.

The following machine learning models were utilized as part of the multiple disease prediction system:

OpenCV's YOLOv3 object detector

OpenCV's YOLOv3 object detector was used for person detection and counting and object detection as well. OpenCV provides a pre-trained implementation of YOLOv3 that can be used to detect objects in images and videos. The YOLOv3 algorithm works by dividing an input image into a grid of cells and predicting bounding boxes and object probabilities for each cell.

OpenCV's Deep Neural Network Model

OpenCV's DNN model allows you to use pre-trained models or train your own models for a variety of computer vision tasks, including object detection, image segmentation, and face recognition.

Resnet50 Convolutional Neural Network Model

The Dlib's face verification model is used to get the registered examinee's name. The model uses a pre-trained Resnet50 CNN model to extract a 128D feature vector. It is used for face verification of the examinee.

VI RESULT

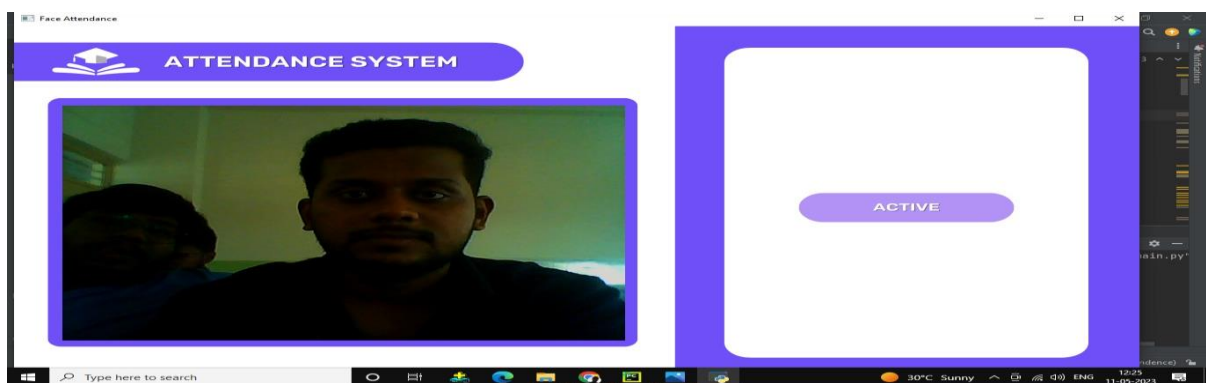


Fig.1 Student Active Attendance System

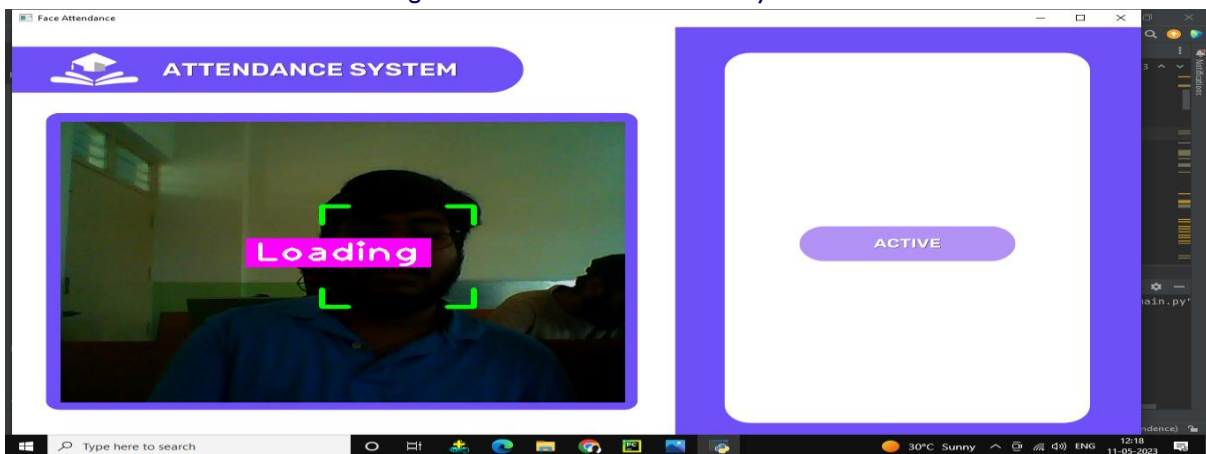


Fig.2 Student Loading Attendance System

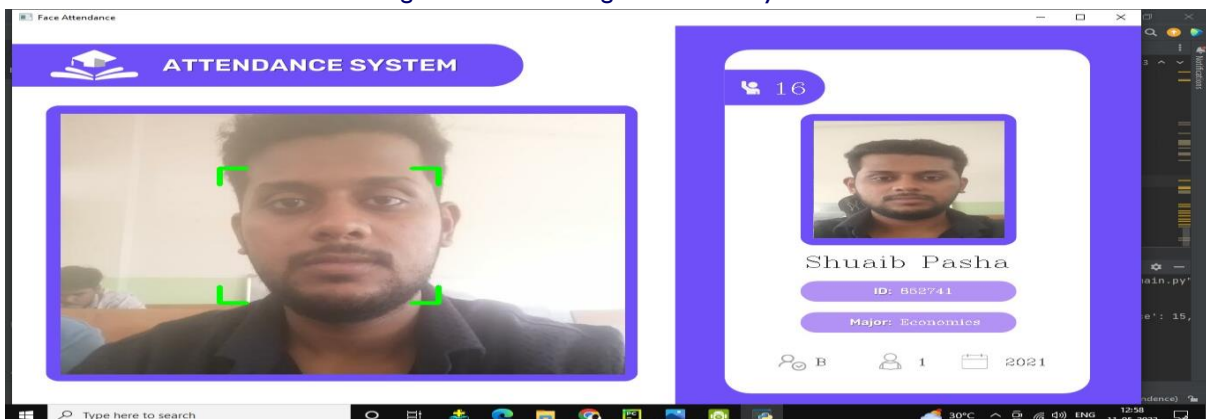


Fig.3 Student Attendance System

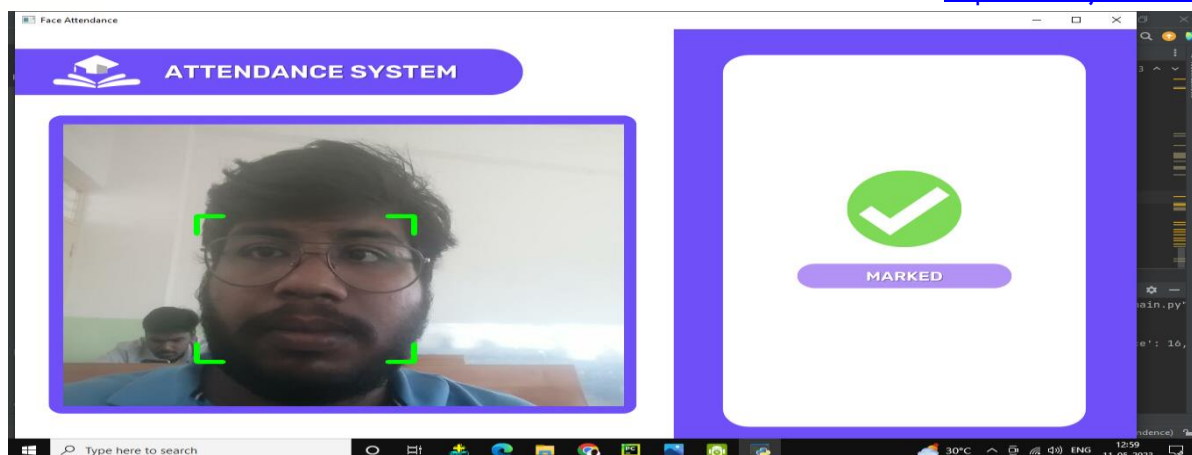


Fig.4 Student Marked Attendance System

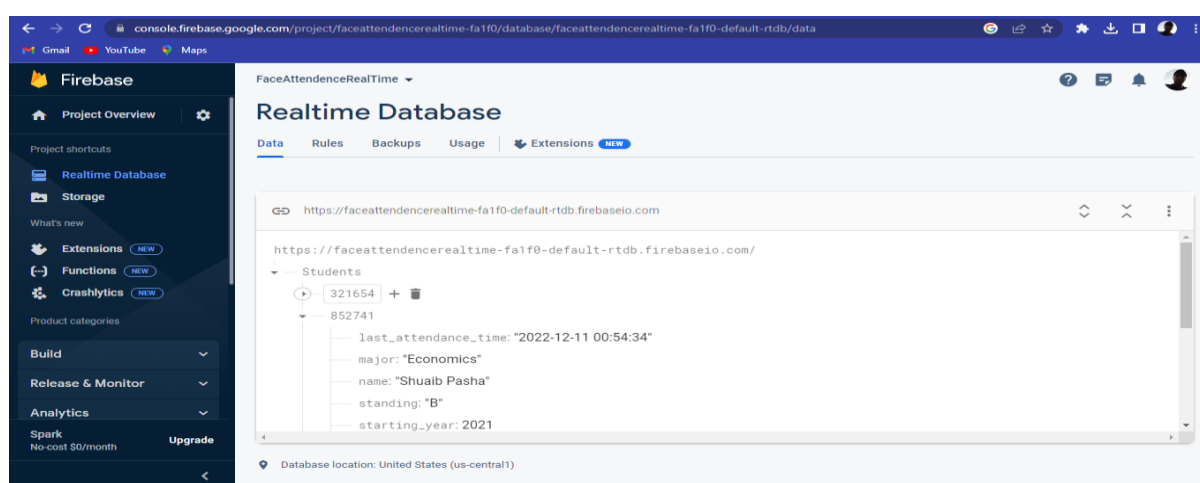


Fig.5 Student Attendance Stored In Real Time Database System

VII CONCLUSION

In this system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant can record students' attendance. It saves time and effort, especially if it is a lecture with huge number of students. Automated Attendance System has been envisioned for the purpose of reducing the drawbacks in the traditional (manual) system. This attendance system demonstrates the use of image processing techniques in classroom. This system can not only merely help in the attendance system, but also improve the goodwill of an institution.

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