Real-Time Attendance Recording System using Face

Recognition Technology

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**Abstract -** The management of the attendance can be a great burden on the teachers if it is done by hand. To resolve this problem, a smart and auto attendance management system is being utilized. But authentication is an important issue in this system. The smart attendance system is generally executed with the help of biometrics and by python in-built libraries. Face recognition is one of the biometric methods to improve this system. Being a prime feature of biometric verification, facial recognition is being used enormously in several such applications, like **video monitoring** and smart **CCTV** footage system and Vehicle Identify & Counting System, By utilizing this new programming framework, the problem of proxies and students being marked present even though they are not physically present can easily be solved. The main implementation steps used in this type of system are face detection and recognizing the detected face. This paper proposes a model for implementing an automated attendance management system for students of a class by making use of face recognition technique, by using Face-Recognition in-built modules and OpenCV, Facial recognition systems attempt to identify a human face, which is three-dimensional and changes in appearance with lighting and facial expression, based on its two-dimensional image After these, the connection of recognized faces ought to be conceivable by comparing with the database containing student's faces. This model will be a successful technique to manage the attendance and records of students.

1. **INTRODUCTION**

To verify the student attendance record, the personnel staff ought to have an appropriate system for approving and maintaining the attendance record consistently.

The following document is a report on the mini Course project on Real-Time Attendance Recording systems using Face

Recognition Technology It involved building a system for face detection and face recognition using several classifiers available in the open computer vision library (OpenCV). Face recognition is a non-invasive identification system and faster than other systems since multiple faces can be analyzed at the same time. The difference between face detection and identification is, face detection is to identify a face from an image and locate the face. Face recognition is making the decision “ Whose face is this “, using an image database collection. In this project, both are accomplished using different techniques and are described below. The report begins with a brief history of face recognition. This is followed by the explanation of HAAR-cascades, Eigen-face, Fisher-face, and Local binary pattern histogram (LBPH) algorithms. A discussion regarding the challenges and the resolutions is described. Finally, a conclusion is provided.

1. **LITERATURE REVIEW**

The main objective of this paper is to develop a smart attendance management system using facial recognition that will take care of the problems which are being faced in other automated systems which are in operation in today’s modern-day world. The main approach which needs to be followed is totally a fairly recent image of a student to that of some images taken deliberately and stored in a database, which further be used to mark the attendance if the images in the database match to the real-time image. A model as specified by Naveed et al, which is linked with two databases. One for the faces and the other one is used for marking the attendance. The image before the detection and recognition phase, the camera is used to click the face image of the student and perform background and noise removal.

* 1. Student Attendance System Using Iris Detection:

In this proposed system the student is requested to stand to Face Recognition Based Attendance System Nandhini R, Duraimurugan N, S.P.Chokkalingam FACE RECOGNITION BASED ATTENDANCE SYSTEM 575 Published By: Blue Eyes Intelligence Engineering Retrieval Number: C11230283S19/19©BEIESP & Sciences Publication in front of the camera to detect and recognize the iris, for the system to mark attendance for the student. Some algorithms like Gray Scale Conversion, Six Segment Rectangular Filter, Skin Pixel Detection is being used to detect the iris. It helps in preventing the proxy issues and it maintains the attendance of the student in an effective manner, but in one of the time-consuming processes for a student or a staff to wait until the completion of the previous members. In the Iris-based student attendance system, the student needs to stand in front of a camera, so that the camera will scan the Iris of the student. The scanned iris is matched with data of students stored in the database and the attendance on their presence needs to be updated. This reduces the paper and pen workload of the faculty member of the institute. This also reduces the chances of proxies in the class and helps in maintaining the student records safe. It is a wireless biometric technique that solves the problem of spurious attendance and the trouble of laying the corresponding network.

* 1. Ms. Pooja Humbe et.al [2] made use of a 360-degree rotating camera for building the model which detects the pupils in the class. This system without the software such as XAMPP controller, NetBeans, Java Advance for the frontend and back-end with MySQL could have been impossible as stated by the author. The characteristics of face are being brought by principal component analysis (PCA). Once registered, the record containing the names of students attended will be sent through email to parents and teachers
  2. Akshara Jadhav et.al [3] prompted face encounter algorithm Viola-Jones and face recognition PCA algorithm with support for machine learning and SVM for extraction functionality. The author also incorporated reprocessing which includes the histogram equalization of the facial image extracted and is scaled to 100x100. The use of neural networks for facial recognition has been shown, and we can see the possibility of a semi-supervised learning approach that uses facial recognition support vector machines for satisfactory results. The process followed after the face is recognized is the subsequent processing in which attendance is generated weekly or monthly and can be sent to parents or guardians.
  3. Nazare Kanchan Jayant et.al [10] executed an automatic attendance system. This system is based on the Viola-Jones facial detection and face recognition algorithm. First, the 20 student's database is created using various head poses for culminated recognition results. The face finding algorithm was then applied, and its efficiency was determined depending on the number of faces detected. The same process is followed for calculating the facial recognition algorithm's efficiency
  4. K.L.P.M Liyanage et.al [16] prompted a system having a separate application and a web-based application. The independent application deals with the process of facial recognition and the process of marking the attendance. The Web-based application mainly deals with the NLP process. Both applications link to a centralized database. Face detection is achieved using the Haar cascade method while face recognition is carried out using the PCM method. NLP is the other research framework developed in SMRT-FR for the processing and management of applications for employee licenses. Employees can easily request authorizations by sending an SMS or using the web interface and these requests for authorization are processed using the NLP application and the result of acceptance or refusal is generated in the light of different conditions and rules. The system has been able to detect faces with 68% accuracy so far..

1. **METHODOLOGY**

***A****. Architecture*

The automated attendance management system has a very simple and easy to implement the architecture. The system consists of two databases, a student database, and an attendance database. The student database is for storing the details of the student in a particular class. On the other hand, the attendance database, as the name suggests, is for marking and maintaining the attendance records of students attending a particular lecture. For the accomplishment of marking attendance, this system will have a high-definition camera installed outside the classroom. Students will avail the access to enter the classroom, by scanning their faces in that camera. Another camera will be installed inside the classroom in such a way that every student in the class will be visible to the lens of the camera. Facial detection and recognition algorithms will be applied to both the cameras to analyze the faces and mark their attendance accordingly.

***B.*** *Methodology*

To develop the smart attendance management system, some steps are required to be followed for accomplishing this task successfully. The steps can be defined in the following ways:

* Enrolment
* Face Image Collection For DB
* Face Recognition
* Confirmation by the class camera for Attendance
* Attendance Marking

*Enrollment*

In this step, the student is enrolled in the student

database. General information like Name, Enrolment Number, Class, and Section is stored in the database. Along with all this information, pictures of the student's face appearing in the camera window are also stored in the student database.

With the help of all the images stored in the student database, facial recognition can be performed for all the students are coming to attend a lecture.

*Face Recognition*

To implement the facial recognition in this model, we will make use of the Principle Component Analysis (PCA). PCA is a methodology utilized for lessening the number of variables that are used in face recognition. In PCA, each picture in the training dataset is represented as a linearly weighted eigenvector called eigenfaces. This methodology change faces into a small arrangement of basic qualities,

eigenfaces, which are the principal parts of the underlying arrangement of learning pictures. Recognition is implemented by anticipating another picture in the eigenface subspace, after which the individual is arranged by contrasting its current position in eigenface space and the

position of known people. The main benefits of using PCA for facial recognition are ease of use, speed and not changing its judgment based on changes on the human face. The students, appearing on the camera present outside the class, will have their faces recognized to get access to enter the classroom.

If the student's face is present in the respective database, then he is allowed the access to enter the class, else if his face image is not present in the database then the system will ask the student to enroll himself in the student database before gaining access in the classroom.

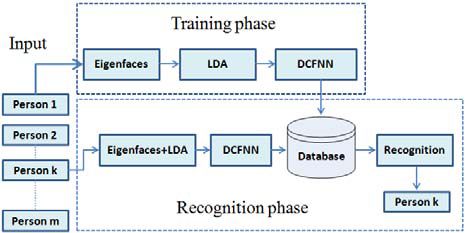


Fig 1. Activity diagram for the smart attendance system

***C****. Algorithm*

REAL\_TIME\_ATTENDANCE\_USING\_FACERECOGNITION

INPUTS: Faces of students at Entrance, Inside

Classroom.

OUTPUT: Automatic Marking of the attendance.

PROBLEM DESCRIPTION: Recognition of faces and

marking attendance accordingly.

Step I: Commence

Step II: Enrolment of students’ details in the student

database.

Step III: Setup a camera outside the classroom. Students’

the face will appear in the camera.

Step IV: Face Detection

Step V: Face Recognition by comparing the students’

face with images in the student database.

Step VI: IF: student is present in the database.

Grant access to the classroom

ELSE: Go back to Step 2.

Step VII: The camera installed in the class is used to check

the presence of the student in the class.

IF: Faces recognized in step 6 are present, Mark them

present.

ELSE: Mark absent.

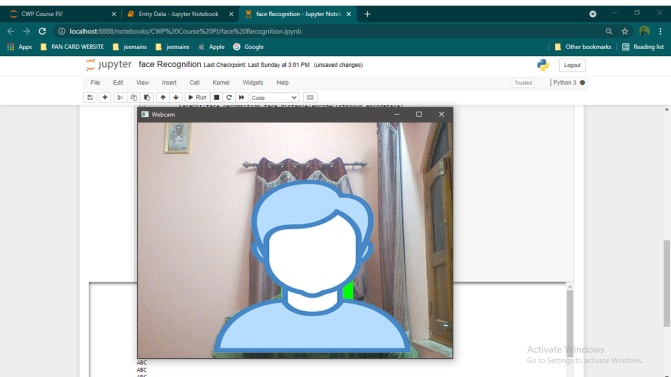
Step VIII: Mark the attendance in the attendance

database.

Step IX: End.

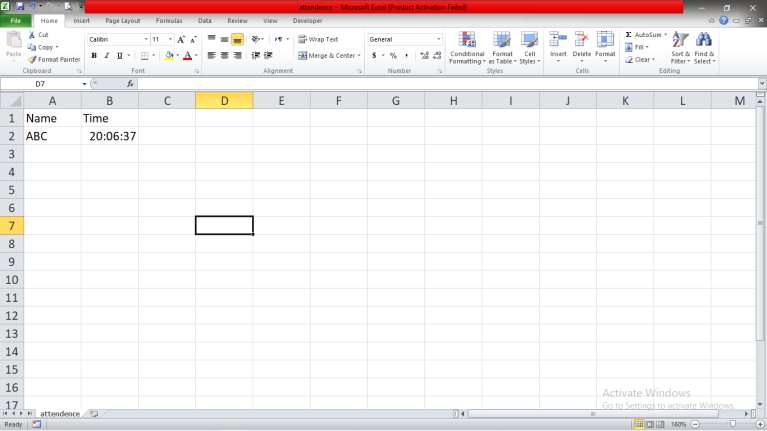
**RESULT**

*GUI of the face recognition module*

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**ABC**

*Screenshot of Attendance record file*



1. **CONCLUSION**

The proposed automated attendance system using face recognition is a great model for marking the attendance of students in a classroom. This system also assists in overcoming the chances of proxies and fake attendance. In the modern world, a large number of systems using biometrics are available. However, the facial recognition turns out to be a viable option because of its high accuracy along with minimum human intervention. This system is aimed at providing a significant level of security. Hence, a highly pro-efficient attendance system for classroom attendance needs to be developed which can perform recognition on multiple faces at one instance. Also, there is no requirement of any special hardware for its implementation. A camera, a PC, and database servers are sufficient for constructing the smart attendance system

**V. FUTURE SCOPE**

We would like to make this project into an App form in the future. In which this app contains the following menu/ module :

1) Student Database page

2) Face Collection DB

3) Attendance Record of Student using face recognition

4) All the Present student records in every new excel file

This Automated attendance system based on face recognition technique proves to be time-saving and secure. In the future when the student is absent then a message can be automatically sent to their parents and also the same system could be used for hostel attendance monitoring.

The proposed system here is only used for classroom attendance for students. However, this system can be improved and enhanced in a way that it can also be used in multi-national companies for maintaining the surveillance of

a much larger database, filled with a huge amount of entries of the employees working in a particular organization. This will be able to help in maintaining security and also the company will able to keep a track of its workers whether

they are completing the desired working hours in a day or not. This can also be implemented in banks. The ATMs can be equipped with a facial recognition algorithm. The customers will only be able to access their bank accounts, once their faces have been recognized by the ATM in comparison with images that are already saved in the database. This can help in preventing money thefts hence increasing the security while operating ATMs.

1. **REFERENCES**

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