Attendance Management System Based On Facial Biometrics

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Abstract—**In all learning institutions, it is crucial to track student performance by monitoring attendance. The oldfashioned way of doing this with paper sheets and signatures is slow, monotonous, and often error-prone. Plus, there's always the problem of students marking their absent peers present, making it hard to accurately track individual attendance, especially in large environment. To tackle this issue, our proposed solution involves implementing a system facial recognition system that can detect and recognize the faces of students automatically using a computer system and mark attendance. To enhance the performance of face recognition, numerous algorithms and strategies have been developed. The system will utilize a biometric enrollment procedure for storing distinct features of each student's face in a database. Then, during the identification and verification procedures, the facial image captured by a camera will be contrasted against the facial features collected during enrollment.**

I. Introduction

A facial recognition-based attendance system uses high-definition monitor video and other data collection to recognize students' faces for the purpose of registering attendees [1]. In my effort to detect faces, a computer system could be able to quickly and accurately recognize human faces from the photos taken with a security camera. The advancement of face reputation has been achieved via the use of a variety of algorithms and It helps to quickly recognize a student's face for attendance purposes and update the attendance database automatically.

The use of face recognition in automated computer vision systems is rapidly increasing. Face recognition is extensively used for a variety of purposes, including security, authentication, and attendance tracking [2]. Analyzing student performance and monitoring attendance at colleges and universities is a challenging task for teachers. Different colleges have put in place different attendance-tracking systems. The traditional methods of recording attendance [3] involve calling out students' names and giving them the attendance sheet. Iris recognition, fingerprint identification, and the well-known car Radio-Frequency Identification and Detection (RFID). There are different types of attendance marking systems in use, including iris and fingerprint identification. Because establishing a queue is required for both

iris and fingerprint recognition, it takes longer and exhibits more arrogance. However, the user must be situated at a medium closer distance for our suggested approach, which is in the middle of the front wall with all of the students facing it [4]. The range of the camera encompasses every pupil in the room. It utilizes an image/video stream to recognize faces for the purposes of maintaining databases and recording attendance at lectures.

II. Literature Survey

1. Face recognition-based mobile automatic classroom attendance management system

In This paper, The Authors R. Samet Muhammed Tanriverdi Published in 2017, there are three alternatives that have been proposed in this project; each one calls for parents and teachers to download a range of mobile-based apps for kids in order to track and monitor the real-time attendance process.[5] This system had this benefit. It has previously been tried with students at the author's college or institution, and the outcomes were positive. This system has several restrictions, such as the need for three distinct types of mobile applications, which is a significant flaw in the system.

2. Face Recognition based Attendance Management System

The authors of this study, Smitha, Pavithra S. Hegde, and Afshin, suggested a method in which each student in their class needed to register themselves and fill out all necessary information. From video web broadcasts of a lecture hall, the

faces of every student will be recognized, and their pictures will be saved and included in the dataset. The dataset is searched for faces that match it, and if one is found, the student may be given attendance, and a notice of absence will be issued to the appropriate lecture college. During. Additionally, their procedure will consist of four steps. Creating dataset, detection of face, Face recognition and updating attendance.To mark attendance it uses student face ids[6].

3. Class Attendance Management System using Facial Recognition

The authors of this study, Clyde Gomes, Sagar Chanchal, Tanmay Desai, and Dipti Jadhav, presented a straightforward and user-friendly method for keeping track of attendance that would be simple for everyone to use and that teachers could maintain and update as necessary. They employ a droid camera to record live videos of students, OpenCV to access the haar cascade algorithm, and their libraries, which are crucial for matching and identifying the captured faces of students with the images of students that have been saved in databases. This approach was successfully used to track down the grades and attendance of the chosen participants. This technology can recognise up to ten faces at once, which means it may be used for more than just gathering and recognising a single student's face.

III. RESEARCH METHODOLOGY

We propose a face recognition-based attendance management system based on haar casade. This stage focuses on the techniques and suggested practices for facial recognition and detection. The camera's facial recognition software, Opencv and TLkit, is utilized and need to train a face recognition model using a dataset of face images. .If the face recognition model doesn't recognise the face, it sends an alert message about the absence to the registered college. Once it does, the model notes the student's attendance. Using the local binary pattern histogram and the haar casade, student's attendance may be efficiently marked.
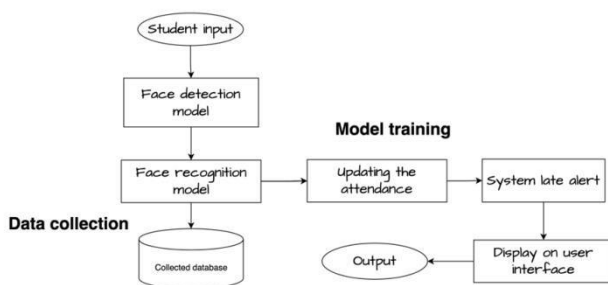

Application Architecture

The proposed system consists the following stages.

I. Creation of Dataset and Training:

The creation of dataset and training is the important step for implementing face recognition-based attendance management system. This involves colleting the data generated during student registration. The registration process typically involves capturing students face and collecting their personal information like name, roll number, department etc. Once the sufficient data is collected then the model utilizes this data for training.

II. Image capturing and face detection phase:

In image capturing and face detection phase different camera sources like dedicated camera device, cctv camera, integrated camera device and laptop's webcam is used to capture the student's image. Once the data is collected the face detection algorithm Haar-cascade is used to locate and separate the facial region from the original data. This isolated facial region is used by LBPH algorithm to compare with the data stored in the database once the match is found then the system updates his/her attendance in the record.
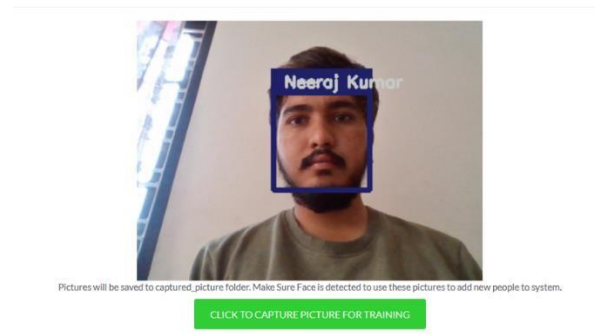
III. Image Matching

The histogram for each picture in the dataset and the captured image are created during this step using the Local Binary Pattern Histogram. The dataset and captured image histograms are then checked to identify faces for attendance marking.

IV. Attendance marking and Alert notification:

After successful facial recognition, the system automatically marks his/her attendance along with date and time. This process is completely automatic and error free. Along with marking the attendance the system also generates the alert to management regarding the students who are late to attend the class or college.

All data   MONTH   ALL

Show 10 ˅ entries   Search:

Name		ID		Department		Date		LOGIN_Time	
Neeraj Kumar		545		CSE		5-4-2023		18:5	
Neeraj Kumar		545		CSE		6-4-2023		16:12	
Neeraj Kumar		545		CSE		7-4-2023		10:42	
Neeraj Kumar		545		CSE		3-5-2023		9:55	
˅		˅		˅		˅		˅	

Showing 1 to 4 of 4 entries   Previous 1 Next

III. EXPERMENT ANALYSIS

A major component of experimental studies on face recognition attendance is testing the effectiveness and accuracy of face recognition systems in accurately recognising and recording individual student. The accuracy of student facial recognition is around 98%.The device is placed in a certain location to obtain tahe ideal light focus for detecting faces. The system is tested on faces with and without beards, and it accurately recognizes both.

During the training many positive and false images are provided to test the correctness and accuracy of the model and the model results were accurate.

III. RESULT

The attendance management system works more efficiently and accurately with Haar-cascade. The student whose face is identified is included with all their details on the attendance sheet. As a result, our system is able to handle many faces at once and update attendance automatically. Once the student faces are identified, their data will be stored in the database. The system also provides an option which helps to download the excel file containing the student's personal info like Name, Roll number along with date and time of the student's attendance.

	A	B	C	D	E	F
1	Name	ID	Department	Date	Login_Time	
2	Neeraj Kumar	545	CSE	05-04-2023	18:05	
3	Neeraj Kumar	545	CSE	06-04-2023	16:12	
4	Neeraj Kumar	545	CSE	07-04-2023	10:42	
5	Neeraj Kumar	545	CSE	03-05-2023	09:55	
6	Neeraj Kumar	545	CSE	04-05-2023	10:51	
7						
8						
9						
10						

IV. CONCLUSION

This system aims to provide an efficient class attendance system using facial recognition techniques. In the proposed system, Face Id will be utilised to track attendance. Webcam facial recognition will be used. Once a student has been spotted, it will indicate their attendance and update the attendance record. The future experiments can be run with a various number of changes which include usage of much densely trained detectors, larger captioning datasets and different architectures for generating language models.

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