IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 7.105 ⁜ Vol. 9, Issue 4, April 2022

DOI: 10.17148/IARJSET.2022.94104

Passive Facial liveness detection

Alex Issac Varghese , Anuj Matadeen Tiwari , Abhishek Kumar

Dept of Computer Engineering, SOEA, Savitribai Phule Pune University, Pune, India

Abstract: The primary goal of this project is to develop a Passive Facial Liveness Detection (attendance monitoring system) that will improve and update the current attendance system, making it more efficient and effective. The existing system is rife with flaws, making attendance tracking incorrect and inefficient. When the authority is unable to enforce the previous system's regulations, a slew of problems occur. Software that recognises faces will be used. The face is one of the natural characteristics that can be used to identify someone. As a result, it's commonly utilised to track down someone's identify because the chances of a face deviating or being cloned are slim. This project will develop face databases to feed information into the recognizer algorithm. Faces will be linked to the database during the attendance-taking session to determine identity. When a person is recognised, their attendance is automatically recorded and the essential data is saved in an excel file. An excel document including all participants' attendance information is emailed to the appropriate academics at the end of the day.

Keywords: Python , NumPy, OpenCV, Hadoop, Pandas, facial liveness.

INTRODUCTION:

The regularity of students' performance is an issue for today's educational institutions. Insufficient attendance is one cause for the drop in student performance. The most popular method of recording attendance is through signing or calling the pupils. It took a little longer and was more difficult. A computer-based student attendance verification system will be necessary from now on to help staff in keeping attendance records.
In this project, we used a face recognition-based intelligent attendance system. We suggest developing a "Passive Facial Liveness Detection" system with a wide range of applications. As a result of the face authorisation, the current implementation includes facial identification, which saves time and eliminates the possibility of proxy attendance.
This technology can now be used in circumstances that call for active participation. The system requires OpenCV and Dlib in Python to function.

MOTIVATION:

In terms of data accuracy, the old attendance monitoring system had a severe issue. Because attendance may not be recorded by the original person, a third party may take a specific person's attendance without the institution's knowledge, risking the data's integrity. If student A is too weary to attend a class, student B will sign for him or her, despite the fact that student A did not show up. The system will overlook this due to a lack of enforcement. If the institution decides to enforce, it will almost certainly squander a lot of people's time and resources, both of which are inefficient. As a result, the old system's attendance records are useless for research purposes. The second flaw with the prior technique is that it takes too long. Assume that a pupil signs his or her name in one minute on a three- to four-paged name list. Only about 60 pupils sign their attendance in an hour, which is clearly inefficient and time consuming. The third issue to consider is the ability of a legitimately interested party to obtain the information. Most parents, for example, are concerned about tracking their children's whereabouts in order to guarantee that they attend college or school lessons. Parents, on the other hand, had no access to such information under the prior system. As a result, the previous system no longer works.

RELATED WORK OR LITERATURE REVIEW:

1. According to the study publication "Attendance System Using NFC (Near Field Communication) Technology with Embedded Camera on Mobile Device," "Attendance System Using NFC (Near Field Communication) Technology with Embedded Camera on Mobile Device," "Attendance System Using NFC (Near Field Communication) Technology with Embedded Camera on Mobile Device" (Bhise, Khichi, Korde,Lokare, 2015). The attendance system has been improved thanks to the usage of NFC technology and a mobile application. According to the research article, each student is issued an NFC tag with a unique ID when they enrol in college. By pressing or relocating these tags, the lecturer's cell phone will be utilised to track attendance for each lesson. The student's face will then be captured by the phone's embedded camera, which will be used to send all of the data to the college server for confirmation and verification. NFC's advantages include its ease of use and the speed with which it establishes connections. It cuts down on the amount of time it takes to take attendance. This technology, however, is unable to detect the violation automatically when the NFC tag is not

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manually marked by the original owner. Apart from that, the professor considered the system's convenience inconvenient, as it uses the lecturer's phone as an NFC reader. Consider the consequences if a lecturer forgot to bring their phone to work. What would be the backup system for keeping track of attendance? Furthermore, given school privacy issues, most professors are unlikely to want their personal smart phones to be used in this way. As a result, rather than using the NFC tag, unique information about the student should be used, such as biometrics or face recognition, which is guanine for a student. This will confirm that the student is taking the attendance.

2. Face Recognition Based Attendance Marking System:

The second research paper, "Facial Recognition Based Attendance Marking System" (SenthamilSelvi, Chitrakala, Antony Jenitha, 2014), is based on the discovery of facial recognition in order to address issues with the previous attendance system. Using a camera to record photographs of the employee, this technology detects and recognises faces. When a match is found in the face database, the taken image is compared to the face database one by one to look for the worker's face, and attendance is recorded. The main advantage of this system is that attendance is tracked on a secure server, with no one else able to track other people's attendance.Furthermore, the proposed system's face detection approach is improved by using a skin categorization technique to improve the detection process' accuracy. Despite increased efforts to improve the accuracy of the facial recognition algorithm, the technology remains unportable. Because this system requires a stand-alone computer with a steady power supply, it is not portable. This technique is only suitable for recording staff attendance because they only need to report their presence once a day, unlike students who must register their attendance at each lesson on a given day. It will be inconvenient if the attendance marking system is not portable.To solve this issue, the full attendance management system can be constructed as a portable module that can be executed using only a Python programme.

3. Fingerprint Based Attendance System Using Microcontroller and LabView:

The third study, "Fingerprint Based Attendance System Using Microcontroller and LabView" (Kumar Yadav, Singh, Pujari, Mishra, 2015), proposed a fingerprint-based attendance system. This system uses two microcontrollers to conduct the fingerprint identification process. A fingerprint sensor will be used to gather the fingerprint pattern, which will then be transferred to microcontroller 1. The data will then be sent to microcontroller 2 for validation against the database that is stored there. The information is provided to the PC via serial communication and displayed after finding a student match. This architecture is advantageous because it facilitates development while maintaining design flexibility and facilitating testing.This technology, however, is not portable because it is tethered to a computer. Apart from that, obtaining database information is tough. Parents who want to know about their child's attendance will not be able to do so easily or efficiently. As a result, the information about the student may be posted to a web server to allow quick access to the legitimate concerned party. A login screen can be used to enforce appropriate access authentication.

4. RFID based Student Attendance System:

The proposed solution, according to the fourth research journal "RFID based Student Attendance System" (Hussain, Dugar, Deka, Hannan, 2014), is essentially identical to the first research journal, which used RFID technology to improve an earlier attendance system. This technique uses a tag and a reader to track the students' attendance. This journal differs from the first in that it allows users to view attendance statistics through a web interface. It facilitates information retrieval. The RFID reader can only function when it is connected to a computer, hence this solution is problematic in that it is not portable.Second, because the RFID tag lacks guanine information that can be utilised to uniquely identify a student, the attendance data acquired is inaccurate. Finally, a better attendance monitoring system should be created with portability, accessibility, and data accuracy in mind.

Proposed System:

Before the attendance management system to work, it needs a set of data, which usually consists of the individual's fundamental information, such as their ID and faces. The first step in creating a portrait is to use a camera to capture the subject's face. If no face is identified in the captured image, the user will be prompted to capture their face again until a specified number of portraits is obtained, which in this case will be 10 for each student. Because of the Pandas' limited storage space, it was decided to keep only 10 images per student due to the university's high student population. After that, the photos will be pre-processed to create a grayscale image and cropped faces of equal size images, which are required to use the EigenFaces Recognizer.

After the photographs have been processed, they are saved in a file hierarchy. All of the faces in this project will be saved in a hierarchy under the "database" folder. When you expand the database folder, you'll notice that it contains numerous sub-folders, each with its own set of files. This represents an individual and is kept in that subfolder because it contains a series of portraits of the same person.

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The subfolders of each individual will be named after him or her. Each and every person in the institution has their own individual identification number. The construct database.py script handles all aspects of image retrieval, pre-processing, and storing.

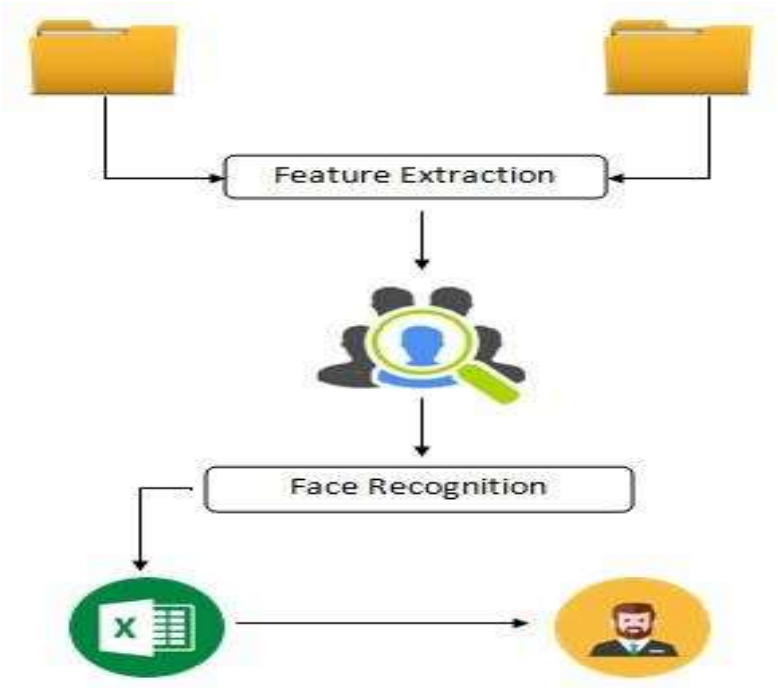

Fig: Proposed System

After a sufficient number of photos have been collected in the database, the photographs will be used in a training process. Eigen Faces, Fisher Faces, and Local Binary Patterns Histograms are the three main types of training methods in OpenCV 3.4. (LBPH). The Eigen Faces recognizer will be the primary centre of this project. Eigen Faces' idea is straightforward: it recognises a face by collecting the face's largest deviation and then converting those variations into information that can be compared when a new face arrives. The csv file will be read during the training phase to provide the path to all of the images, which will then be loaded into a list variable. The list will then be passed to the training function, which will run for a specified amount of time. The more time it takes to train them, the more photographs there are in the face database.

CONCLUSION:

Before the start of this project. The traditional method of taking attendance has various shortcomings that have caused countless problems for most institutions. As a result, the facial recognition technology embedded into the attendance tracking system ensures precise attendance while also eliminating the flaws of the previous method. By assigning all of the challenging jobs to the machine, using technology to remove defects not only saves time and money, but it also reduces human intervention in the process. The only cost of this method is having enough database storage space to store all of the faces. Micro SD cards, fortunately, are accessible to compensate for the data volume.In this project, the face database was successfully built. Aside from that, the face recognition system is excellent. Finally, the system not only addresses concerns that existed in the previous model, but it also allows the user to get data by submitting the attendance sheet to the appropriate faculty member.

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