FACE RECOGNITION BASED AUTOMATED ATTENDANCE SYSTEM

Rationale and Gap Analysis

Automatic face recognition (AFR) technologies have made many improvements in the changing world. Smart Attendance using Real-Time Face Recognition is a real-world solution that comes with day-to-day activities of handling student attendance systems.

With the advancement of technologies every day, humanity is slowly going towards contactless everything. It is quite evident that the future ahead of us will become so much advance that maybe 90%+ things that we are doing right now will be either automated or become contactless. One such advancement will be facial recognition technology or the FR tech, which is the prime focus of this projects.

Facial recognition technology is a system or software which is capable enough to verify the identity of a person from analyzing an image or video footage. Some of the technologies or software are so advanced that even blurred pictures are sometimes rendered enough and analyzed to know the identity of the person. So many are the advantages of this system that it would take a long article to note down each one of them. But today, our prime focus will be on one of the many applications of facial recognition technology, and that is using face recognition-based attendance systems.

1.Attendance System Using NFC Technology with Embedded Camera on Mobile Device

According to research journal “Attendance System Using NFC (Near Field Communication) Technology with Embedded Camera on Mobile Device” (Bhise, Khichi, Korde, Lokare, 2015). The attendance system is improved by using NFCtechnology and mobile application. According to the research paper, each student is given a NFC tag that has a unique ID during their enrolment into the college. Attendance of each class will then be taken by touching or moving these tags on the lecturer mobile phone. The embedded camera on the phone will then capture the student‟s face to send all the data to the college server to do validation and verification. The advantages of this method is where the NFC is simple to use, and the speed of connection establishment is very high. It indeed speeds up the attendance taking process a lot. However, this system couldn‟t automatically spot the violation when the NFC tag is not personally tagged by the original owner. Apart from that, the convenience of the system which uses the mobile phone as the NFC reader was actually an inconvenience to the lecturer. Imagine if the lecturer had forgotten to bring their mobile phones to work, what would be the backup procedure for the attendance to be recorded? Moreover, most of the lecturer will not likely to prefer their personal smart phones to be used in this way due to privacy matter. Hence, unique information about the student like biometrics or face recognition, which is guanine for a student should be used in replacement of the NFC tag. This will ensure attendance to be taken originally by the actual student.

2. Face Recognition Based Attendance Marking System

The second research journals “Face Recognition Based Attendance Marking System” (SenthamilSelvi, Chitrakala, Antony Jenitha, 2014) is based on the identification of face recognition to solve the previous attendance system‟s issues. This system uses camera to capture the images of the employee to do face detection and recognition. The captured image is compared one by one with the face database to search for the worker‟s face where attendance will be marked when a result is found in the face database. The main advantage of this system is where attendance is marked on the server which is highly secure where no one can mark the attendance of other. Moreover, in this proposed system, the face detection algorithm is improved by using the skin classification technique to increase the accuracy of the detection process. Although more efforts are invested in the accuracy of the face detection algorithm, the system is yet not portable. This system requires a standalone computer which will need a constant power supply that makes it not portable. This type of system is only suitable for marking staff‟s attendance as they only need to report their presence once a day, unlike students which require to report their attendance at every class on a particular day, it will be inconvenient if the attendance marking system is not portable. Thus, to solve this issue, the whole attendance management system can be developed on an portable module so that it can be work just by executing the python program.

Objectives

To develop a portable Smart Attendance System which is handy and self-powered.

- To ensure the speed of the attendance recording process is faster than the previous system which can go as fast as approximately 3 second for each student.
- Have enough memory space to store the database.
- Able to recognize the face of an individual accurately based on the face database.
- Develop a database for the attendance management system.
- Provide a user-friendly interface for admins to access the attendance database and for non-admins (parents) to

- Allow new students or staff to store their faces in the database by using a GUI.

Hypothesis Maximum NA

Research Methodology

Face Recognition Based Attendance System this project will be use full in Educational fields like schools, colleges, Universities, Offices, as well as in Hospitals. This system can handle Administrator as well as student attendance data, it will help to store the different type of data like student will store there roll numbers, email ids, contact numbers, addresses and date of birth, Photograph. That data is used to mark attendance.

The design part of the Face Recognition Based Attendance system is divided into two sections which consist of the hardware and the software part. Before the software The design part can be developed, the hardware part is first completed to provide a platform for the software to work. Before the software part we need to install some libraries for effective working of the application. We install OpenCV and Numpy through Python.

Hardware Development

 Camera Module with good mega pixels.

 Power Supply Cable

 16Gb Micro SD Card Class 10

Programming Language:

There are bindings in Python, Java and MATLAB/OCTAVE. The API for these interfaces can be

found in the online documentation. Wrappers in other languages such as C#, Perl, Ch, Haskell, and Ruby have

been developed to encourage adoption by a wider audience.

Since version 3.4, OpenCV.js is a JavaScript binding for selected subset of OpenCV functions for the web

platform.

Operating System Support:

All of the new developments and algorithms in OpenCV runs on the following desktop operating

systems: Windows, Linux, macOS, FreeBSD, NetBSD, OpenBSD. OpenCV runs on the following mobile

operating systems: Android, iOS, Maemo, BlackBerry 10. The user can get official releases from SourceForge or take the latest sources from GitHub. OpenCV uses CMake

Preliminary Work / Survey Maximum 300 Words

With the advancement of technologies every day, humanity is slowly going towards contactless everything. It is quite evident that the future ahead of us will become so much advance that maybe 90%+ things that we are doing right now will be either automated or become contactless. One such advancement will be facial recognition technology or the FR tech, which is the prime focus of this projects.

Expected Outcome (Working Explanation)

The facial recognition technology can be used in recording the attendance through a high-resolution digital camera that detects and recognizes the faces of the students and the machine compares the recognized face with students' face images stored in the database. Once the face of the student is matched with the stored image, then the attendance is marked in the attendance database for further calculation. If the captured image doesn't match with the students' face present in the database then this image is stored as a new image using add user python code onto the database or excel sheet. In this system, there are possibilities for the camera not to capture the image properly or it may miss some of the students from capturing.

Benefits to the Society

Automated time tracking system

Offices or workplaces or even just public places where the entry and exit times of employees or a person are strictly noted down will have a ready-made automated system to record the entry and exit time of each person for a given time. It won't even need the person to stop and click a photo, the software's are advanced enough to record the data from a continuous reel also. This means the flow won't get hampered, or you won't have to stop and smile or something like that. Just enter or exit the place effortlessly like you do everyday and boom! Your attendance will be recorded without any fuss!

Increased security

Face recognition-based attendance system won't just calculate attendance but also note down the entry and exits of visitors in the place. At times when there is a situation where the identity and time of entry and exit of a specific person need to be noted, this system would become handy as it will easily show you when he/she came in and what are the places he/she went to a very precise level. All of this means, you will have a much higher security level in your workplace.

Time saving

The whole world is suffering from COVID19 and it is high time we must give heed to social distancing. Having a safe distance with others has become a necessity nowadays. Times like this can be problematic if you have manual attendance system, Having a Face recognition based attendance system will not only allow you to register the attendance of a person but also keep you at a safe distance from them as you can work remotely and still see who all are coming and going. This calls for the point that, this whole system is a much safer, time-saving, and faster method to record attendance.

Easy to manage

Since the artificial intelligence-based attendance system is fully automated, managing the records and keeping a track of day-to-day activities will become much easier than the manual system. Everything will be done by the system. Many software is programmed in such a way that it shows the exact time of how many hours or minutes a person worked on his/her desk in the day. All this is can be done on a very large scale. Just imagine, recording the activities of a large crowd of 200 people simultaneously without any fuss and recording it at the same time in an organized manner!. Such is the power of AI in face recognition.

Cost Benefit Analysis Maximum 200 Words

Since the whole process will be done by a computer, it means the total attendance registration and calculation will be automated and done by the system itself, therefore, saving us the money which would have been otherwise spent on the labor cost to do that.

LIMITATION:

- Software is limited to Desktop only.
- System requires python interpreter installed on the system.
- All opinions of student management are not included in current version. Security options provide only low-level security against beginner attackers.
- GUI is in English only.
- System use only those schools and colleges who tie up with us.
- This system is unable to mark attendance when light density is low.

FUTURE SCOPE:

- An automated Attendance System can be implemented in larger areas like in a seminar hall where it helps in sensing the presence of many people.
- Sometimes the poor lighting condition of the classroom may affect image quality which indirectly degrades system performance, this can be overcome in the latter stage by improving the quality of the video or by using some algorithms.
- This system can also implement with surveillance camera to detect and find someone.

References (Important Only)

http://scholar.google.co.in/scholar?q=face+recognition+based+attendance+system&hl=en&as_sdt=0&as_vis=1&oi=scholart

https://github.com/informramiz/opencv-face-recognition-python

https://analyticsindiamag.com/a-complete-guide-on-building-a-face-attendance-system/