

Face Recognition System based on Smart Attendance using Hybrid Algorithm and Machine Learning

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Abstract—A student's attendance record at an academic institution is very important when evaluating their performance. An automated Attendance management system (AMS) that is entirely based on face identification and face reputation tactics is suggested because the manual labor required for this methodology is time-consuming. An application of computer vision and image processing known as a "Face recognition computer" is capable of carrying out the crucial tasks of identifying and validating someone from a repository of videos and images. The main objective is to automate the attendance system through the integration of face recognition generation using modified local Binary sample (LBP) and Support Vector machine (SVM) algorithms with Octave Graphical User Interface (GUI). Following the completion of taken photos as well as artifact removal utilizing Viola Jones and LBP, the image is also relocated for recognition. In the database, a student's attendance is listed as smart if indeed the picture is known; otherwise, it is recorded as missing.

Index Terms— Face detection, face popularity, LBP, SVM, and Viola Jones algorithm are index terms.

I. INTRODUCTION

In general, how you present oneself with your face has a big impact on how you see other people in day-to-day interactions. A biometric identifier called Face Popularity captures a person's facial characteristics as an entirely unique facial print, allowing it to identify them. Due to its numerous applications, software that recognizes faces has garnered the interest of researchers. Facial reputation generation is greater than that of other fingerprint authentication recognition technologies like the finger, palm, and iris so because biometric process is contactless. Without touching or otherwise interacting with them, people can also be remotely identified using facial recognition technology. Currently, the facial expression popularity technique is used at crime scenes, airfields, train stations, and on social media platforms like Facebook. Criminal investigations can also use facial recognition technology. The images that are taken are saved in a datasets that can be used to identify specific people. Facebook automates the process of adding tags to photos by using facial recognition technology. Face recognition under all circumstances, such as changes in lighting, maturity level, pose, and more, requires large amounts of data and sophisticated algorithms. According to recent research, the popularity structure of faces may be changing. Although popularity strategies have advanced significantly over the past ten years, the majority of them still rely on a small number of subjects in a single frame, in controlled lighting, to their faces in the appropriate positions, at this time. It only functions well if the is evident. image picture. In order to identify distinctive subjects and take clear photos with faces in the proper positions, face reputation requires massive sets

of data and successful at getting to manipulate specific mimics, such as lighting. It takes a lot of data and expert skill to distinguish between subjects with distinctive facial reputations by adjusting certain imitations like lighting, pose, and ageing. Over the past few years, there has been significant advancement in the facial reputation structure. In actuality, over the past ten years, the ground of face recognition has made significant advancements. When there aren't many faces in the image, the majority of face evaluation structures currently in use perform well. Additionally, these techniques were tested in a setting with regulated lighting, acceptable facial expressions, and crystal-clear pictures. Without adjusting the lighting or the position of the faces, the face detection system of presence device suggested in this essay can recognize two faces in a frame. This order is for facial recognizing participation devices for educational institutions. Work may be a difficult, tedious task. A detailed counselling may take as little as five minutes, and departments are required to name and track attendance. It takes a while to do this. The delegate has a cheerful disposition. As a result, numerous businesses have begun leveraging a variety of recording technologies, such as RFID, iris scanning, fingerprint recognition, and others. These online-based structures, however, can be time-consuming and perplexing. Facial recognition is a crucial biometric that is accessible and imperceptible. A completely face-based forest that overlooks the innumerable facial structures that take into account various expressions. The layer of facial recognition applications are verification and facial recognition. A 1:1 perfectly matched system for face matching is contrasted with face-to-face image processing, and a 1:N contrast of face query images is also made. This strategy aims to develop a route plan entirely based on facial recognition methods. Here, a private face is considered an indication of existence. These days, facial recognition is widely used and becoming more so. The location had a face in the middle of it. A face reputation tool with stunning live video has also been suggested. This new generation, which is centred around this site, will be prepared much quicker than the existing one.

II. LITERATURE REVIEW

A. NFC-Enabled Presence Device with A Built-In Camera for Mobile Devices

Participants could use "NFC (Close to Region Discussion) new tech to digital photography integrated into mobile tools," according to the test book, and face-based constructs were advised (Bhise, Khichi, Korde, Lokare, 2015). Using mobile apps as well as NFC technology, you can improve your attendance machine. Every student who enrolls in college is given a NFC chip with such a completely unique ID, claims a research article. To track attendance at each lesson, the travelling teacher touches or passes these tags. The student's face is then captured by the built-in camera, and the data is sent to the school's servers for validation. The simplicity of NFC and the quick broadband speed are two benefits of this time. The second dosing method is much simpler to use as a result. However, as soon as the customer stops utilizing his NFC chip, the devices frequently miss violations. Having said that, NFC students began to obstruct teachers, making mobile app usage crucial. Wouldn't it be simpler to collect everyone's gifts if the reverend didn't even bring her mobile phone to work? Furthermore, you might not want to watch often these profs use their friend's iPhone because of the sensitive subject. As a result, a distinct student record, together with biometric or knowledge application, It ought to be used in place of the NFC indicator in additament to the settings. This enables a select group of students to accept participation first. B. Facial recognition and presence marking systems only.

Facial reputation is used in a second research paper, "Face Detection Engines Fully Based on Face Reputation" (Romanticist, Architrave, Antony Zenith, 2014), to get around earlier technical challenges. Employees are photographed using a digital camera in this technique, and both their faces and visions are documented. On Face's website, you can see the finished item, but I believe the picture contrasts the worker for whom the attendance is being noted with their face. Attendance data is kept on a totally private, highly secure server. Additionally, the face recognition algorithm of this warning machine is constructed with pore as well as skin segmentation technology to increase the accuracy of a recognition system. The machine is still functioning properly despite ongoing efforts to increase the precision of facial recognition algorithms. A fixed, non-portable, standalone computer with a reliable power supply is necessary for this software. This kind of system is prepared to track staff attendance because they prefer to sign in on the day in question rather than asking students to confirm their attendance for each class on a particular day. It is a big deal if sign is a gift. System management is impossible. The entire conventional device management solution is transformed in to the portable modules and used on Python machines to address this issue. C. Student 's attendance tracking system based on RFID.

The proposed remedy is the initial research of using RFID generation to enhance attendance applications, according to 4th journal "Fingerprint Complete Student 's attendance Equipment" (Hussain, Dugar, Deka, Smith and smith, 2014). Similar to the journal, almost. His two additional techniques for tracking student attendance in the system are Tag and Scholar. The difference between original journals and these is the availability of

contributor facts on the website. It offers statistical data that are very simple to acquire. This approach is not always the best because RFID readers are most effective when linked to a computer. Second, a purine documentation that recognizes the reader is not always present on RFID tags. As a result, participants are asked to provide false information.

A Facial Recognition Attendance System with GSM Notification was demonstrated by Samuel John in 2017[14]. The Viola Jones algorithm is employed by this system. This algorithm is utilized to find faces. Also, patterns of the captured faces were created using the Fisher faces method. In the database, the produced templates were stored. The graphical user interface for this system was made using the Software Development Kit (SDK) and the Open CV library.

Jenif D. Souza describes an Automatic Attendance Marking and Management System using Face Recognition in [2019][18]. By using the camera to take a picture of each student in the class, this technique automatically recorded each student's attendance. The Histogram algorithm is used by this system. The histogram technique is used to identify faces. The face image is transformed into a matrix in this approach. Histograms are used to identify certain faces.

The issue of time-consuming is resolved by this system.

Ref No	Title & Authors Name	Concept Used	Advantages	Disadvantages
1.	Individual Stable Space: An Approach to Face Recognition Under Uncontrolled Conditions Xin Geng, Zhi-Hua Zhou, & Smith-Miles	Face recognition under uncontrolled condition[5]	This paper projects on face recognition under uncontrolled conditions.	Video sequences, verification, and multiple persons per image required by most of the real applications can't be implemented
2.	Design of Classroom Attendance System Based on Face Recognition, Wenxian Zeng	CNN uses a system like a multi layer perceptron that has been designed to process the requirements faster.[13]	The Automated Classroom Attendance System helps in increasing the accuracy and speed ultimately achieve the high-precision real-time attendance to meet the need for automatic classroom evaluation.	Other methods with greater accuracy can be used to build
3.	An Attendance Marking System based on Face Recognition" Khem Puthea, Rudy Hartanto and Risanuri Hidayat.	The complete system is implemented in MATLAB[4]	User-friendly application on face recognition created.	Similar Technique are used

III. PROPOSED SYSTEM

The proposed system's goal is to take a picture of every student's face and post it on the internet for students to view. The student's face should be visible to all viewers, regardless of a student's seating arrangement or standing position, when the teacher's face is captured. The instructor does not need to be present in class because the system records this same clip, monitors it for ongoing facial processing stages, and notifications the attendance website. Prior to taking photos and storing them in the database, each member of the classification first must register the necessary data. Elegance's live footage will allow you to see your face throughout each session as shown in figure 1.

The database's currently used images are compared to the reconstructed faces. Once a match is found, the participant is scored as a perfect leader. A list of absentees is sent at the end of each consultation to the ideal college overseeing the consultation.

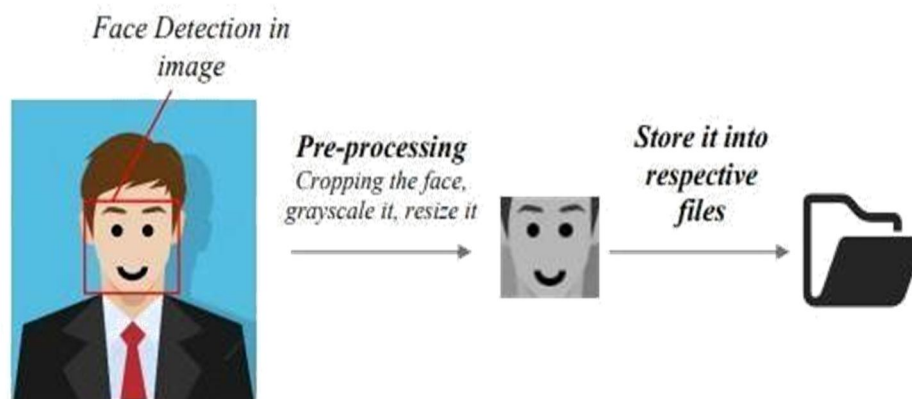


Fig. 1: Proposed System

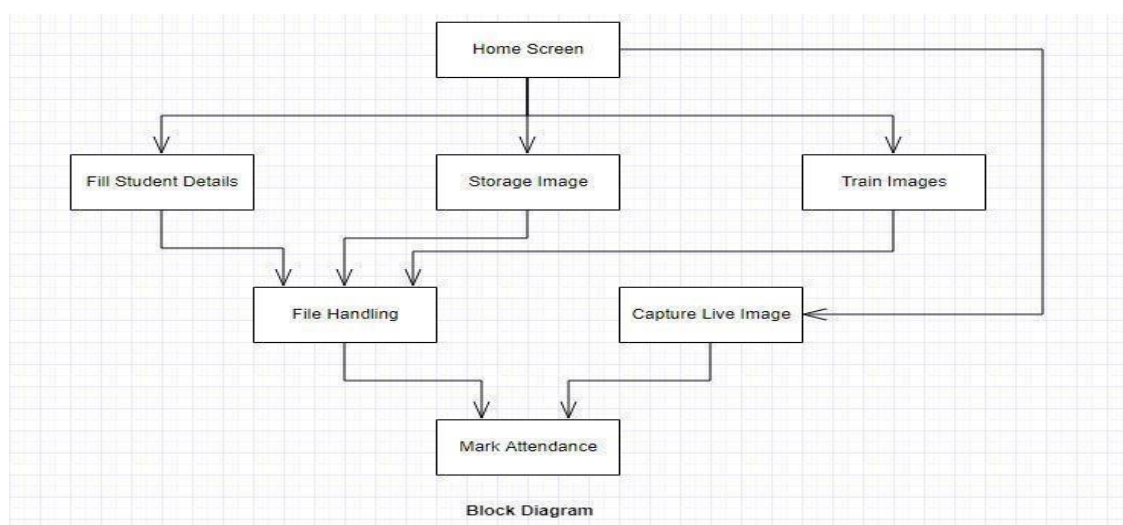


Fig 2: Block Diagram

A. Structure of general recognition

1. Devices that Require a Fingerprint:

The Handheld Fingerprint Tool needs to be set up in advance for thumbprint departure machines that use character fingerprints. Later in the category day or earlier, students are expected to do is provide their fingerprint image on exposure gadgets to verify continued attendance. When people see it, they are supposed to look away.

2. Complete RFID-based detection devices:

In the present, Founder always presents a legitimate ID and individuality to the card machine of any RFID-based gadget to notify its existence on a regular basis. I must do it. The RS232 port can be used by devices to connect and document attendees to saved websites. The possibility of unauthorized access exists. Additionally, some students might try to misuse her ID themselves occasionally or use the ID of some other student to prove their identity when the real student isn't around.

3. Iris-based Recognizing Technology:

In order for the camera to test the iris code, the student must turn toward the camera when using the id student travel application. To verify the iris scan's existence, it must be especially in comparison to the personal as well as female data already kept on the website. This lessens the group's college members' dependence on pens and paper.

4. Tools for assessing reputation on Facebook:

Participants can be recorded using biometric technology and a high-definition camera that can identify a character's face. The computer then makes a comparison between the recognized face and the student's face that

is saved on the website. For additional calculations, participants are labeled with the current website, and the code face is especially in comparison to previously taken pictures. The website will save the captured image as a new image if it doesn't match this same student's face there. It's feasible that the webcam isn't trying to capture the right image or that some of the subjects are accidentally left out of the shot at some point.

5. Specific details about the current timekeeping device:

At the moment, manual student's attendance systems are cumbersome and extremely slow. The name of the student is taken from of the statistics sheet by teachers or students replying to faculty. However, the existing system is very difficult because there are so many teenagers in big classes. Students frequently call in to mark their delegates. During exam time, this creates a disturbance and diverts students' attention. Checking the number of student by keeping track of attendance also takes time. During lectures, calling names and attendance lists are circulated among the students. However, it might be challenging to turn in attendance records in classes with such a lot of students. In 2006, Michael Dobson, Benny Di Dario, and Douglas Ahlers created the idea for a participation tracking device. Every attendee will receive identification tags that can verbally communicate over Wi-Fi and are detected by scanners as those who enter the assigned room[8]. The development of a bio - metric attendance management by O.A. Idowu and O. Shoewu. To assist with attendance, fingerprint scanner is used, and a DBMS stores this same attendance records. A hit is recognized and its existence is noted.

IV. RESULTS AND DISCUSSION

A smart attendance management system is a very easy-to-use tool and as a result works very efficiently experiments suggest that using deep algorithms in attendance systems can be significantly more accurate The accuracy of this algorithm from various angles is 95% [15] and the maximum distance is 7 feet. It was detected with 94% accuracy [16], making it an advantageous and useful method. the system works Automatically after each student is enrolled by the teacher and a record is created. Our project's front end or GUI consists of three main parts:

Create an attendance list and export it to Excel format.

In the initialization phase, the teacher must enter the student ('name', 'role number', 'course'). The training dataset contains 200 photos of her from different angles of each student. This attendance system can recognize images from different angles and in different lighting conditions. Students whose faces are not included in dataset are marked as unknown [17]. During that time, the recognized student's "presence" is scored. Export to an Excel spreadsheet, automatically saved by the system.

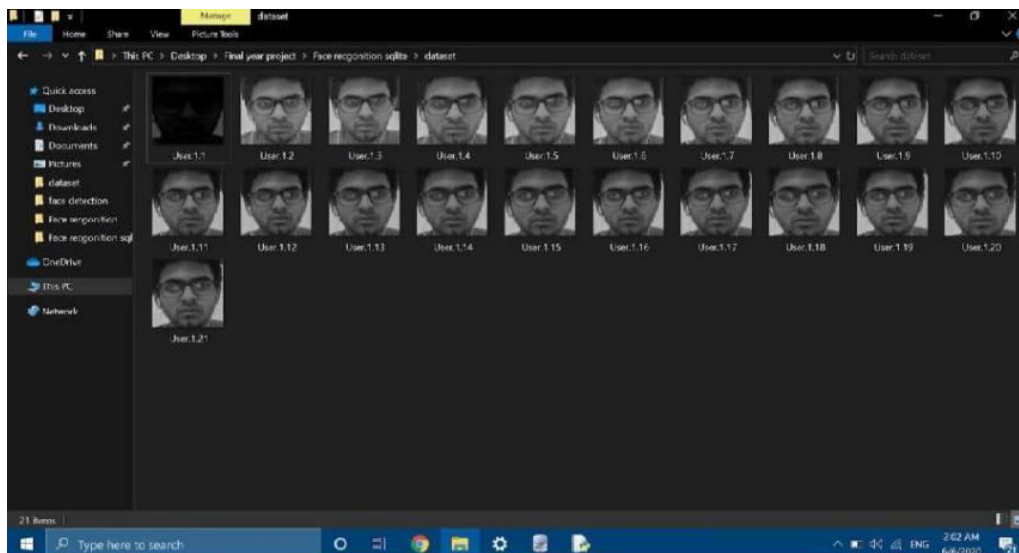


Fig 3: Dataset

Use all the features we created. I tested the output of the in real time using an existing test image. After the section are screenshots of the output of the different functions of the System was tested with the help of two volunteers. Create a test database by capturing images from the camera Collect Firebase Dataset

Using the function Firebase Database we create a database of the enrolled students which is stored in the folder. All faces recognized by the figure are cropped and saved in the test Database folder. From this location Algorithmically load the image and processing is done. Way of The folder must be specified exactly. again, Each face name is given by a number automatically. This will Images from folders.

Face Recognition

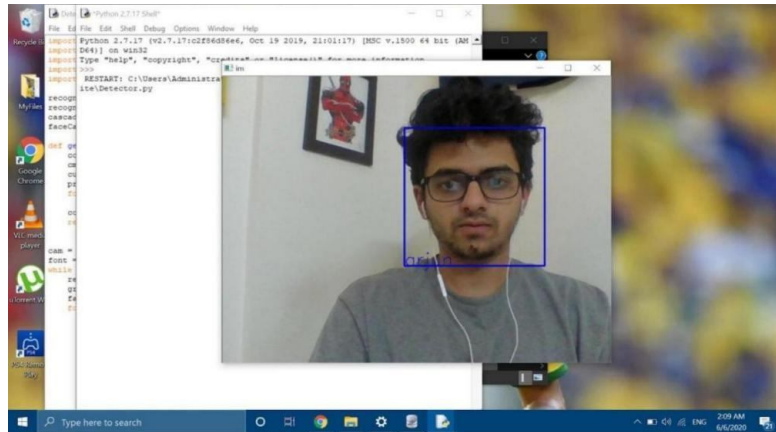


Fig 4: Face Detection

The cropped face image is fed into the Face Detection Algorithm to get the result. The Eigenface algorithm is applied to the images and compared to the database. After this operation you will get the output as shown. Photos of people not in the database are simply ignored.

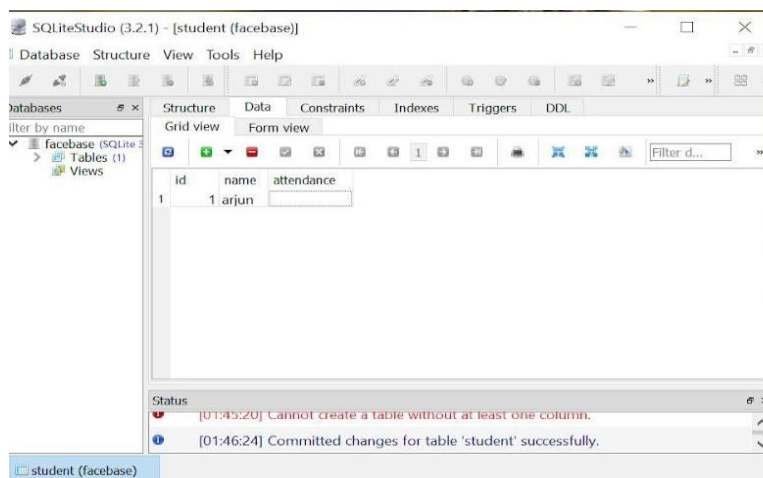


Fig 5: Database Before Attendance

The most important step is creating the database. I want a database that contains all data for all students in a particular class. The basic process of creating a database is to form a system that takes pictures. This uses a camera module to capture images of each student enrolled in a particular class. These images are captured by the and use basic image processing techniques to enable the and computer image processing and make them comprehensible.

V. CONCLUSION AND FUTURE SCOPE

Face recognition technology has revolutionized the way attendance is taken in organizations, educational institutions, and other settings. The technology offers a range of benefits, including improved accuracy, faster processing times, and enhanced security. In conclusion, face recognition for smart attendance has already proven to be a reliable and efficient solution for managing attendance records. As the technology continues to advance, it is likely that it will become even more accurate and effective.

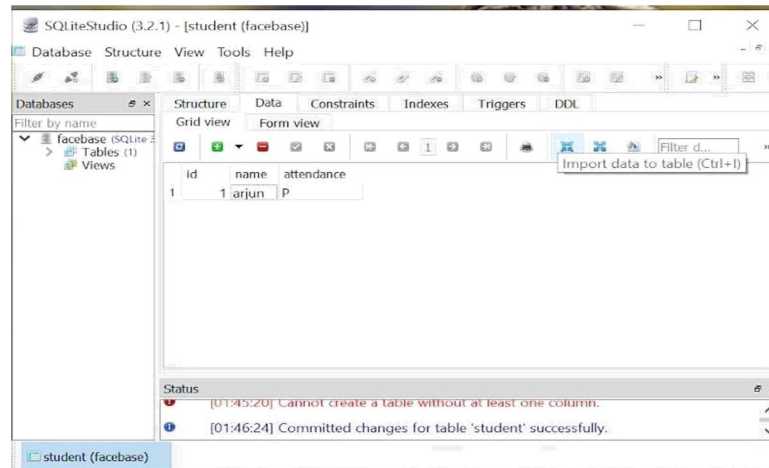


Fig. 6: Database after Attendance

In terms of future scope, face recognition technology can be integrated with other technologies such as artificial intelligence, machine learning, and data Analytics to provide even more comprehensive attendance management solutions. Additionally, face recognition can be used for other purposes such as access control and security management, making it a versatile technology with a wide range of applications.

However, it is also important to consider the ethical implications of face recognition technology, particularly with regards to privacy and data protection. As the technology continues to develop, it will be essential to establish clear guidelines and regulations to ensure that it is used ethically and responsibly.

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