Attendance Management System Using Face Recognition Method

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Abstract. When it comes to classroom management, the attendance check is a critical component. Time-consuming, particularly when it comes to open meetings, is checking attendance by calling names or by handing around a sign-in sheet to make it easier to commit fraud. An implementation of a real-time attendance check is described in this article in great detail facial recognition system and its outcomes. The system must be able to identify a student's face in order for it to work first snap a photograph of the pupil and save it in a database as a reference for future use. During the event, there were students may be identified by using the webcam, which captures photos of their faces auto-detects faces and selects students with names that are most likely to match, and lastly, depending on the facial recognition findings, an excel file will be updated to reflect attendance. To identify faces in webcam footage, the system uses a pre-trained Haar Cascade model. As a result, a 128-bit FaceNet has been generated by training it to minimise the triplet loss. The dimensions of the facial picture. When two facial pictures have similar encodings If the two facial pictures are from the same student or different. Use of the system as part of a class, and the outcomes have been extremely positive. There has been a poll done to find out more about There are both advantages and disadvantages to using a college attendance system.

1. Introduction

School and college attendance has a significant impact on student academic achievement. As a result of frequent absences from class, students are at greater risk of failing and dropping out early. Attendance check is an effective method to increase a student's class attendance. The old way of doing things Methods such as calling names or signing documents, which takes a lot of time insecure. Every school needs a reliable and consistent method to track student attendance. There are a lot of institutions that still manually take attendance by calling out names during lecture times, whereas just a few have used biometrics such as RFID card readers [1], fingerprint and iris scanners to take daily attendance. Calling pupils' names by hand is a time-consuming procedure that takes up a lot of time. Each student is given a unique RFID card, however there is a possibility that the card may be lost or that an unauthorised individual would abuse the card to create a false attendance record. Voice recognition[1] and iris[2] are examples of biometrics that are not 100 percent accurate. The technique of face recognition is capable of identifying or verifying an individual from a digital picture or video frame. In order for facial recognition systems to function, they must be able to distinguish between faces in a database based on specified facial information. According to use cases, it's also known as
biometric artificial intelligence (AI) since it may identify a pupil by looking for patterns in his or her face features and forms. Using facial recognition [4] as a method of attendance tracking is the fastest and most efficient approach to handle attendance records. Among other approaches, face recognition [5] is a better and quicker method, and it reduces the possibility of proxy attendance. In order to implement a fingerprint-based attendance system, a portable fingerprint device must be used. Fingerprint recognition is a useful tool for keeping track of the kids' attendance. Attentiveness is tracked via RFID. In order to be recorded, students must show their RFID cards to an ID card reader [2]. In using an iris scan [3], a camera scans students' Iris, which will be used to keep track of attendance student records to the Iris database of students, and to update the attendance of pupils. In spite of the fact that face-recognition attendance systems are becoming more popular (4, 5 and 6). A facial recognition attendance system is suggested and developed in this article using trained neural networks. A poll of pupils in a class that has been introduced has shown undertaken to determine the system's educational effect and possible issues.

2. Proposed Methodology
The suggested attendance system is made up of four parts, which are as follows Using a webcam to capture your face, Fig.1 shows a student picture database, face recognition, and attendance record updating. The A laptop with a built-in web camera has been equipped with the system. Think about the following: to verify a class's attendance. Attendance check preparation is a class-wide effort will be needed to shoot a minimum of ten photos using the built-in webcam camera. For real-time reference, these images are utilised to create the student face database Recognition of a person's face. In order to verify a student's presence in class, the computer snaps a picture of their face a real-time video feed of the student's face, and deep learning neural networks using neural networks to determine whether the student matches anybody in the database, and if so, how far to take it from there identify the student by name. There are many ways in which this data may be utilised. Microsoft Excel formatted attendance record.

2.1 Face detection
For security reasons, we should preserve faces since our identity identification is solely dependent on facial recognition while eliminating other portions of a person's body or backdrop from the picture. A face is an example of this. There must be a way of detecting the facial area automatically, so that a picture containing a face can be produced automatically Most faces can be trimmed for subsequent facial recognition, but not all of them can be preserved. An efficient method of object identification is to use Haar feature-based cascade classifiers. Paul Viola and Michael Jones developed a technique in [7]. It is based on machine learning positive and negative pictures are used to train the cascade function. We have recourse to Face detection using the Haar Cascade classifier. You may now see a larger version of the face that has been identified a picture of the size 96x96 (jpg). The scaled picture is either stored in a database or processed in real time by a real-time processor. It will be addressed in the next parts. Getting to know your face Find out how to detect utilising Haar Cascades in [8]. It is
seen in Fig. 2 that the web camera screen has a white background and an orange border found a face frame and saved a picture of it (96x96 pixels).

![Fig.2 Fact detection: (a) video screen with a green rectangle identifying a detected face; (b) cropped face image for database or face recognition.](image)

### 2.2 Recognition of facial features

There are two possibilities for the images: either for database or recognition, based on the face detection the images have been downsized and face-focused (e.g. Figure 2(b)). The algorithm's main component is a deep neural network dubbed FaceNet converting facial pictures into compact Euclidean space where distances are small face resemblance. A 128-bit number is generated using the FaceNet algorithm. A vector of 128 elements may be created from a picture by dimensional encoding it in such a manner that

1) The encodings for two pictures of the same individual are quite similar. A large distance separates the pictures of people. As a result, the Euclidean distance between them is possible to tell whether the two pictures of the same person have the same encoding. Since FaceNet training takes a large amount of data and processing, therefore we load the previously trained FaceNet into the new FaceNet inception blocks v2 [11] is a trained model. The resultant model has a total of 3,743,280. Each student in the class has a 128-dimensional encoding in the database. Reducing we took ten pictures of a student's face and produced ten encodings, and in a database, the average of the 10 encodings was stored as a student's encoding. Each student should have a personal computer as a dictionary object with the name as the key, his/her name and an encoding are kept encoded information in Python, and vice-versa. Each student is obliged to appear in front of the webcam during attendance check to each. In the case of one student, the software will automatically take a picture of their face and produce the corresponding report 128-dimensional encoding using the same FaceNet. When the search process has been completed, the results are shown try to locate an encoder in the database whose distance is the lowest from this real-time facial picture encoder the name of the student who is connected with it. A predefined criterion (e.g. 0.6) is met if the shortest distance is less than that otherwise, it is presumed that he or she does not exist in the database. As a matter of fact, The recognition accuracy will be affected by the threshold setting In order to enhance face recognition's accuracy, the software collects several pictures of a single face identifies each face in real time and independently, and produces the result based on the information gathered they have received so many accolades. We used the software to take ten pictures of faces, for instance, before moving on to autonomous facial recognitions. If five of the ten recognitions are deemed to be the best, it's believed that the recognition will be a success. 5 out of 10 isn't exactly a plan adjusted to improve accuracy.
2.3 The Attendance Marking Procedure

In a file called cmpe3403A.xlsx, all of the pupils' attendance is recorded. The first column of the excel file is filled with student names to generate the starting file. An Figure 5 shows an example. For the attendance record, all columns (save the first one) are utilised except the first one of a single class meeting. If a pupil has been identified more than five times out of ten trials, the student is considered to be proficient. It will be recorded in a cell that is linked with each recognition a row of students, and a date of the class (column). Since every student who has an identification number is eligible to participate in the programme, is regarded to be in the class, whereas a student without a number recorded (less than 5) is deemed not to be in the class it will be regarded that you aren't there.

3 Experimental Analysis

Three Python applications make up the system. The first software takes ten photos of each student's face for each class period. The second builds FaceNet model and loads parameters. One of these programmes creates a database from photos taken by another, identifies faces in real time using a webcam, and maintains the attendance record in an excel spreadsheet. As a consequence, the third programme delivers all apparent benefits.

As you can see in Figure 4, a facial recognition has been performed. Will's facial encoding was found to be 0.4891117 distance away from the frame's position. A person's "Will" is determined by this distance: the smaller it is, the more probable he or she is. Ten straight recognitions result in the larger "Will" at the top centre. In Fig.5, you can see a part of the attendance record in an excel file generated by the attendance system. Students' names are listed in the first column, while attendance is shown in the second. In the case of a student, it is the number of successes among 10 attempts. There are two possibilities: either the student did not verify attendance, or there are less than five awards (i.e. face recognition failed). In the event that the student's attendance is not recognised, he or she must notify the teacher and request a manual attendance marking.
The accuracy of facial recognition in a class of 28 pupils was approximately 95 percent. There’s a caveat though: the attendance system is sensitive to variations in lighting and facial distance. If these circumstances drastically alter, the accuracy will be substantially reduced.

4 Conclusion
Using facial recognition, a laptop computer has been equipped with an attendance system. The technology was used in a classroom to check attendance. As long as the picture capture conditions (e.g., light, face distance, and expression) are constant, face recognition accuracy for a class of 28 students is approximately 95%. The student poll indicates that the system is functional and efficient, and that it is well-liked by students. However, there are a few areas that may be improved in the future. A few things to note about the present system: it consists of three Python programmes (or files), and its functioning relies on command-line inputs. To make using the system more easy for a user (such as an educator), it would be ideal to have everything in one application file with an intuitive Graphic User Interface (GUI). The system will be updated for a more robust facial recognition algorithm if one becomes available. A third issue is that some students are concerned about their privacy while using facial recognition software, according to the study. This issue must be addressed.

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