

ATTENFACE: A REAL TIME ATTENDANCE SYSTEM USING FACE RECOGNITION

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ABSTRACT: Keeping track of who goes to college these days is difficult and time-consuming. AttenFace, a free piece of software, uses face recognition technology to keep track of attendance and provide results rapidly. It can determine who is in the classroom by analyzing their faces in a live video feed and a collection of still images. Both groups of people's faces can be recognized at the same time and independently. This ensures that the system can service a wide range of users at the same time. Because the facial recognition server and the attendance calculation server can be on distinct servers, this method can be added to programs that already track attendance, such as Moodle. Running the facial recognition program on classroom images every ten minutes consumes far less computer power than watching the live video feed. If they need to leave class for a brief period of time, such as to answer the phone, they can still receive credit for the time they were absent. People are considered present if they are in the room at the time a specified number of photographs are shot. Because the cameras and computer can communicate in both directions, the system may be able to function on its own. The teacher is not in responsible of setting up the cameras or monitoring them. It ensures that students, teachers, and administration obey the college's default attendance policies. AttenFace is the first method to use face recognition technology to completely eliminate proxies in schools.

Index Terms- Real time attendance, face recognition, software architecture, deep learning.

1.INTRODUCTION

After high school, getting an education is part of the mandatory attendance standard. Students are expected to attend class every day. Roll call and paper-and-pencil attendance diaries are simple ways to keep track of attendance. These tasks are tedious, time-consuming, and rely on outdated technology. Anyone wishing to register for attendance must do so in person. It's simple to fake attendance when the roll call comes up by calling out someone else's name or pretending to be that individual. Biometric attendance tracking solutions are becoming more widespread in the workplace. Connecting the biometric device to a computer allows you to obtain accurate, real-time records of who is present. Someone who utilizes their own DNA may not need a proxy. The children will still have to wait in huge lines for biometric attendance checks. Some kids may dislike the fingerprint device, however it may be relocated about the classroom to improve things. There is no way to guarantee that pupils will sit for the entire class hour if these approaches are used to take attendance. Students are welcome to enter the classroom at any moment throughout the designated attendance period.

We go over how the new snapshot facial recognition technology developed by Atten face addresses these concerns, as well as the more prevalent issue of people attending college without actually being there. Instead of writing it

down by hand, students might utilize a camera to register their attendance in real time. Because the camera is always on, it is simple to maintain track of a student's attendance. The teacher would assess how much class time was sufficient to register as attendance before recording the student's total attendance. The system's userfriendly design makes it simple for students to check in and affirm that they attended every course. Teachers may elect to relax attendance standards for certain classes or groups of pupils.

2. RELATED WORK

To correctly identify students, the suggested attendance approach combines face detection, object detection, and facial recognition. Face recognition software scans the entire classroom and recognizes pupils by name. After that, software that recognizes faces compares the images. There's a lot more to discover about these topics. Since its initial release in 2016, the YOLO real-time object detection system has been greatly enhanced. Haar Casading has devised a method for locating persons via live video. FaceNet believes that this is an extremely active area. To generate a 128-dimensional image quickly, a deep convolutional neural network with 22 layers and a triplet loss function is used. The VGGFace2 dataset teaches computers to recognize faces based on age and position.

The proposed technique is powered by a facerecognition algorithm. There are numerous solutions to this problem. Principal component analysis (PCA) can be used to determine which elements of a person's face are most relevant for identification. Template matching, which matches and compares patterns to determine what a face is, makes extensive use of neural networks. Consider adopting a more optimistic attitude and rewarding yourself for your efforts in enhancing the strategy. The level of liveliness recognition is determined by how difficult it is to distinguish between a real person's face and an image of that person's face.

Attendance tracking systems that use face recognition technology are becoming more popular. To keep track of who arrived and exited from the classroom, a facial recognition program **JNAO** Vol. 14, Issue. 2, : 2023

and radio frequency identification (RFID) tags were utilized. The students' IDs were checked using ocular fingerprinting. A photograph of each student's eye was matched to a database to ensure that they were present. We used real-time attendance data to assess Eigen and Fisher's ability to recognize faces. According to the results, the eigen face was correct 70% to 90% of the time. Before employing the Radial Basis Function (RBF) to detect the eyes, the authors employed the Discrete Wavelet Transform (DWT) and Discrete Cosine Transform (DCT). Their method of marking was deemed to be 82% reliable. The authors discussed a variety of realworld difficulties, such as poor classroom balance and insufficient lighting. It was claimed that detecting 3D elements could encourage more people to participate.

There is a variety of software available that uses facial recognition to track attendance. However, the most majority of these are time and attendance tools, whose primary use is to rapidly locate a certain person. Truein's touchless face recognition technology, for example, can be used to track when employees arrive at work. People who work from home and utilize mobile apps may find the facial recognition tools in iFace beneficial. There is no standardized user interface for checking attendance, altering attendance rules, or linking to other attendance management systems. This means that schools do not have a financially viable option for employing facial recognition to record attendance in real time. Because the technology used for facial recognition is comparable, it may be modified to operate with the proposed method.

3. SYSTEM ARCHITECTURE

Face recognition software would be used to track who enters and exits a building. The technology uses a "black box" face recognition program to determine who is present.

The first performance will be captured on film. The program records when and where each lesson occurs.

Every ten minutes, the entire class gets photographed. Students are identified using face

recognition software, and their attendance is logged for 10 minutes.

If the teacher notices a pupil in at least 'n' images, they are most likely present. According to the professor. If there is an emergency, you will not be penalized for leaving class early.

Atten Instead of relying on live video face detection, which takes a lot of time and resources, Face's image-based solution allows attendance to be recorded continually during the session. After taking attendance by hand, students must remain in class for the remainder of the time allotted. It works just as well with this way of application.

Each student now requires only one face recognition scan, either before or after class.

Requirements

The system must adhere to the following rules:

- Technical requirements for an intranet portal accessible to managers, personnel, and faculty.
- where both teachers and students may quickly find and look at attendance records.
- Teachers can utilize the interface to make minor modifications to attendance rules for individual classes or the entire course without obtaining authorization from administration.
- Because of the way the interface is configured, incorrect attendance records can be manually corrected.

Non-functional requirements

- At the school, there is a database that contains information about students, professors, and classes.
- It is critical to establish a website that operates on all devices for tracking participation.
- Face recognition software must be both fast and accurate.
- Because lessons may be taking place at the same time, the facial recognition system must be able to handle a large number of cases.

Use Cases



Fig.1. Ideation for a use case in UML.

- Anyone, whether a student, instructor, or administrator, should be able to access the system using their college credentials.
- Everyone in the class must be able to demonstrate that they have attended every single class.
- A student should receive a 0 or 1 for turning up to class.
- If a student needs to prove they were in class, they should be able to determine whether the number of "blocks" they visited (see above) is greater than the minimal number required by the teacher.
- Display the student's current attendance as well as the total number of absences that resulted in a failing grade.
- The teacher should be able to tell how many students are present right away.
- The teacher determines how many attendance days are required for a good grade. This response can be modified to meet the demands of a particular class or the entire term. A teacher does not need permission from the school to skip a class day or make attendance voluntary.
- Teachers should be allowed to change the room number and activate the camera in the new location before class begins in order to retain proper attendance records.
- A manager should be able to manually update a student's attendance record for one class if necessary.

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If there are conflicts with other events or groups, an administrator should be allowed to change the course's room number.

System Architecture



Fig. 2. Things that keep a house together

You could use the following tools to get started: The user interacts with the system through the interface, which is made up of both mobile and web apps. This type of information will be included on the list: a. The overall number of attendances thus far; b. The total number of attendances in each class; c. The total number of "blocks" attended in each class to supplement the attendance for each class; and d. The required minimum attendances in each class. They may consider how many kids are already enrolled and how many students can be in each teacher's class at the same time.



Fig.3. Displays a user interface designed for

JNAO Vol. 14, Issue. 2, : 2023 children.

C5.176: Artificial Intelligence V	
Choose class	
12th March, 2022, 11:30 - 1:00	•
Attendance options:	
Attendance options: Waive attendance for this class	

Fig.4. Academically accepted user experience...

The app's back end communicates with the database to obtain information such as pupil images for facial recognition algorithms. It then displays the data to the user and performs the three basic activities of make, read, and update. Furthermore, it totals a student's attendance across all classes to calculate an average attendance figure. You can also determine a student's performance in a class by adding up all of his attendance grades for that class. This is because the facial recognition server cannot directly access the database; instead, it must inform the backend of what it has discovered.

Face Recognition Model Server: The most computationally intensive approaches for recognizing faces will be utilized here. There will be a distinct computer process for each track. Here you'll find the most recent information about attendance and livestreaming. Each thread on the face recognition server receives information from the base, such as a) photos of all the pupils in the class, b) the start and end times of the class, and d) the camera ID from which to start and receive a live feed. Figure 6 depicts how the camera, the facial recognition program, and the server-side components all function together. Because the camera and server are built in, the system does not require any other equipment to function.

Database: It keeps track of professors, students, classrooms, and school cameras, as well as student information (such as photographs and enrollment status). Figure 8 depicts how the database might

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look if there were fewer fields.

University Classroom: Take a look at this video of AttenFace in action, which was shot in a college classroom:

Five minutes before class, a camera is set up in the system.

By entering the doorway, the teacher can adjust the rules about who can and cannot attend class (see Figure 4).

Every day, from the beginning until the end of class, the face recognition computer photographs the classroom eight times. It keeps track of every student who arrives in under ten minutes.

A student can check their attendance record online after class (Figure 3).

Extensibility and Ease of Integration

There are numerous moving parts in the proposed design. The facial recognition server, in particular, operates without the need for instruction or attendance tracking. The face recognition module receives images of the subject's eyes as input and then does the necessary computations to recognize the face. The information is then used by the server to determine which students were present. Because it is constructed in modules, the technology may be readily incorporated to existing institutional platforms. For example, connecting the suggested real-time reporting system to Moodle is simple. Moodle can manage the front end, database communication, and university registration all by itself. The final step is to create an app that communicates with the facial recognition server and performs the math in the background. Following that, Moodle may be able to obtain attendance records and display them to everyone.



Fig.5. Class diagrams in UML



Fig.6. Using UML 2.0 notation, it is possible to demonstrate how the face recognition server, the database, and the backend server are linked.

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Fig.7. In UML, a sequence diagram can be used to depict an interaction between a user and the front end.



Fig.8. It made database organization easier.

4. CONCLUSION AND FUTURE WORK

The findings of this study point to a novel application of face recognition technology: grading assignments and tracking attendance in real time. Class sizes can be determined quickly, with no need for the teacher to do anything. Students must be in the classroom for a particular length of time to be counted as present under this approach.

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