

# INTRODUCING ATTENFACE: A REAL-TIME ATTENDANCE SYSTEM WITH FACE RECOGNITION

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Abstract- Today's college attendance record keeping is time consuming and tedious. I offer AttenFace, a free program that uses facial recognition technology to manage attendance and provide fast grades. By evaluating the facial expressions in a sequence of images collected from a live video feed, the system can determine which students are present in a classroom. Faces from each group are detected simultaneously but independently. This ensures that the system can handle multiple user groups at the same time. Because the face recognition server and the attendance calculation server are separate, this technology can be linked into current attendance monitoring programs such as Moodle. Running the facial recognition system on photos of the classroom every 10 minutes requires substantially less computing power than monitoring the live video feed. Students can even leave class briefly (for example, to answer the phone) and still gain credit for that session when they return. A student is considered present if they remain in the room for a specified number of images. The cameras and the backend interact in real time, allowing the system to operate completely autonomously. The teacher is not responsible for installing cameras or keeping track of attendance. It guarantees that default attendance policies are followed by students, instructors, and the college administration. AttenFace is the first fully working proxy-prevention system for schools that tracks attendance with face recognition.

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

# **1.INTRODUCTION**

In postsecondary education, attendance is required. Students are usually subjected to some kind of attendance requirement. The two most basic procedures are roll call and manual attendance marking. These techniques are timeconsuming, boring, and technologically outmoded. It is necessary to manually enter from attendance attendance data the paperwork. When the roll is called, it is equally simple to show attendance for someone else by yelling out their name or falsifying their signature. Biometric attendance systems are now often employed in the workplace. The biometric device can be linked to a database for real-time attendance updates. The proxy problem can be avoided because each person's

thumb print is unique. With this technique, children still waste time standing in line for biometric attendance checks. To address the issue, the fingerprint gadget can be distributed across the classroom, although it may become a distraction for some children. The problem with those ways of documenting attendance is that there is no way to assure that students stay seated for the entire class hour. A student may enter the classroom at any moment throughout the attendance period.

All of these issues, as well as the pervasive issue of proxy attendance at colleges, are addressed by Atten face's cutting-edge snapshot facial recognition technology (detailed in Section III). Instead of pupils manually registering their attendance, a camera may do it in real time. Because the camera is

always on, it is simple to determine how much time a student spends in class. Only if the student was there for a sufficient period of time during the course, as decided by the instructor, would final attendance be recorded. The system's simple interface allows students to check their attendance in each class. Teachers have the authority to change attendance policies for certain classes or students.

# 2. RELATED WORK

To identify students, the suggested attendance system will need to use face detection, object detection. and facial recognition. Face recognition examines the classroom and recognizes students' faces. Facial recognition technology is then used to match the photographs. There is still much to learn about these subjects. The YOLO real-time object detecting technology has advanced since its introduction in 2016. Haar Casading is capable of recognizing humans in real-time video. FaceNet is frequently used for this purpose. It uses a deep convolutional neural network of 22 layers trained with a triplet loss function to produce a picture with 128 dimensions for quick results. The VGGFace2 dataset is used to train facial recognition systems that take age and position into account.

Because of the face-recognition algorithm, the proposed method is effective. This problem has a plethora of solutions. We can use principal component analysis (PCA) to discover which elements of a face are the most important for identification. A neural network is frequently used in template matching, which uses pattern comparison and matching to recognize faces. Consider stance modifications and liveliness recognition to improve the approach. The difficulty of distinguishing between a real person's face and an image of that person's face determines the level of liveliness recognition.

Attendance systems that incorporate facial recognition software have increased in recent years. Face recognition software and Radio-Frequency Identification (RFID) tags were used to track students' attendance and movement in and out of the classroom. Ocular biometrics were used to confirm the students' identities. The technology tracked each student's attendance by scanning an image of their eye and comparing it to a database. We

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examined the Eigen and Fisher facial recognition algorithms using a real-time attendance system. The results revealed that eigen face was between 70% and 90% accurate. The authors used the Radial Basis Function (RBF) to locate the pupils after extracting facial features with the Discrete Wavelet Transform (DWT) and the Discrete Cosine Transform (DCT). Their scoring approach was around 82% accurate. The writers covered several practical factors, such as classroom lighting and student posture. A 3D approach of locating features was recommended to increase turnout. There are several products available for recording attendance using facial recognition. The great majority of these, however, are time and attendance systems, which are primarily intended to quickly identify a single person. Employee attendance, for example, can be Truein's touchless tracked using facial recognition technology. People who undertake remote work via a mobile app may benefit from iFace's face recognition features. There is currently no commercially available solution for real-time facial recognition attendance recording at educational institutions while simultaneously providing a uniform interface monitoring attendance, for adjusting attendance policies, and integrating with other attendance management systems. Because facial recognition uses the same underlying technology, it may be changed to use the proposed method.

# **3. SYSTEM ARCHITECTURE**

To automatically log attendance, the proposed method uses facial recognition technology. The actual facial recognition algorithm is used as a "black box" by the technology to determine who is present.

The first lecture will be captured on video. The database keeps track of class times and locations.

Every ten minutes, the entire class gets photographed. Face recognition software detects the pupils and records their presence for 10 minutes.

A instructor will think a student was present in class if they saw that student in at least 'n' photographs. This criterion is determined by the lecturer. This means that if a student is forced to leave class unexpectedly due to an

emergency, they will not be penalized.

Rather of relying on time-consuming and resource-intensive live video face identification, Atten Face's picture-based technique allows for continuous attendance tracking throughout the session. Students leaving class after manually taking attendance is abolished because they will be obliged to stay in the classroom for a specified length of time. This method of application is equally effective. It is, however, more reliable than current facial recognition systems, which only scan each student once, either before or after class.

#### Requirements

- The system must meet the following criteria:
- Functional specifications
- Login gateway for faculty, employees, and administration at the institution.
- A single area where educators and students can check attendance data for all classes.
- Teachers can make small changes to attendance policies directly in the interface, either for specific classes or for the entire course, without involving management.
- Configuration of the interface that allows for manual rectification of inaccurate attendance records.

#### Non-functional requirements

- Connecting to the school's database allows the system to retrieve information on students, teachers, and subjects.
- A cross-platform, mobile-friendly attendance monitoring portal is required.
- Computer facial recognition algorithms should be speedy and accurate.
- Because more than one class may be taking place at the same time, the facial recognition system must be able to accommodate several instances running concurrently.

**Use Cases** 

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Fig.1. A use case's rough UML draft.

- A A user should be able to log in with their college credentials, whether they are a student, faculty member, or administrator.
- Every student must be able to demonstrate that they have attended every session of every class.
- If a student attends class, they should obtain a score of 0 or 1 right away.
- A student who wants to demonstrate that he or she was present in class should be able to assess whether the number of "blocks" attended (explained in the preceding section) is more than the instructor's criterion.
- Show the student his current attendance in the course as well as the number of absences he has accumulated before failing to meet the attendance criteria.
- The lecturer should be able to see how many pupils are in class right away.
- The number of times a student must be present in class to obtain credit may be changed at the teacher's discretion. This solution is adaptable enough for individual classes or the entire semester. Without obtaining permission from the school, the instructor may skip a class day or make attendance optional.
- Teachers should be permitted to alter the room number and activate the camera in the new place before class begins in order to keep correct attendance statistics.
- If necessary, a supervisor should be able to manually update a student's attendance in a

specific class.

When difficulties arise with other groups or activities, an administrator should be given the authority to change the room number for the entire course.

# User User Interact Frontend Send data Backend Server Send recognition data Face Recognition Server

# System Architecture

## Fig. 2. The core components of a system

During installation, the following tools may be used:

The interface (consisting of mobile and web apps) serves as the system's point of contact with its users. The list will comprise (a) the total number of attendances received thus far, (b) the total number of attendances received in each class, (c) the total number of "blocks" attended in each class to support the attendance for each class, and (d) the minimum number of attendances required in each class. They will be able to see the number of enrolled students as well as the maximum permissible enrolment in each of the professor's classes.



## **JNAO** Vol. 11, Issue. 2 : 2020 Fig.3. An outstanding example of a user interface designed for students.

Choose class	
12th March, 2022, 11:30 - 1:0	• •
- 10 10 10 10 10 10 10 10 10 10 10 10 10 10 1	
Attendance options:	
Attendance options: Waive attendance for this class	



The program's back end is in charge of interacting with the database and retrieving data, such as photos of students to be used in a facial recognition algorithm, displaying that data to the user, and completing the three basic actions of create, read, and update. It also computes a student's overall attendance for a course by adding his attendance for each class in that course. It also computes a student's total attendance for a course by adding up his grades from each individual class session. Because the facial recognition server cannot access the database directly, it must communicate its data to the back end.

Face Recognition Model Server: The incredibly computationally expensive facial recognition processes will be executed here. Each course that is running will have its own computing thread. This thread will be updated with live camera feeds and attendance figures. Each thread on the face recognition server receives the following data from the backend: a) photos of all pupils in the class, b) class start and end times, and d) the camera ID from which to activate and receive a live feed. Fig. displays the interaction of the camera, facial recognition system, and server side components. 6. Because the system's camera and server are directly connected, it can be operated without any other components.

**Database:** It saves information about the students (such as photos and enrollment status),

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teachers, classrooms, and cameras at the school. Fig. The reduced database design is depicted in Figure 8.

**University Classroom:** Here's a video of AttenFace in action in a camera-equipped university lecture hall:

- The camera is linked to the system five minutes before class begins.
- By entering the gateway (see Figure 4), the teacher can change the attendance policies for this class.
- The face recognition computer takes a photo of the classroom eight times per day, starting at the start of class and concluding at the end. The names of the students who arrive within the stipulated ten minutes are written down.
- After class, students can access their attendance records online (see Fig. 3).

#### **Extensibility and Ease of Integration**

The proposed structure is composed of many modules. The facial recognition server, in particular, is an independent component unattached to the lecturer or the school's attendance requirements. The face recognition handles recognition-based module all computations utilizing eye-pictures of the subject's pupils as input. The individual findings are then used by the back-end computer to establish which students were present. Because the technology is modular, it can be readily integrated into existing institutional portals. The proposed real-time reporting system, for example, can be simply connected with Moodle. Moodle automatically manages the front end. universitv authentication. and college database communication. The only component that is lacking is backend software that interfaces with the facial recognition server and does the required calculations. Moodle may then obtain the attendance records and display them for everyone to view.



Fig.5. Class modeling with UML.



Fig.6. It depicts the interdependencies between the facial recognition server, the database, and the back-end server in UML 2.0 notation.

Fig.7. A UML sequence model can be used to depict the relationship between the user and the front end.



Fig.8. A less complex database design.

# CONCLUSION AND FUTURE WORK

The findings of this study point to a novel application of face recognition technology for real-time monitoring and ranking of attendance. We can estimate attendance for each class automatically and without human intervention. Students must be physically present in class for a certain amount of time before they may be counted as present, according to the technique.

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