FACIAL RECOGNITION ATTENDANCE SYSTEM

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Abstract: Colleges have historically faced a great deal of difficulty with student attendance, necessitating a large time and effort investment from staff in manual tracking. Even though they are in place, the existing biometric attendance systems are not entirely automated, which causes delays in processing fingerprints, maintenance issues, and inefficiencies in time. Given that almost everyone has a smartphone and is continuously online in this day and age, a more simplified method is necessary. This study suggests using sophisticated object identification algorithms to check attendance using faculty members' smartphones. Because of its effectiveness in face detection and the addition of Microsoft Azure's face API for database recognition, YOLO V3 (You Only Look Once) is the preferred option among these. One special feature of the system is that it takes pictures of the classroom at the start and finish of every class to make sure everyone is present. After determining the number of students in each photograph, YOLO V3 separates the faces that are known and those that are unknown, creating distinct spreadsheets. Monthly email reminders are also sent to teachers, parents, and students. The system that has been put into place shows strong real-time performance in counting and detecting jobs, with excellent facial recognition accuracy and overall efficiency.

***Keywords:**, OpenCV, Local Binary Pattern Histogram (LBPH), Real-time Tracking, Facial Analysis, You Only Look Once (YOLO V3), Firebase Database.*

I.INTRODUCTION

Keeping track of attendance is essential for evaluating student performance at the monthly and semester levels in all educational settings. Attendance by students is essential for maintaining good study habits, achieving academic success, and reducing delinquent behaviour. Prolonged absences are frequently associated with increased failure and early dropout rates. However, there are a number of reasons why manually recording attendance is ineffective:

1. Takes up a lot of lecture time.
2. Easily distracted by proxies.

Every educational establishment uses a different system for keeping track of attendance, which might range from outdated paper-based methods to more advanced biometric ones. Faculty still have a difficult time keeping track of attendance, though, as they have to create monthly attendance reports for every student. We suggest a creative solution that makes use of the current classroom security cameras to reduce this workload and expedite the attendance process. Our system automatically recognizes and identifies students by using these cameras to take pictures of them at the start and end of each class session. This reduces the possibility of errors, streamlines attendance monitoring, and saves a significant amount of time for both students and staff.

We employ the YOLO V3 technique, which is essentially used to detect over 1000 objects, to detect faces. However, we have adjusted it specifically for face

detection in our work. The YOLO V3 system is also used for counting, and it provides us with information regarding the total number of students in a class. Following that, facial recognition is required, and this is accomplished by utilizing the Firebase API, which uses facial traits to detect and reliably identify faces. Following that, a spreadsheet with the precise time and date of each student's attendance will be generated by matching their data in the face database.

Objective: Using this automatic approach, we can do away with the traditional, labor-intensive, and time-consuming methods of recording student attendance in classrooms. The efficacy of attendance management and control can be increased by utilizing face detection and identification automated attendance. A software application module that recognizes faces in recorded videos, logs students' attendance, and saves the findings in a database for later analysis. The Eigenface recognition approach is employed by the system for facial recognition. Eigenfaces, or faces composed of eigenvectors, are assessed and measured by the system. In order to ascertain the existence and identity of a person (face), this method additionally assesses the Eigenfaces. The following steps are included in this method:

Face dataset for training. After that, we compute Eigenface for each face we detect. After that, the system compares the eigenvectors of the current face with the recorded face image to determine whether or not the face is detected. If the unknown face is discovered frequently, the algorithm will eventually learn to recognize faces—this is an optional last step.

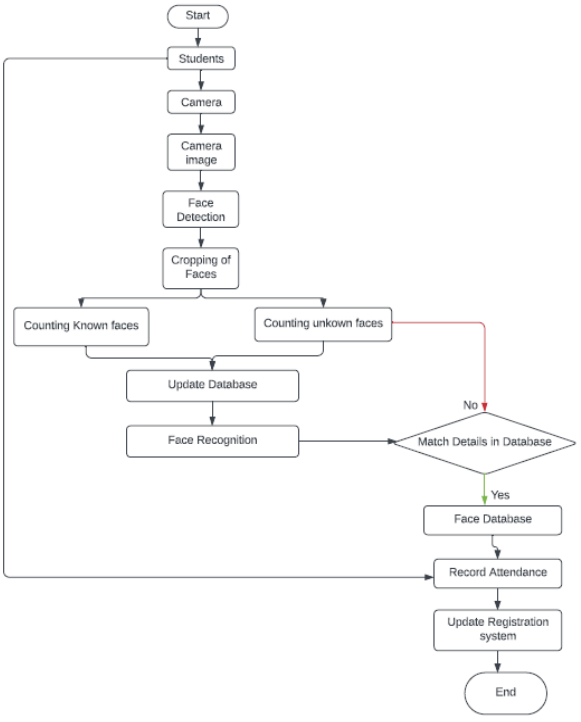

Fig.1 Architectural Diagram

II Related Work

Modern technology is advancing more quickly, and automation is becoming more prevalent in equipment. Software technology is progressing quickly as a result. Numerous methods of monitoring and recording attendance are used in businesses, industries, and educational institutions.

The majority of the time, students' attendance is recorded using a register or attendance sheet provided to teaching members [8]. It requires extensive time and effort. It also leads to manual errors because we are unsure if the verified student has responded or not. Additionally, some kids may misplace or steal their attendance sheet.

Fingerprint identification is used in other biometric systems. By using this technique, each student's fingerprint is first gathered and saved in a database that has a finger print sensor. Following this, the database and finger print match, and the attendance is recorded.
However, its primary drawback is that students must form a line and wait for their turn, which is laborious and time-consuming. Additionally, if the system fails to correctly recognize the fingerprint, attendance will not be recorded, making the system ineffective.

Another biometric technology that is available is called Eyeball Detection, which uses an eyeball as a sensor to identify the location and blinking rate of the iris. This technique stores each person's iris or eyeball in a database initially; yet, each person's eyeball is unique. Although it is nearly impossible to catch every student's eyeball in an image, the captured image's eyeball is compared with the eyeball in the database, and attendance is noted.
An additional option is an attendance system based on RFID. Each student has an RFID tag, which tracks their attendance as they pass by an RFID reader. However, using a tag reader takes time, and there is a potential that students could misuse the cards by marking multiple absentee students' attendance.
A sophisticated system for recording attendance uses cameras to take pictures of a classroom in order to avoid the problems mentioned above. picture processing has been utilized recently to extract information that is important for a picture that marks attendance. With the increasing popularity of smartphones, it is possible to register attendance using the devices that are already in place without setting up a specific system by using a photograph. Although almost every student's face is different, some traits may resemble those of another person.

While many methods have been developed expressly for face detection and recognition in attendance systems, each has some shortcomings. Backpropagation neural networks (BPNNs) and the Viola-Jones algorithm are one method. BPNNs use two weighted propagation methods:

forward, where input is fed through the network to generate output propagation activation, and hackward, where input is formed by using the output to create a difference between the target and actual output.
using MATLAB for normalization, skin categorization, and noise filtering. One issue with this type of system is that it is
limited to MATLAB's built-in features.

Face recognition is done using a deep neural network (DNN). Deep Face Model, which DNN employed, tends to be accurate to a human level by using many sets of photos for training. Significant issue, The issue is that it needs a vast dataset for training, which makes it impossible to keep a large number of pictures for every pupil. Our solution will register attendance automatically in real time, saving time and providing accuracy, by utilizing a special mix of the YOLO V3 algorithm and Firebase face API.

III Proposed Methodology

The suggested system has extremely clear functions and is easy to use, straightforward, and manageable. It includes a database of students' faces and personal information such as name, enrollment number, and course. Depending on the size and requirements of the classroom, two or more cameras can be mounted on the ceiling, covering the whole space. These cameras will take pictures multiple times during a lecture, which will increase the system's efficiency because if one camera doesn't cover enough students, other cameras will. When a system is unable to identify laces because of a poor pose, a student can adopt a variety of emotions and poses. Afterwards, the system may be able to identify those faces during another image acquisition session. Following the completion of image acquisition, the teacher can activate the

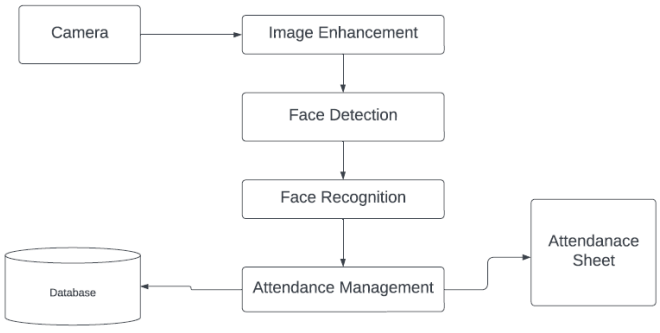

Fig.2 System Training Diagram

system by clicking the start button. This will initiate face detection, which compares detected faces with student images stored in the database once all faces have been identified in an image captured by all cameras at all times. Although there are multiple cameras and instances, there is a possibility of redundant faces. Collaborative results will be generated by excluding redundant faces of the same student so that that student receives a single attendance during a lecture. Once the face is ratched, it is then marked in front of its corresponding enrollment number and name in excel format.

IV Implementation

We have divided the process of creating our full attendance system into several phases. The development of the face detection module is the first step. The next step is a self-taught training module that uses user-input graphics. This system has a facial recognition module after it. This paper's suggested system is a Desktop application built with python and firebase.

The Introduction section already stated that the Microsoft Azure face API and the YOLO V3 algorithm will be used, respectively, for face detection and face recognition.

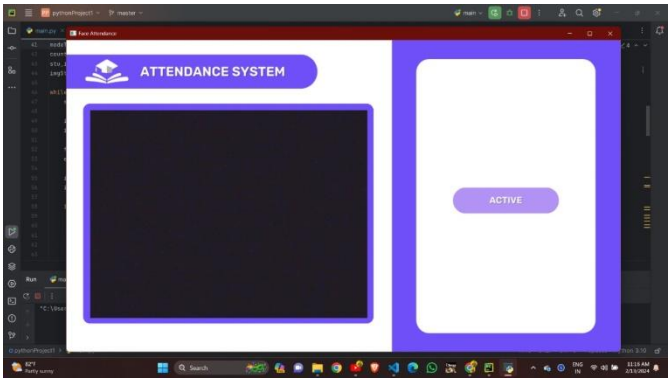

Fig.3 System Active

A. YOLO Algorithm for Face Detection

The object detection algorithms are often classified into two categories. The first category consists of two-stage classification-based algorithms. The first step involves choosing the image's regions of interest. Then, in the second stage, CNN is used to help classify those regions.

Typical examples of this type of algorithm include region-based R-CNN and FAST R-CNN. The Fast R-CNN algorithm relies on regression. The attractive part of this algorithm is looking at those parts of an image which have the highest possibility of having an object in it; in addition, we like to predict classes along bounding boxes for the entire image in a single step. R-CNN and its family do not look into the entire image. Although R-CNN is accurate, its drawback is that it is extremely slow and incomplete when it comes to end-to-end object detection. Although they are more

faster, single stage detectors (SSD) are not as precise as two stage detectors (TSD). YOLO is a more effective paradigm for single-stage detectors than R-CNN, which only processes data at 5 frames per second on a GPU. In contrast, the YOLO algorithm processes data at 45 frames per second on a GPU [15]. Yolo receives an input image, which the YOLO framework then divides into square grids. Each square grid in the image has localization and classification applied to it. Finally, bounding boxes with class probabilities for object detection of object is founded by YOLO predictions.

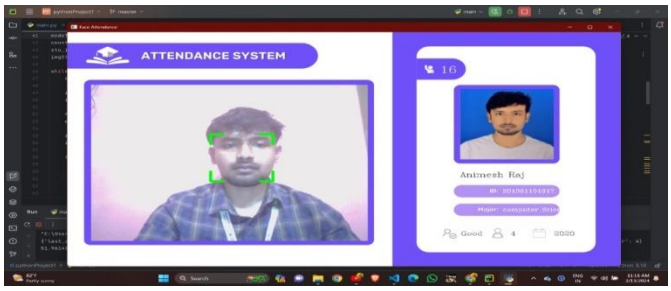

Fig.4 Face Detection

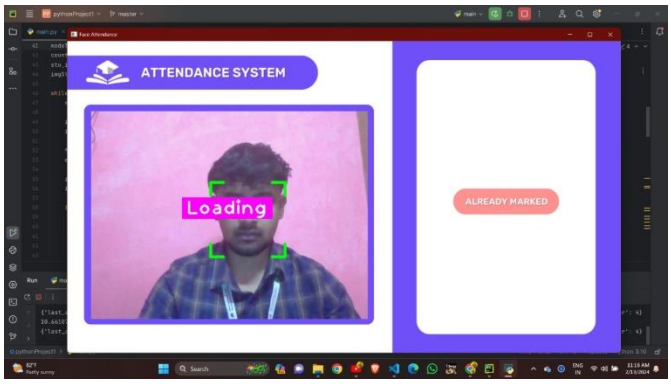

Fig.5 Attendance Marking

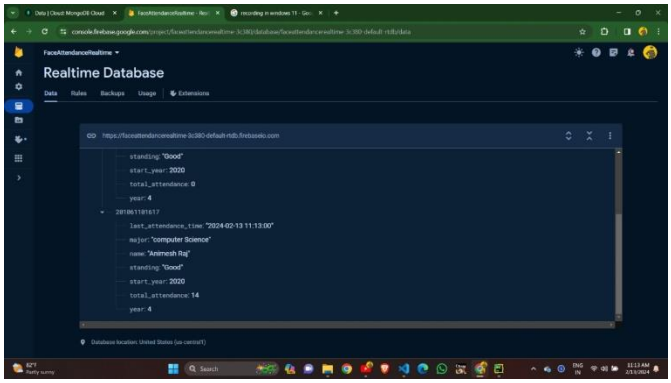

Fig.6 System Searching for the Database

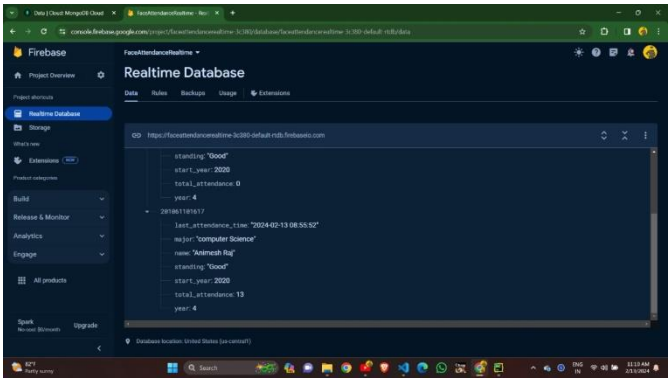

Fig.7 Data synchronize successfully

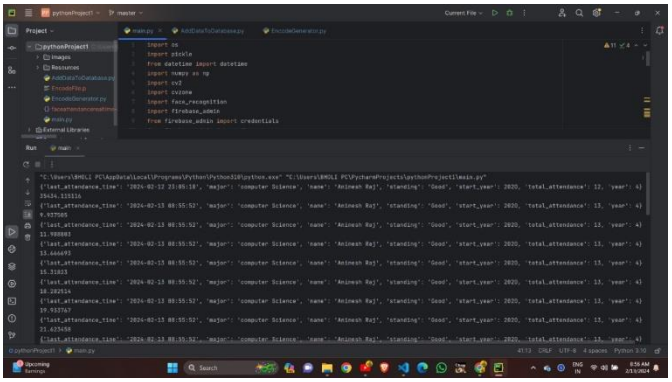

Fig.7 Attendance Marked Successfully

III. Conclusion

An automated and real-time monitoring system for attendance is created and put into place. The main reason for using automatic attendance tracking is to address the time-consuming, proxy attendance, and paper waste associated with the traditional approach. We attempted to eliminate every obstacle in this work, and attendance will be marked in a classroom with a camera. Students are counted, and faces in photos are identified to automatically record attendance.

Different classrooms have different kinds of lighting, environments, and seating arrangements. The majority of circumstances are tested, and the system typically displays 100% accuracy. Students may act out various facial expressions in class, like sporting a beard, glasses, different hairstyles, etc. All of these scenarios have been tested and found to be highly accurate and efficient. From the foregoing description, it can be seen that our suggested system is a safe, dependable, quick, better, and more efficient module that is designed to replace an inefficient manual system.

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