

AI-Powered Smart Student Recognition System for Attendance and Academic Record Display

Tasleem Ahmed,* Atif Muhammed, K , and Shijina T

*Department of Artificial Intelligence and Machine Learning, P. A. College of Engineering,
Karnataka, Mangaluru, India*

E-mail: tasleem5903@gmail.com

Abstract

In today's fast-paced academic environment, manual attendance tracking and student record verification are not only time-consuming but also vulnerable to errors and misuse. To address this challenge, our project presents an AI- powered facial recognition system designed for two primary purposes: automated attendance marking and real-time academic profile retrieval .The system uses facial recognition algorithms to accurately identify students through live camera input. Once a face is recognized, it automatically marks the student's attendance and simultaneously retrieves and displays their academic profile, including details like course enrolment, grades, attendance percentage, and other relevant data. This dual-functionality enhances classroom efficiency, reduces administrative effort, and ensures accurate, tamper-proof records.

Our solution leverages deep learning models and a secure student database to deliver a seamless and intelligent interface for institutions. It not only streamlines the attendance process but also acts as a quick-access academic dashboard for both students and faculty.

Introduction

In educational institutions, maintaining accurate student attendance records and tracking academic performance has traditionally required significant manual effort, often resulting in inefficiencies, errors, and lack of transparency. Conventional methods of attendance marking, such as roll calls or physical registers, are not only time-consuming but also susceptible to manipulation and data loss. With the advancement of artificial intelligence, especially in the field of computer vision, there is an opportunity to automate these repetitive administrative processes. The proposed project, titled "AI-Powered Smart Student Recognition System," aims to streamline student attendance management by utilizing face detection and recognition technologies. Face detection is performed using Haar Cascade classifiers, while face recognition is implemented using the powerful and easy-to-use `face_recognition` Python library, which generates facial encodings and compares them against a pre-trained dataset. Upon successful identification, the system automatically logs the student's attendance and also provides access to their academic records stored in structured formats. This approach not only minimizes human intervention but also ensures real-time, accurate, and secure data handling, making it a valuable tool for modern academic environments.

1 Objective

The project focuses on developing a facial recognition-based attendance system that automatically identifies students using a webcam and marks their attendance in an Excel sheet. The system captures live images of students, detects faces using Haar Cascade classifiers, and recognizes them using the `face_recognition` library, which compares live facial encodings with those stored in a pre-existing database. Once a match is found, it logs attendance details such as the student's name, date, and time in real time. Additionally, the system retrieves and displays the recognized student's academic records, including grades

and personal information, from a connected database. The attendance data is automatically updated in the Excel sheet, ensuring accurate record-keeping and eliminating the need for manual attendance-taking. This solution automates the attendance process, improves accuracy, and provides valuable insights into students' academic performance.

2 System Overview

The system consists of three main modules: face detection, face recognition, and attendance marking, with the added feature of academic record display. Each module is designed to streamline and automate the process of tracking student attendance while also offering valuable insights into their academic performance. This ensures efficiency and accuracy, making the system ideal for educational institutions that need a reliable, real-time solution.

1. **Face Detection:** The library uses HOG (Histogram of Oriented Gradients) and CNN (Convolutional Neural Networks) methods to detect faces in images or video. These methods are highly accurate, fast, and suitable for real-time applications, ensuring quick identification of students.

2. **Face Recognition:** The system generates a unique 128-dimensional vector for each face using a pre-trained model. The system then compares the detected face's encoding to the ones stored in the database to identify the student and verify their identity.

3. **Attendance Marking:** Once a face is successfully recognized, the system automatically marks the student's attendance in an Excel sheet, including important details like name, student ID, date, and time. This process is performed instantly, ensuring real-time attendance logging.

4. **Academic Record Display:** The system not only tracks attendance but also provides a detailed report of academic records, including marks, grades,

attendance history, and additional information such as extracurricular activities. This data is presented in an easy-to-understand format, making it simple for administrators and teachers to monitor and assess student progress.

The system seamlessly integrates face recognition for attendance marking with academic record management, allowing educators to monitor both student participation and academic performance in one efficient platform.

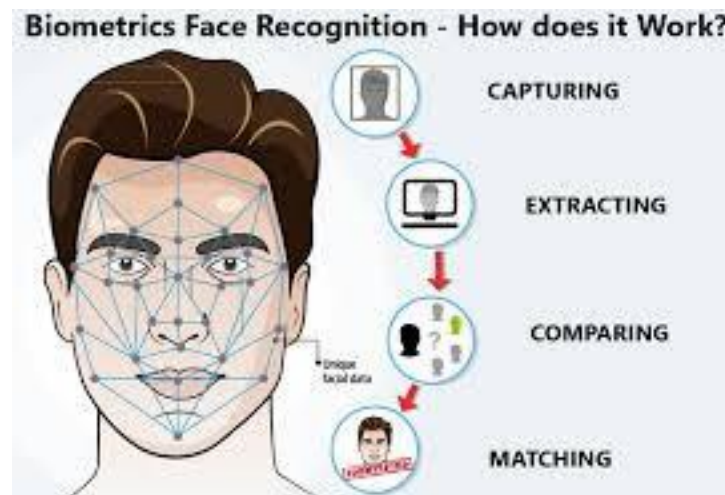


Figure 1:

3 Results and Discussion

The system shows effective real-time performance in recognizing students and marking their attendance accurately, with seamless academic record display. It minimizes errors and significantly reduces manual administrative workload.

4 Technologies Used

Python

OpenCV

Haar Cascade Algorithm

Face_recognition Library

Pandas and CSV/Excel for data storage

Face Detection

The Face Detection stage in your project uses the Haar Cascade classifier to identify human faces from live webcam footage. The classifier works by scanning the image for specific features such as the eyes, nose, and mouth, which are unique to human faces. Once a face is detected, the classifier marks the region of the face within the image, making it easy for the system to focus on those areas for further recognition. This process is fast and efficient, allowing the system to work in real-time, which is crucial for applications like attendance marking where immediate results are required. Additionally, Haar Cascade is lightweight, making it suitable for devices with limited processing power, ensuring smooth operation without significant delays. Its reliability and speed make it an ideal choice for integrating into systems that need quick face detection and recognition.

Integration with mobile apps and cloud storage is planned, enabling centralized monitoring. Advanced models like FaceNet or Dlib will enhance accuracy.

5 Face Recognition

After detecting a face, the system uses the face_recognition library to compare the detected face with a pre-trained dataset of student faces. The library generates face encodings, which are unique numerical representations of each student's face, and compares these encodings with those stored in the dataset. If a match is found, the system automatically retrieves the corresponding student's name and ID. This allows for seamless and real-time identification, marking attendance without any manual intervention. The system is designed to be fast and reliable, ensuring that attendance is recorded accurately as soon as the face is recognized. This automation not only saves time but also minimizes the potential for human error, making the entire process more efficient and reliable. Additionally, the use of face encodings

improves the accuracy of the system by ensuring that each student is uniquely identified based on their facial features

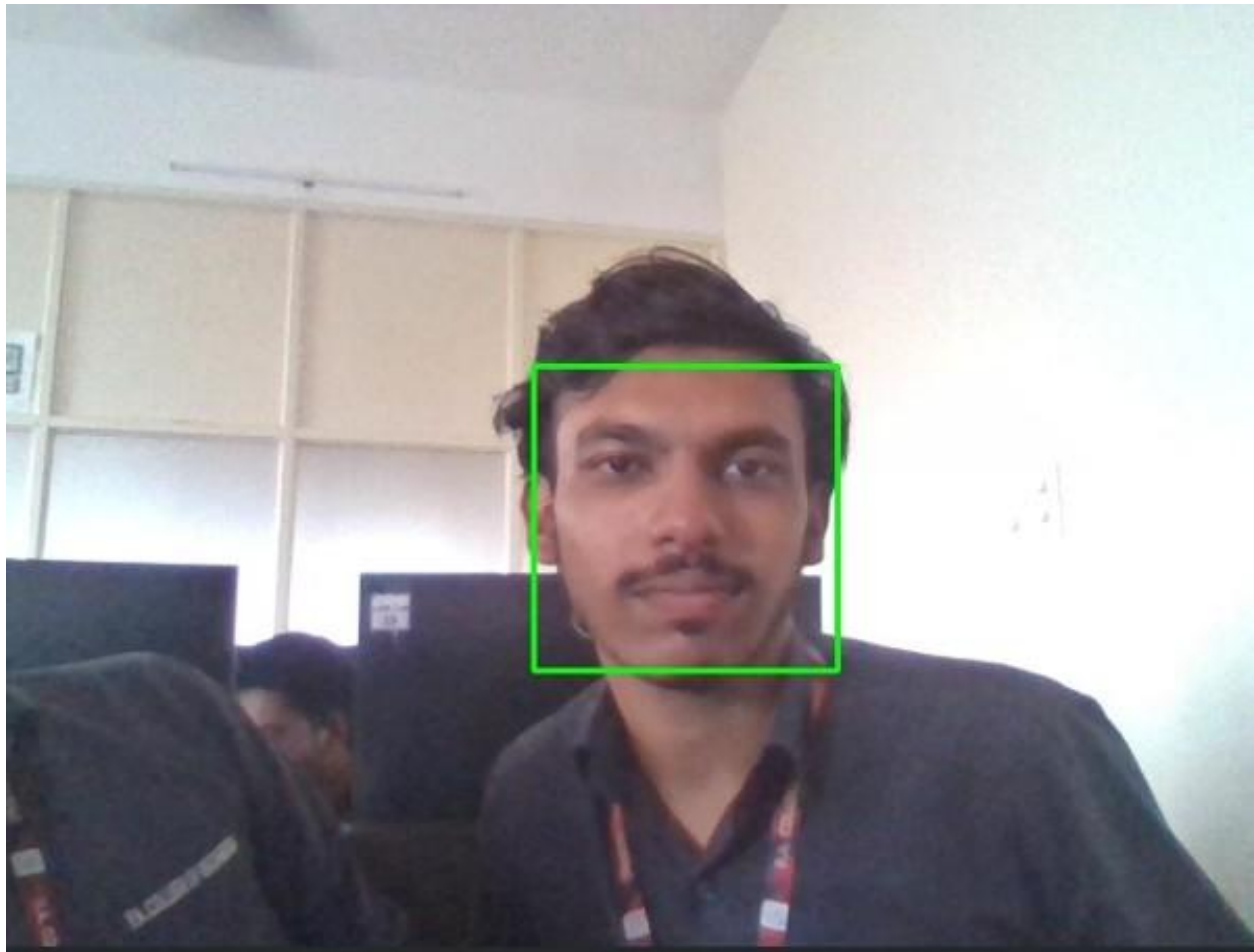


Figure 2:

6 Attendance Marking in Excel

Once a student is recognized, the system automatically records their attendance in an Excel sheet, capturing essential details such as their name, ID, date, and time. This process takes place in real-time, ensuring that attendance is marked instantly without the need for manual input. The system eliminates human error and saves time by automating the process, making it more accurate and efficient. The recorded data is neatly organized, enabling easy tracking and retrieval of attendance records for future system.

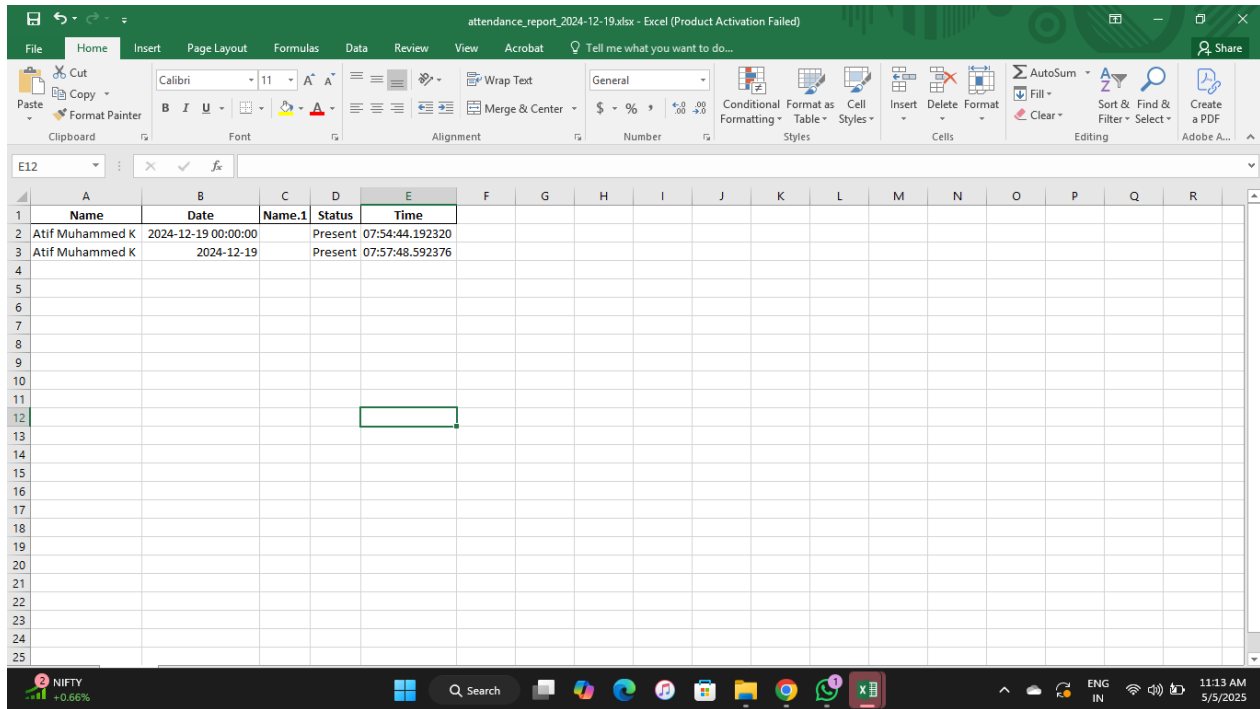


Figure 3:

7 Attendance Report

The system not only marks attendance automatically but also provides a detailed attendance report in a user-friendly format, stored in an Excel sheet. The data can be easily filtered by student name, ID, date, or time to identify trends, such as regular or irregular attendance. Administrators or teachers can also sort and analyze the attendance data, enabling them to monitor student participation over time, identify patterns, and generate insightful reports. This feature makes it easy to track student progress and ensure accurate record-keeping, improving overall administrative efficiency.

8 Working Flow of the System

1. Register student →
2. Train model →
3. Start recognition →
4. Detect & recognize →
5. Mark attendance

Attendance Report

Atif Muhammed K - 2024-12-19 00:00:00 - 07:54:44.192320 - Present

Atif Muhammed K - 2024-12-19 00:00:00 - 07:57:48.592376 - Present

Tasleem Ahmed - 2024-12-19 00:00:00 - 10:18:15.576054 - Present

Atif Muhammed K - 2024-12-19 00:00:00 - 15:12:46.958552 - Present

Figure 4:

9 Advantages

- Reduces manual attendance work
 - Saves time
 - Minimizes errors
 - Secure and automated

10 Limitations

- May fail in low lighting conditions
 - Faces with masks or obstructions may not be recognized
 - Requires consistent dataset for accuracy

Face Recognition Report

Name: Tasleem Ahmed

USN: 4PA22AI030

Branch: AIML

Year: 3rd Year

Mobile: 8547073702

Academic Result File: N/A

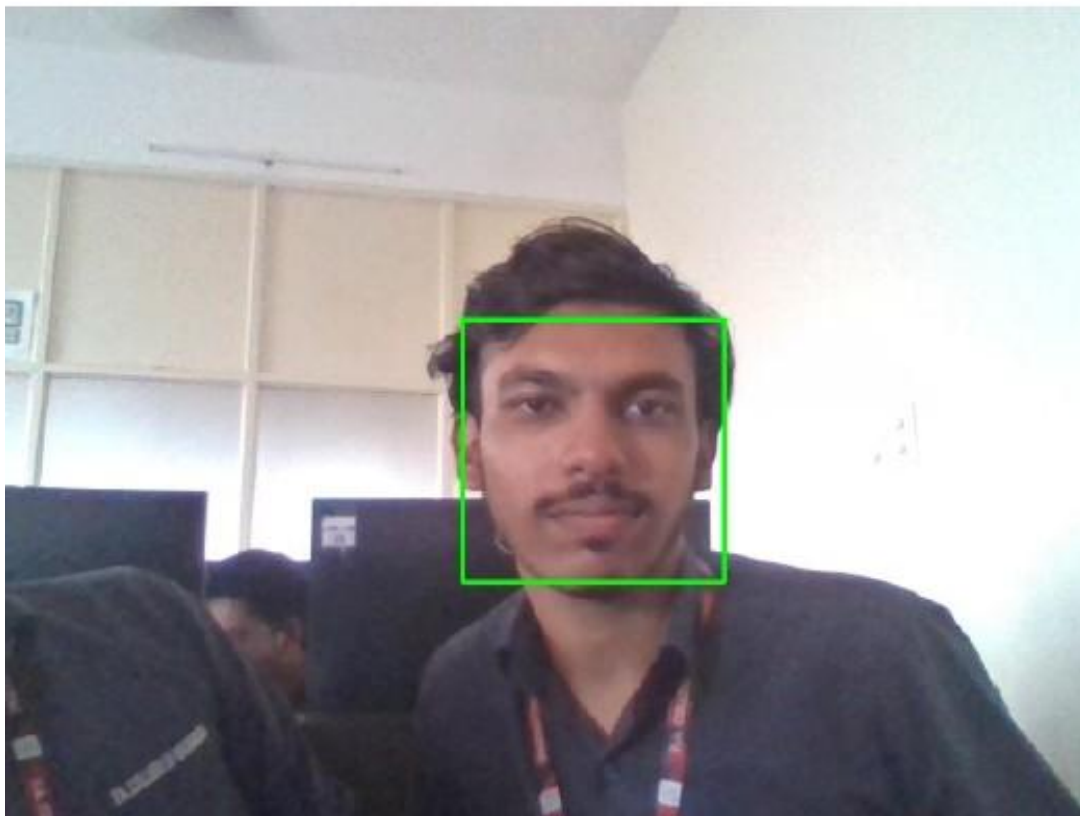


Figure 5:

11 Future Scope

In the future, this system can be further enhanced by integrating with mobile apps and cloud storage for centralized and real-time monitoring. Mobile apps would allow teachers and administrators to access attendance data and reports on the go, while cloud storage would enable seamless data synchronization, ensuring that the information is always up to date and accessible from anywhere. Additionally, using more advanced face recognition models like FaceNet or Dlib could further improve the accuracy and efficiency of the system. These models use deep learning techniques to provide even more precise face recognition, reducing the chances of misidentification and improving overall system performance. With these future enhancements, the system could become even more robust, scalable, and reliable for managing attendance in educational institutions.

12 Conclusion

This AI-based system provides an efficient, secure solution for automating student attendance and academic monitoring, offering substantial administrative benefits.