INTERNATIONAL JOURNAL
OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT

ISSN

INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.802

Smart AI Face Recoginition Attendance Based System Using OpenCV

Atharva Sonawane[1], Harshit Vadher[2], Anish Shewale[3], Rupesh Battise[4], Mrs Kiran Borade[5]

Student of Third Year, Department of Computer Engineering, Guru Gobind Singh Polytechnic, Maharashtra, India

Sr. Lecturer, Department of Computer Engineering, Guru Gobind Singh Polytechnic, Maharashtra, India

ABSTRACT: Face recognition is a biometric technology that can identify and verify a person's identity based on their facial features. It has various applications in security, authentication, and access control. In this paper, we propose a smart AI face recognition attendance based system that can automate and streamline the process of recording attendance in educational institutions. The system uses a deep learning (LBPH algorithm) model to capture and analyze the faces of students from live video, and matches them with a pre-registered database of faces. The system then marks the attendance of the students in real-time, and generates reports and analytics for the teachers and administrators. The system is designed to be robust, accurate, and efficient, and to overcome the challenges of traditional attendance methods such as manual errors, fraud, and health risks. We evaluate the performance of the system on various datasets and scenarios, and demonstrate its effectiveness and feasibility for practical use.

KEYWORDS*: Attendance, face Dectection, Recognizer, OpenCV.*

I. INTRODUCTION

In this age of technology and automation we are still using the same old ways of classroom management. Most An important factor in the classroom is attendance which is directly linked to the academic performance of the students. More The attendance system is as efficient as the class participation and learning. In the past we used techniques like rolls Calling numbering and signing against specific roll number. These methods have a high chance of proxy and time Usage We came up with the idea of automating this process through modern technology to maintain it well and a disciplined classroom. A facial recognition system with appropriate software will help in meeting the goals of this project.

Facial recognition system is an innovation in image processing. Image processing deals with feature extraction The data that can be associated with a digital image plays a unique role in technological advancements. Our main focus will be on that Acquiring digital images and then using programs and algorithms to extract useful information from them. As illustrated The information is then fed to the image processing function and makes it useful for human interpretation. From that information image The process will play a great role and help in various areas of life where it can be implemented. Image applications

The process is broad and can be applied to most situations where imaging data can be related to pre-defined algorithms. That Image processing was an advanced application and is also the mainstay of our project.
Attendance is an essential part of any educational institution, as it reflects the students' engagement, participation, and performance. However, traditional methods of taking attendance, such as manual roll calls, paper-based registers, or RFID cards, have several drawbacks. They are time-consuming, prone to errors, vulnerable to fraud, and pose health risks due to physical contact. Therefore, there is a need for a more efficient, accurate, and secure way of recording attendance.

The main contributions of this paper are as follows:
present a novel architecture for a smart AI face recognition attendance based system that integrates face detection, face alignment, face embedding, face matching, and attendance management modules.
use a state-of-the-art deep learning model, namely to extract high-dimensional feature vectors from the faces, and apply a cosine similarity metric to compare them with the database of faces. Implement the system on a device with a Pi Camera module, and demonstrate its feasibility and effectiveness for practical use in educational settings.Evaluate the performance of the system on various datasets and scenarios, and compare it with other existing methods. We also discuss the ethical, social, and legal implications of using face recognition for attendance purposes.

II. PROBLEM STATEMENT

The traditional methods of taking attendance in educational institutions, such as manual roll calls, paper-based registers, or RFID cards, have several drawbacks. They are time-consuming, prone to errors, vulnerable to fraud, and pose health risks due to physical contact. Therefore, there is a need for a more efficient, accurate, and secure way of recording attendance using face recognition technology. Face recognition is a biometric technology that can identify and verify a person's identity based on their facial features. It has various applications in security, authentication, and access control. However, there are also challenges in implementing a face recognition based attendance system, such as occlusion, illumination, pose, expression, and identity variation. The system should be able to handle these challenges and provide robust, accurate, and efficient attendance management. The system should also generate reports and analytics for the teachers and administrators, and ensure the ethical, social, and legal implications of using face recognition for attendance purposes..

PROJECT SCOPE

The project aims to design and implement a smart AI attendance based system that can automate and streamline the process of recording attendance in educational institutions using face recognition technology. The project scope includes the following tasks:
Review the literature on face recognition techniques and attendance management systems. Collect and preprocess face images of students and teachers from various sources. Train and test a deep learning model, such as FaceNet, to extract and compare face embeddings. Develop a user interface using Tkinter or Flask to capture and display the faces of students and teachers from live video or images. Integrate the face recognition model with a database, such as MongoDB or MySQL, to store and retrieve the attendance records of students and teachers. Implement features such as report generation, analytics, and email notification for the teachers and administrators. Evaluate the performance, accuracy, and efficiency of the system on various datasets and scenarios. Discuss the ethical, social, and legal implications of using face recognition for attendance purposes..

III. GOALS AND OBJECTIVES

- To automate and streamline the process of recording attendance in educational institutions using face recognition technology.
- To enhance the accuracy, efficiency, and security of attendance management and reduce the errors, fraud, and health risks associated with traditional methods.
- To provide real-time attendance data and generate reports and analytics for the teachers and administrators.
- To improve the student engagement, participation, and performance by monitoring their attendance patterns and providing feedback and incentives.
- To ensure the ethical, social, and legal implications of using face recognition for attendance purposes are addressed and respected.

IV. LITERATURE SURVEY

Facial Recognition Smart Attendance System using OPENCV (IJERT)
The face is an important part of the human body and can identify a person. Facial recognition can be achieved by using facial features as biometric features. The most difficult job in any organization is participation. In normal attendance, students are called by the teacher and their presence or absence is marked accordingly. But today's process is time consuming and tedious. In this project, an Open CV based face recognition method is proposed. The model is combined with a camera that captures the input image, a method to detect the face from the input image, encode and recognize the face, mark participation in the presentation, and pass to the PDF document algorithm. Training data is created using the face of students who are authorized to train the system. The cropped image is then stored in a database along with the tags. Features were extracted using the LBPH algorithm.

Student Attendance System using Face Recognition (IEEE 2021
[With the advent of the big data era in the world and the economic value of facial recognition technology, facial recognition technology has a bright future and a large market. This paper is designed to build a facial recognition engagement system based on real-time video processing. This article basically puts forward four guidelines to consider: the accuracy of facial recognition in the real signature, the security of time video of facial recognition technology, the audience, the maintenance fee, and the direction of the video plan. Facial recognition verifies participation. By analyzing the current situation of these problems, the concept of convergence as face recognition technology was proposed and research was conducted on the recognition of the face as a real movie. Testing data shows that the

accuracy rate of facial recognition video is as high as 82%. Compared to traditional authentication methods, facial recognition can reduce time by approximately 60%. The cost of education has greatly reduced Instances of students leaving early and skipping classes have greatly reduced. Confirmed by the above tests, facial recognition attendance real-time video can quickly complete students' activities in the attendance signature, eliminate the phenomenon of naming, greatly improve classroom efficiency, and contribute to the improvement of attendance, such as: a key role.

Automated Smart Attendance System Using Face Recognition (IEEE2021)
[In the human body, the face is the most important part in identifying every person because it has many important points.
There are many ways to catch people, such as Biometrics for Resume, which is a time-consuming process.
This paper develops a model to classify each character's face using image capture rule, LBP algorithm to collect student participation. One such method is LBP (Local Binary Pattern), a popular and effective technique for image representation and classification, chosen for its robustness to design and illumination changes. The proposed ASAS (Automatic Smart Attendance System) will capture the image and compare it with the image stored in the database. The file is updated using an automatic process after student registration this file also contains the name and roll number. If the captured image matches the image in the file, that is, if both images are the same, ASAS identifies the current person. The proposed algorithm can reduce the workload and capture the daily work of managing each student and draw events easily.

V. SYSTEM ARCHITECTURE
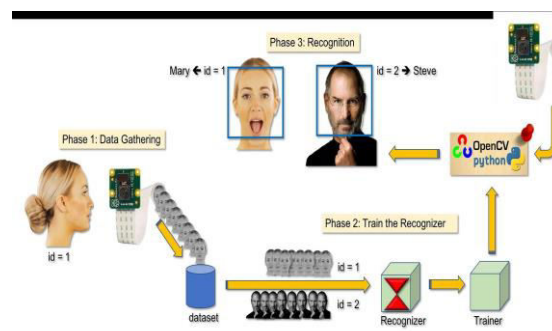
VI. FUNCTIONAL REQUIREMENTS

88Functional requirements:
A login portal connected to the institute login, to be used by students, professors and administrators1.
A dashboard for students and professors to view attendance details for any class or course taken by them1.
A face recognition module that analyzes, tracks and grants attendance in real time using face recognition1. The face recognition algorithm runs at 10 minute intervals on classroom snapshots, significantly reducing computation compared to direct processing of live camera feed1.
A back-end server that interfaces with the face recognition module and the QR code module, and calculates the final attendance based on the presence of students in multiple snapshots taken throughout the class duration1. The back-end server can also enforce default attendance rules for a certain threshold of time, which can be decided by the professor teaching the class1.
Non-functional requirements:
  – Implement robust encryption for data security.
  – Design for scalability to accommodate a growing user base.
  – Ensure quick responses and optimize data retrieval for performance.
  – Adhere to established blockchain standards and provide APIs.
  – Design a user-friendly interface with multilingual support.
  – Adhere to legal and regulatory standards, regularly updating compliance measures.
  – Ensure high availability, implement redundancy, and minimize downtime.
  – Prioritize privacy by minimizing unnecessary data storage.
  – Generate detailed logs for transactions and restrict access to authorized personnel.
  – Design adaptability to changes in blockchain technology, regularly updating for compatibility

VII. CONCLUSION

A smart AI attendance system is a system that uses artificial intelligence techniques, such as face recognition, to automatically record and manage the attendance of students or employees in an organization.

A smart AI attendance system can have many benefits, such as reducing time and effort, improving accuracy and reliability, providing real-time updates and insights, enhancing security and safety, and integrating with other systems.

The scope of a smart AI attendance system can vary depending on the needs and goals of the organization. Some possible features and applications of a smart AI attendance system are clocking in/out, leave management, payroll, reporting, facial recognition, and motion detection.

A smart AI attendance system can be applied in various settings, such as educational institutions, industrial or corporate settings, and public or social events. There may be more ways to use this technology to improve the efficiency and effectiveness of various organizations and sectors.
.

VII. FUTURE SCOPE

The future scope of AI-based face recognition attendance systems is quite promising. These systems are expected to become more accurate, faster, and more reliable as technology advances. Here are some key aspects of their future development:

Improved Accuracy: With advancements in machine learning and deep learning, the accuracy of facial recognition algorithms is likely to improve, reducing the number of false positives and negatives[1].

Real-Time Processing: Future systems may process live video streams in real-time, allowing for instant recognition and attendance marking[1].

Integration with Existing Infrastructure: These systems could be integrated with current educational or organizational infrastructure, making them more versatile and user-friendly[1].

Enhanced Security: As the technology matures, it will include better security measures to protect sensitive biometric data from unauthorized access[2].

Wider Application: Beyond attendance, facial recognition could be used for various other purposes, such as identifying threats or unauthorized individuals in secure areas[2].

User-Friendly Interfaces: The systems will likely feature more intuitive interfaces for both users and administrators, simplifying the process of checking attendance records and managing data[1].

Notifications and Reporting: Advanced reporting features and notifications could be implemented to alert administrators of attendance trends or issues[1].

Ethical and Privacy Considerations: As the technology becomes more pervasive, there will be an increased focus on privacy, consent, and ethical use of facial recognition[2].

These advancements will make AI-based face recognition attendance systems a more integral part of smart environments, enhancing security and efficiency in various settings.

REFERENCES

1. Appendix B:- Bibliography (References from Links,Books)
2. https://www.pockethrms.com/blog/ai-based-smart-attendance-system/
3. https://www.spiceworks.com/hr/workforce-management/articles/features-of-attendance-management-systems/
4. https://medium.com/datatobiz/what-is-facial-recognition-its-use-and-future-scope-985dac5f25c8
5. https://www.brsoftech.com/blog/smart-attendance-system/
6. https://www.researchgate.net/publication/344303798_Smart_AI_Attendance_System

INTERNATIONAL JOURNAL

OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING, TECHNOLOGY AND MANAGEMENT