
ATTENDENCE MONITORING SYSTEM USING OPENCV – A SURVEY

Dr. Umesh Pawar*¹, Darshana Patil*², Dhruvi Choudhari*³,

Prerna Nikumbh*⁴, Atharva Dhumal*⁵

*¹Head Of Department, Department Of Computer Science & Engg. Sandip University, Nashik, India.

*^{2,3,4,5}Student, Department Of Computer Science & Engg. Sandip University, Nashik, India.

DOI : <https://www.doi.org/10.56726/IRJMETS63496>

ABSTRACT

An essential task that must be carried out daily in businesses, schools, institutions, and organizations is attendance tracking. Typically, this is done manually by calling out individuals' names or roll numbers. The main aim of this project is to create an automated attendance system utilizing facial recognition technology to replace the existing manual method. This initiative meets both the requirements for effective time management and the modernization of attendance processes. The device is installed in classrooms, where students' personal information, such as names, roll numbers, classes, sections, and photographs, is inputted. Using Open CV, the photographs are processed beforehand. Before the class begins, the student can approach the device, which will start capturing images and comparing them to the authorized dataset. The image processing occurs as follows: first, the device automatically marks attendance, compares histogram data with a pre-existing dataset, and recognizes faces through the LBPH (Local Binary Pattern Histogram) Algorithm. An Excel spreadsheet is generated and updated every hour with information from the respective class instructor.

Keywords: Face Recognition, OpenCV, Python, Attendance Monitoring.

I. INTRODUCTION

Keeping track of attendance is crucial for institutions to monitor their students' academic achievements. Each institution has its own approach to achieve this. While some have adopted automated attendance methods using biometric technologies, others continue to rely on outdated paper or file systems. A facial recognition system is a type of biometric software that analyzes facial features to identify or verify individuals. The management of facial recognition technology has advanced considerably in recent years, and this technology is now commonly used for various applications, including security and commercial purposes. Facial recognition, as a digital technology, is a significant area of research. Utilizing facial recognition for attendance marking is a practical application of this technology. It is similar to other biometric methods such as fingerprint or iris recognition and is often employed in security contexts. As the number of students in educational programs or the workforce increases, the demands on instructors and the organization itself become more complex, making attendance tracking more challenging. This project can help address these kinds of challenges. In a classroom setting, the number of enrolled students is assessed, each individual is recognized, and the attendance data is continuously updated.

CHARACTERSTICS

- **Facial Recognition and Detection:**

Face Detection: OpenCV utilizes advanced algorithms such as LBPH (Local Binary Pattern Histogram) or techniques like Haar cascades to identify faces in real time.

Face Recognition: By converting facial features into a vector space, OpenCV, along with libraries such as Numpy and Pandas, can be used to recognize individuals. This enables users to compare and identify people from a dataset of known faces.

- **Real-Time Processing:**

To swiftly detect and recognize faces, the system employs cameras to capture faces and processes video frames instantly. The efficient image processing capabilities of OpenCV allow for rapid and effective handling of video streams.

Instant attendance marking is enabled by real-time processing, eliminating delays.

• **Scalability:**

The system can be scaled up to accommodate larger environments. By positioning multiple cameras at various locations, real-time attendance marking can be conducted across several entry points.

The performance improvements of OpenCV allow for the effective processing of vast quantities of video data.

• **Cross-Platform Compatibility:**

OpenCV works with a variety of operating systems, such as Windows, Linux, and macOS. This enables the implementation of the system on an array of devices, including desktop computers, embedded systems, tablets, and smartphones.

II. LITERATURE REVIEW

SR.NO	TITLE	YEAR	CONTRIBUTION	RESEARCH GAP	RESULT
1	Edge-AI based Face Attendance System for Large Institutions	2024	An edge-AI based system has been created to operate effectively for large organizations without relying on the cloud.	Scaling across very large networks with diverse edge devices can be challenging..	Faster recognition was accomplished with minimal delay, and real-time settings saw a decrease in dependency on cloud servers.
2	Face Recognition in Low Light for Attendance Systems	2023	Utilized image enhancement techniques to overcome the difficulties of face recognition in low-light environments.	Cases of extreme lighting conditions or very low-resolution input images continued to pose challenges.	Achieved enhanced accuracy of up to 92% in low-light conditions.
3	A Hybrid Approach to Face Recognition Attendance Systems	2022	Traditional algorithms (LBPH) have been integrated with deep learning (CNN) to enhance accuracy.	The computational cost is high, and there are difficulties in integrating older models with newer methods.	Achieved a higher level of precision at around 95%, but demanded significant processing capabilities.
4	Real-Time Face Recognition for Attendance using IoT	2021	IoT has been integrated with face recognition technology to track attendance in real time.	In settings with a high volume of participants, there is a lack of scalability.	Real-time recognition was shown using an edge-based system in small group environments.

RESEARCH GAP

• **Challenges with Illumination:**

Variations in lighting can significantly affect the effectiveness of face detection and recognition technologies. For instance, strong backlighting or insufficient lighting can obscure facial features, leading to reduced accuracy.

Solution: Techniques such as histogram equalization and infrared cameras can help alleviate this issue, though they do add complexity and cost to the system.

• **Difficulties with Pose Variations:**

OpenCV may struggle with accurately identifying and recognizing faces when they are tilted or obstructed (e.g., when a person is gazing down or to the side).

Solution: While newer face recognition algorithms have become more tolerant of minor pose variations, significant changes or occlusions may still hinder accuracy. Enhanced alignment can be achieved through methods like facial landmark detection, although they require additional computational resources.

• **Challenges with Facial Occlusions:**

Accessories such as masks, sunglasses, and hats can block essential facial features. This issue has gained prominence, especially in light of the increased use of face masks during the COVID-19 pandemic.

Solution: Models that are trained to be aware of masks can be developed for face detection, which, while reliant on extra data and not always foolproof, can account for occlusions in recognition systems.

• **Hardware Failures and Maintenance:**

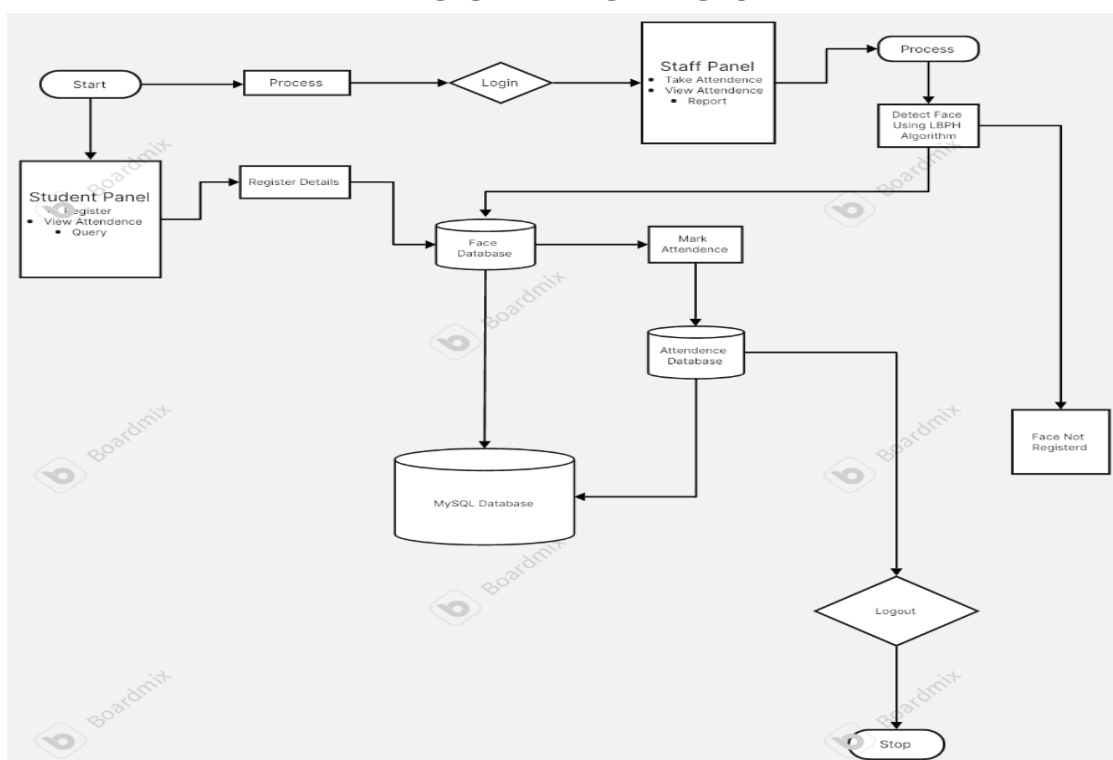
Cameras, sensors, and network equipment may develop faults over time, particularly in high-traffic or outdoor environments. Maintaining these systems can be costly and labor-intensive.

Solution: Implementing regular maintenance routines and investing in high-quality, durable hardware can help mitigate this problem, though it does lead to higher overall operational costs.

• **Concerns Regarding Privacy and Data Security:**

The biometric information collected by face recognition systems raises concerns about privacy and data security. If managed inappropriately, the retention of facial data can lead to user discomfort, privacy breaches, or legal complications.

III. SYSTEM ARCHITECTURE



IV. CONCLUSION

This study presents the most efficient face recognition technique using Open CV for managing attendance. It includes more challenges, it has various characteristics. There is a great scope to continue research in this field of attendance monitoring system. It will help to track attendance accurately to prevent proxy attendance. By studying other papers, we planned to design a web-based smart attendance system, also planned to generate automatic student attendance reports, decided to implement a query section for students, and to design both student and staff login panels.

V. REFERENCE

- [1] Smart Attendance System Utilizing Computer Vision And Machine Learning Dipti Kumbhar#1, Prof. Dr. Y. S. Angal*2 # Department Of Electronics And Telecommunication, BSIOTR, Wagholi, Pune, India 1 Diptikumbhar37@Gmail.Com, 2 Yogeshangal@Yahoo.Co.In.
- [2] ATTENDANCE SYSTEM EMPLOYING MULTI-FACE RECOGNITION 1P. Visalakshi, 2Sushant Ashish 1Assistant Professor 1,2Department Of Computer Science And Engineering SRM Institute Of Science And Technology, Chennai, Tamil Nadu, INDIA.
- [3] Student Attendance System Based On Face Recognition Utilizing Opencv CH. VINOD KUMAR1, DR. K. RAJA KUMAR2 1 PG Scholar, Dept Of CS& SE, Andhra University, Vishakhapatnam, AP, India. 2Assistant Professor, Dept Of CS& SE, Andhra University, Vishakhapatnam, AP, India.
- [4] Automatic Attendance System Leveraging Face Recognition. Ashish Choudhary1, Abhishek Tripathi2, Abhishek Bajaj3, Mudit Rathi4, And B.M Nandini5 1,2,3,4,5 Information Science And Engineering, The National Institute Of Engineering,.
- [5] Attendance Management System Based On Face Recognition Using Machine Learning Anushka Waingankar1, Akash Upadhyay2, Ruchi Shah3, Nevil Pooniwala4, Prashant Kasambe5.
- [6] Edge-AI Based Face Recognition Attendance System For Large Institution#1Aisha Patel #2Victor Rodriguez
- [7] Face Recognition In Low-Light Attendance System#1Ahmed Khan #2Elena Garcia
- [8] A Hybrid Approach To Face Recognition Attendance System#1Mohammed Hassan #2Priya Mehta Ix. Real-Time Face Recognition For Attendance Using Iot#1Rajesh Gupta #2David Lee
- [9] <https://www.superdatascience.com/blogs/opencv-face-recognition>.
- [10] <https://towardsdatascience.com/face-recognition-how-lbph-works90ec258c3d6b>.
- [11] <https://www.pyimagesearch.com/2018/09/24/opencv-facerecognition/>.