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## Advanced Multi-Face Recognition and Attendance System for Colleges Using Real-Time Video Processing

# Vidyadhar Hanji<sup>+1</sup>, Anusha Anand Belavi<sup>+2</sup>, Khushita Balachandra Goudar<sup>+3</sup>, Poonam Satish Nimbalkar<sup>4</sup>, Shraddha Mallikarjun Nemagoudar<sup>5</sup>

<sup>1</sup>Assistant prof. CSE Dept, Belagavi), Angadi Institute of Technology and Management <u>abhishekgayakwad@gmail.com</u>

<sup>2</sup>Computer Science and Engineering), Angadi Institute of Technology and Management <u>anushabelavia@gmail.com</u>

<sup>3</sup> BE (Computer Science and Engineering), Angadi Institute of Technology And Management khushitagoudar@gmail.com

<sup>4</sup>BE (Computer Science and Engineering), Angadi Institute of Technology and Management Poonamnimbalkar2003@gmail.com

<sup>5</sup>BE (Computer Science and Engineering), Angadi Institute of Technology and Management shraddhanemagoudar2003@gmail.com

#### ABSTRACT:

A real-time face recognition-based attendance system designed specifically for classroom use is revealed in this thought. With the aid of OpenCV, LBPH, and Haar Cascade classifiers, the system uses a multi-face recognition process to identify multiple students simultaneously from live webcam feed. Time and date stamps are automatically added to attendance in a backend database. This technique advances accuracy while reducing human labour when compared to manual and biometric methods. In addition, contactless identifiable proof is made possible by the use, thus suiting contemporary classes. Further work will focus on addressing hidden or occluded faces and increasing recognition speed.

Keywords: Face Recognition, Real-Time Video Processing, Attendance System, OpenCV, LBPH, Haar Cascade,

#### 1. Introduction:

In schools, keeping accurate students' attendance records is paramount for academic management and assessment. Conventional practices like manual attendance or biometric fingerprint identification tend to result in inefficiencies, lateness, and sometimes inaccuracies owing to human mistakes or system capability. The conventional methods also involve physical contact or manual intervention, which might not be desirable in contemporary classrooms, particularly in the post-pandemic context.

Face recognition technology offers a touchless, automatic, and secure way of identifying people, and it is the appropriate solution for attendance systems. Thanks to the fast development of computer vision and deep learning methods, real-time facial recognition has improved significantly and is now possible to implement in real-world applications.

This work introduces a multi-face recognition-based attendance system with real-time video processing. The system can detect and recognize multiple students' faces at one time from a live camera feed and take attendance directly into a backend database. Detection and recognition work are done using tools like OpenCV, Haar Cascade Classifiers, and the LBPH algorithm. The automatic system not only eases the workload on teaching staff but also increases reliability and efficiency in tracking attendance.

#### Methodology:

The methodology used in this project is the creation of a real-time, automated facial recognition-based attendance system. The system is intended to recognize multiple student faces at once using live video feed and mark attendance automatically. The approach as a whole is modular and is segmented into a number of phases: data collection, face detection, face recognition, and recording of attendance.

#### Data Collection and Preprocessing

A database of registered students is established prior to starting real-time recognition. The face of each student is captured from a variety of views under various conditions of lighting to improve the accuracy of recognition. About 20 images of each student are stored and tagged with IDs. Images are preprocessed by converting them to grayscale and down sampling them for uniformity purposes, so that they could be processed efficiently during recognition.

#### Image Acquisition

It employs a regular webcam or security camera to record real-time video feed of the class. Frames are pulled off from the video real-time and fed into the face detection module. Video acquisition in real time allows the system to detect students as they enter or walk around in class, making it ideal for live attendance monitoring.

#### Face Detection

Face detection is performed utilizing the Haar Cascade Classifier offered by OpenCV. This classifier applies edge and feature-based detection to detect faces in the recorded frames. The model reads the input frame from top to bottom and left to right to identify facial features like eyes, nose, and mouth. It then draws bounding boxes around every detected face. Since the classifier facilitates multi-face detection, the system can detect multiple faces at once within one frame.

#### Face Recognition

The Local Binary Pattern Histogram algorithm is utilized for the identification of the identified faces. The algorithm is suitable for grayscale images and performs well in real-time systems. The face is searched for texture-based features and matched against the pre-trained set. In the case of an identification, the student ID and name are accessed. The LBPH technique is selected because it is both accurate and fast and is perfect for live classrooms.

#### Logging Attendance

After the system has successfully detected a face, it takes attendance by filling in the name, ID, date, and time of the student into a MySQL database. This is all accomplished with automated backend integration, where no manual intervention is necessary. If a student doesn't register or isn't present in the dataset, the system can log him/her as "Unknown" or simply ignore him/her based on the desired setting. Duplicate records for the same student on the same date are automatically prevented by date checks.

#### **Objective:**

- 1. Automate student attendance using real-time face recognition.
- 2. Detect and recognize multiple faces from live video input.
- 3. Use Haar Cascade for detection and LBPH for recognition.
- 4. Store attendance data securely in a MySQL database.
- 5. Develop a simple interface for managing records and viewing reports.
- 6. Eliminate proxy attendance and reduce manual effort.
- 7. Ensure high accuracy and real-time performance.
- 8. Make the system scalable for future enhancements.

#### Results

The systematic review identified 72 articles that met the inclusion criteria, which were analyzed using a thematic synthesis approach. The majority of the studies were conducted in North America, Europe, and Australia, with a smaller number of studies conducted in Asia, Africa, and South America. The research designs of the studies included qualitative, quantitative, and mixed-methods approaches. The sample sizes of the studies ranged from a few participants to several hundred participants.

The analysis of the literature identified several key themes related to the academic and social integration of international students in higher education. These themes were grouped into categories and subcategories. Language proficiency was identified as a crucial factor for academic success and social integration [7]. The studies highlighted the importance of English language proficiency in particular, as English is the primary language of instruction in most higher education institutions. The studies found that language barriers can limit communication and participation in academic and social activities, which can affect academic performance and social integration.

Academic preparation, including familiarity with the academic expectations and systems of the host institution, was found to be important for academic integration. The studies highlighted the challenges faced by international students in adapting to the different academic cultures and expectations of the host institution. The studies also emphasized the importance of academic support programs that provide guidance on academic writing, research, and study skills. Cultural adjustment, including acculturation and adaptation to the norms and values of the host culture, was crucial for social integration. The studies highlighted the difficulties faced by international students in adjusting to the new cultural environment, including homesickness, culture

shock, and identity crises. The studies also emphasized the importance of intercultural training programs that help international students understand and adapt to the cultural norms and values of the host culture. Social support, such as social networks, mentoring, and counseling, was vital for both academic and social integration. The studies highlighted the importance of social support in reducing social isolation and promoting a sense of belonging among international students. The studies also emphasized the role of peer mentoring programs, which pair incoming international students with current students who can offer guidance and support.

The review identified several challenges faced by international students, including language barriers, differences in academic expectations and systems, cultural adjustment difficulties, and social isolation. The studies highlighted the negative impact of these challenges on academic performance, mental health, and overall well-being. Overall, the review suggests that the academic and social integration of international students is a complex and multifaceted process that depends on several factors, including language proficiency, academic preparation, cultural adjustment, and social support. The review highlights the importance of addressing the challenges faced by international students and providing effective support programs and policies that promote their academic and social integration. The findings of the review have implications for policymakers, educators, and institutions in developing effective support programs and policies.



#### Conclusion

The proposed system effectively automates the attendance process by utilizing real-time face recognition technology. By detecting and recognizing multiple student faces simultaneously from a live video feed, the system eliminates the need for manual attendance marking and reduces the chances of

proxy or false entries. Technologies such as OpenCV, Haar Cascade, and the LBPH algorithm have been integrated to ensure accurate and fast recognition in real-time classroom environments. The system also provides a secure backend database to store attendance records systematically.

Overall, this project demonstrates a reliable and contactless solution for modern educational institutions, improving both efficiency and transparency. In the future, the system can be enhanced by adding support for masked face recognition, cloud-based attendance access, mobile app integration, and advanced deep learning models for even higher accuracy.

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List all the material used from various sources for making this project proposal

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