IJITCE

ISSN 2347- 3657

International Journal of Information Technology & Computer Engineering

Email : ijitce.editor@gmail.com or editor@ijitce.com

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

AUTOMATED ATTENDANCE SYSTEM USING FACE RECOGNITION

[1]A.Anitha,[2]Rohith Reddy Maddi,[3]Poojitha Nalavath,[4]Uday Babu Parise,[5]ch.Vinay Kumar

[1]Assistant Professor,Department Of Computer Science and Engineering, Sreyas Institute of Engineering and Technology, anitha.a@sreyas.ac.in.

[2,3,4,5]Students,Department of Computer Science and Engineering, Sreyas Institute of Engineering and Technology.

[2]rohithreddymaddi28@gmail.com, [3]poojithanalavath@gmail.com, [4]udayparise123@gmail.com, [5]chitiyalavinay@gmail.com.

ABSTRACT

Attendance management is a vital daily activity in educational institutions, workplaces, and organizations, traditionally carried out using manual methods such as roll calls or name-based identification. These conventional approaches are time-intensive, prone to human error, and inefficient, especially in large groups. This project proposes an automated attendance system that leverages face recognition technology to address these challenges and modernize the process. The system is designed to be installed in classrooms or similar environments, where it captures and processes the facial data of individuals for attendance tracking. Students' information, including their name, roll number, class, section, and facial images, is pre-registered and stored in a structured dataset. Using the OpenCV library, the system extracts, processes, and trains the facial images to create a robust recognition model. Before the start of a class, students interact with the system, which scans their faces, matches the captured data with the stored dataset, and automatically records attendance upon successful identification. By eliminating the need for manual intervention, the system enhances accuracy, saves time, and ensures a seamless and efficient attendance process. Furthermore, it aligns with the growing need for digital transformation by introducing a secure, user-friendly, and technologically advanced solution that improves operational efficiency and minimizes errors.

KEYWORDS: *Attendance System, Face Recognition, Automated Process, Manual Process, OpenCV, Student Information, Roll Number, Photographs, Time Management, Classroom Device, Dataset Training, Modernization, Automation.*

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

I.INTRODUCTION

To verify the student attendance record, the personnel staff ought to have an appropriate system for approving and maintaining the attendance record consistently. By and large, there are two kinds of student attendance framework, i.e. Manual Attendance System (MAS) and Automated Attendance System (AAS). Practically in MAS, the staff may experience difficulty in both approving and keeping up every student's record in a classroom all the time. In aclassroom with a high teacher-to-student ratio, it turns into an extremely dreary and tedious process to mark the attendance physically and cumulative attendance of each student. Consequently, we can execute a viable framework which will mark the attendance of students automatically via face recognition. AAS may decrease the managerial work of its staff. Especially, for an attendance system which embraces Human Face Recognition (HFR), it normally includes the students' facial images captured at the time he/she is entering the classroom, or when everyone is seated in the classroom to mark the attendance Generally, there are two known methodologies to deal with HFR, one is the feature-based methodology and the other is the brightness-based methodology. The Feature based methodology utilizes key point features present on the face, called landmarks, of the face, for example, eyes, nose, mouth, edges or some other unique attributes. In this way, out of the picture that has been extricated beforehand, just some part is covered during the calculation process. Then again, the brightness-based methodology consolidates and computes all parts of the given picture. It is also called holistic-based or image-based methodology. Since the overall picture must be considered, the brightnessbased methodology takes longer handling time and is likewise more complicated. There are different advances that are done during the process of this face recognition framework, yet the essential steps of these are face detection and face recognition. Firstly, to mark the attendance, the images of students' faces will be required. This image can be captured from the camera, which will be installed in the classroom at a position from where the entire classroom is visible. This image will be considered as an input to the system. For efficient face identification, the picture should be upgraded by utilizing some image processing methods like grayscale conversion and histogram equalization. After image quality upgrade, the image

ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

will be passed to perform face detection. The face identification process is trailed by face recognition process. There are different strategies accessible for face recognition like Eigen face, PCA and LDA hybrid algorithm. In the Eigen face, when faces are identified, they are trimmed from the picture. With the assistance of the element extractor, different face highlights are extracted. Utilizing these faces as Eigen features, the student is recognized and by coordinating with the face database, their attendance is marked. Developing the face database is required with the end goal of comparison.

II.EXISTING SYSTEM

To verify the student attendance record, the personnel staff ought to have an appropriate system for approving and maintaining the attendance record consistently. By and large, there are two kinds of student attendance framework, i.e. Manual Attendance System (MAS) and Automated Attendance System (AAS). Practically in MAS, the staff may experience difficulty in both approving and keeping up every student's record in a classroom all the time. In aclassroom with a high teacher-to-student ratio, it turns into an extremely dreary and tedious process to mark the attendance physically and cumulative attendance of each student. Consequently, we can execute a viable framework which will mark the attendance of students automatically via face recognition. AAS may decrease the managerial work of its staff.

III.PROPOSED SYSTEM

The proposed face recognition-based attendance system leverages K-Nearest Neighbors (KNN) for real-time, automated attendance management, specifically designed for educational institutions. This system begins with a data collection phase, where facial images of students are captured and stored in a structured database. During this stage, images undergo preprocessing techniques such as grayscale conversion and histogram equalization to enhance facial features and optimize recognition accuracy. For real-time attendance, a live camera feed captures images as students enter the classroom. Using OpenCV’s Haar Cascade classifier, the system identifies faces within each frame, cropping and resizing each detected face to a standard format. These facial images are then converted into feature vectors, which serve as input for the KNN classifier. By comparing these vectors to existing records in the database, the KNN algorithm determines the closest match based on Euclidean

ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

distance, effectively identifying each student in real-time. When a match is confirmed, the system records the student's attendance automatically in an Excel file, updating the attendance database without requiring manual input.

IV.LITERATURE SURVEY

1.The paper by S. Lukas, A. R. Mitra, R. I. Desanti, and D. Krisnadi discusses the implementation of a student attendance system in the classroom using face recognition techniques. In recent years, biometric authentication methods such as fingerprint recognition have become popular in various applications like video surveillance, human-computer interaction, door access control systems, and network security. While fingerprint recognition is considered one of the most accurate and fast methods due to its uniqueness and permanence, face recognition is preferred for capturing student attendance in a classroom setting. In addition to attendance, face recognition can also provide insights into student behavior, such as their readiness or interest in the lecture. The proposed method uses multiple facial images to classify facial objects. Experiments were conducted with 19 students in a classroom setting, resulting in 174 successful face recognitions out of 205 attempts, achieving a recognition rate of approximately 85%.

2. P. Wagh, S. Patil, J. Chaudhari, and R. Thakare focus on automating the attendance system through face recognition by using the Eigenface database and PCA (Principal Component Analysis) algorithm in a Matlab GUI environment. Traditional attendance systems face several issues, such as fake attendance, time consumption, and manipulation, while also lacking secure information management. However, face recognition technologies face challenges like image quality, size, angle, and varying light intensity. To overcome these limitations, the authors use techniques like Illumination Invariant, Histogram Equalization, and PCA. The proposed system automatically updates attendance after comparing the detected face with the original Eigen database integrated with an Excel sheet and Matlab GUI.

3. The paper by Viola, M. J. Jones, and Pau presents a face detection framework designed for high-speed processing while maintaining high detection rates. The authors introduce a novel image representation called the "Integral Image," which allows for rapid computation of features used by the

ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

detector. Additionally, the framework employs a simple and efficient classifier built using the AdaBoost learning algorithm to select a small number of critical visual features from a large set. The paper also introduces a method for combining classifiers in a "cascade," enabling faster background elimination while focusing computational resources on promising face-like regions. The system's performance is evaluated in the domain of face detection, yielding comparable results to previous systems. When implemented on a conventional desktop, the system processes face detection at 15 frames per second.

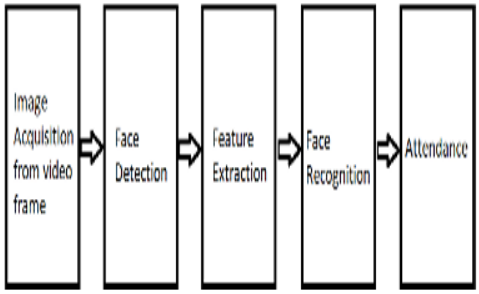

Fig1: System Architecture

V.METHODOLOGY

To develop the smart attendance management system, several steps need to be followed to ensure successful implementation. These steps are as follows: Enrollment, Face Detection, Face Recognition, Confirmation by the class camera, and Attendance Marking. In the enrollment step, the student is added to the student database, where general information such as name and enrollment number is stored. Additionally, images of the student's face captured by the camera are stored in the database. These images are critical for facial recognition and allow the system to identify and verify students attending lectures. By using the stored facial images, the system can recognize students as they enter the classroom and perform attendance tracking.

Face detection is a crucial first step in this face recognition-based attendance system. It is responsible for accurately identifying faces in a live video feed. The system uses OpenCV’s Haar Cascade Classifier to perform real-time face detection. The classifier employs pre-trained data to recognize key facial features, such as eyes, nose, and mouth. Once the camera captures an image, the system detects the face and highlights it by drawing a bounding box around it. This process makes it easy to monitor the success of each detection. The detected face is then cropped and resized, preparing it for feature extraction and recognition by the KNN classifier. Haar Cascade offers a balance of speed and accuracy, making it ideal for real-time attendance tracking. Face recognition is implemented using Principal Component

ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

Analysis (PCA), a technique for reducing the number of variables involved in facial recognition. In PCA, each image in the training dataset is represented as an eigenvector, referred to as an "eigenface." This methodology transforms faces into a smaller set of features—eigenfaces—which are the principal components of the original training images. Recognition is performed by projecting a new image into the eigenface subspace and comparing its position with the positions of known individuals. The advantages of using PCA for facial recognition include its ease of use, speed, and stability despite variations in human faces. When a student approaches the classroom, their face is checked against the database. If their face matches an entry, they are granted access; if not, they are prompted to enroll in the system. After face recognition, the system employs a confirmation step using a second camera installed inside the classroom. This camera is strategically placed to ensure all students are visible, helping to confirm their presence in the class and preventing proxy attendance. This step ensures the accuracy of the attendance records. At the end of the lecture, the camera inside the classroom is used to generate a list of students present. This list is then used to mark attendance in the attendance database, finalizing the process for that particular lecture. OpenCV is a powerful, cross-platform library used to develop real-time computer vision applications. It focuses on image processing, video capture, and analysis, offering various features such as face detection and object detection. OpenCV simplifies the development of applications related to real-time visual processing. Computer vision is a field that deals with the interpretation and understanding of 3D scenes from their 2D images, with a focus on modeling and replicating human vision through computer software and hardware. It significantly overlaps with areas such as image processing, which focuses on image manipulation; pattern recognition, which involves classifying patterns; and photogrammetry, which is concerned with extracting accurate measurements from images. The distinction between computer vision and image processing lies in their objectives. Image processing involves transforming images, where both the input and output are images. In contrast, computer vision goes a step further by creating meaningful descriptions or interpretations of 3D scenes from their 2D images. The output of computer vision is a description or understanding of the physical structure represented in the scene.

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

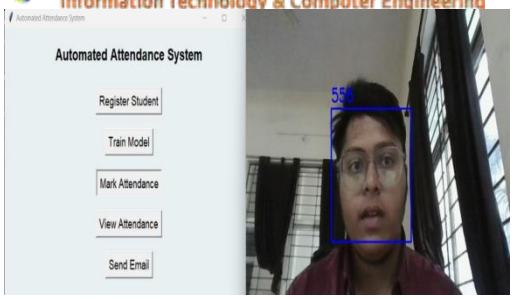

Fig2: Mark Attendence

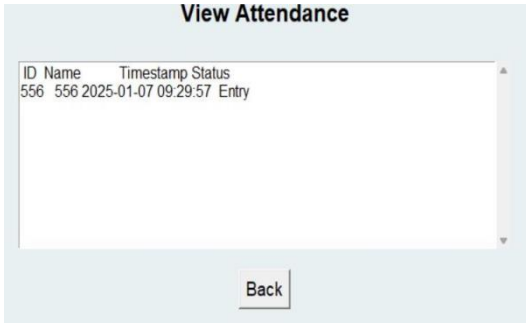

Fig3: View Attendence

VI. CONCLUSION

The proposed automated attendance system using face recognition is a great model for marking the attendance of students in a classroom. This system also assists in overcoming the chances of proxies and fake attendance. In the modern world, a large number of systems using biometrics are available. However, the facial recognition turns out to be a viable option because of its high accuracy along with minimum human intervention. This system is aimed at providing a significant level of security. Hence, a highly pro-efficient attendance system for classroom attendance needs to be developed which can perform recognition on multiple faces at one instance. Also, there is no requirement of any special hardware for its implementation. A camera, a PC and database servers are sufficient for constructing the smart attendance system.

VII.REFERENCES

1. S. Lukas, A. R. Mitra, R. I. Desanti and D. Krisnadi, "Student Attendance System in Classroom Using Face Recognition Technique," in ICTC 2016, Karawaci, 2016.

2. P. Wagh, S. Patil, J. Chaudhari and R. Thakare, "Attendance System based on Face Recognition using Eigen face and PCA Algorithms," in 2015 International Conference on Green Computing and Internet of Things (ICGCloT), 2015.

3. N. M. Ara, N. S. Simul and M. S. Islam, "Convolutional Neural Network Approach for Vision Based Student Recognition System," in 2017 20th International Conference of Computer and Information Technology (ICCIT), 22-24 December, 2017, Sylhet, 2017.

4. N. Khan and Balcoh, "Algorithm for efficient attendance management: Face recognition based approach," in JCSI International Journal of Computer Science Issues 9.4, 2012.

5. KAWAGUCHI and Yohei, "Face Recognition-based Lecture Attendance

ISSN 2347–3657
Volume 13, Issue 1, Jan 2025

System.," in The 3rd AEARU Workshop on Network Education. 2005., 2005.

6. MuthuKalyani.K, "Smart Application For AMS using Face Recognition," in CSEIJ 2013, 2013.

7. M. Arsenovic, S. Skadojevic and A. Anderla, "FaceTime- Deep Learning Based Face Recognition Attendamce system.," in IEEE 15th International Symposium on Intelligent Systems and Informatics, Serbia, 2017.

8. K. Goyal, K. Agarwal and R. Kumar, "Face Detection and tracking using OpenCV," in International Conference on Electronics, Communication and Aerospace Technology, ICECA 2017, 2017.

9. Viola, M. J. Jones and Paul, "Robust real-time face detection.," in International journal of computer vision 57.2 (2004), 2004.

10. A. Jha, ""Class Room Attendance System Using Facial Recognition System."," in International journal of Mathematical science technology and management 2(3). 2007, 2007.