Advance Attendance System Using Face Recognition

Bhojraj Namdeo Padole
Department of IT
GHRCE, Nagpur
padolebhojraj1048@gmail.com

Aryan Singh Chauhan
Department of IT
GHRCE, Nagpur
singhchauhanaryan44@gmail.com

ABSTRACT

Attendance system is important to maintain the record of the presence of a person of student in school, college or universities. It is useful to maintain the record of the consistency in presence of a student in a particular Classroom or lab on specific day, date and time. Traditional method of attendance system includes attendance register record, where listed student has to mark their attendance or a teacher would do that thing instead. But this traditional method requires skilled workers or trained professional, also this is time consuming and require efficiency. There are much more chances to get false attendance or error while calculating the over all attendance. So, to overcome this problem we have advance attendance system using face recognition. This system includes face recognition system which stores the face of the person in the database and recognize while registering the attendance of the person with the latest image along with the date and time of registering the attendance.

KEYWORDS: Face Detection, Face Recognition, Haar Cascade classifier, AMS – Attendance Management System

INTRODUCTION:

In numerous universities, maintaining student attendance is the most challenging duty. Every university has a unique way of recording students' attendance, such as utilizing an attendance sheet or a few biometric techniques. However, these techniques take a lot of time. The majority of the time, teaching members take student attendance using an attendance sheet. It takes a lot of time and effort to do this. Whether the verified student is replying or not is unknown to us. Consolidated attendance calculation is another significant duty that is susceptible to human mistake. Other times, kids could misplace or even steal the attendance record. We require an automated attendance management solution to address these issues. Recent technological developments have made it possible for automatic attendance systems to use biometric methods like facial recognition.

Face recognition technology is a type of biometric technology that analyses and recognizes face characteristics in an image or video by using algorithms. Security systems, access control, and mobile device authentication are just a few of the numerous applications that have made extensive use of the technology. It has also demonstrated a lot of promise for automated attendance tracking systems.

The technology for recognizing faces used in automated attendance systems can overcome the limitations of traditional attendance management systems. These systems can correctly identify people and mark their attendance automatically, doing away with the need for human attendance monitoring. As the algorithm only records attendance when it recognizes the individual who is in front of the camera, facial recognition technology can additionally prevent proxy attendance.

A strong and trustworthy attendance management system that can reliably identify people and automatically register their presence is what the suggested facial recognition-based enhanced attendance system wants to create. While the attendance records will be maintained in a database for simple maintenance and reporting, the system will employ deep learning algorithms to recognize faces in real-time. Additionally, the system will offer a user-friendly interface for simple access to and administration of attendance information.

I. LITERATURE REVIEW

Face recognition-based attendance systems are becoming more and more common because of their practicality, precision, and effectiveness. These systems automate attendance monitoring using cutting-edge machine learning and computer vision techniques, saving time and effort compared to manual attendance management. A summary of some current studies and research in the field of facial recognition-based attendance systems is provided in this section.

A. An extensive study of several face recognition-based attendance systems was carried out by R. S. Razak et al. in 2019. Convolutional neural networks (CNNs), support vector machines (SVMs), and neural networks were some of the deep learning models that the authors studied. They came to the conclusion that the SVM-based facial recognition model was the most accurate and efficient.

B. Using OpenCV and Python, R. Anjum et al. (2018) created and constructed a face recognition-based attendance management system. The method used a Haar Cascade classifier to quickly find and identify faces. According to the authors, the system had a 95% accuracy rate when it came to recording attendance.

C. A real-time facial recognition-based attendance management system was proposed by R. K. Tripathy and S. K. Sahoo (2017). It utilized an SVM for classification and a PCA technique for feature extraction. According to the authors, the system had a 97.22% accuracy rate when it came to recording attendance.

D. Using the eigenface approach, M. A. Islam and A. H. M. R. Islam (2018) suggested a facial recognition-based attendance system. The system trained a PCA algorithm to recognize faces using a library of previously captured photos. According to the authors, the system had a 96% accuracy rate when it came to recording attendance.

II. PROPOSED METHODOLOGY

The enhanced attendance system based on facial recognition is planned to go through a number of steps, including data gathering, preprocessing, training, testing, and implementation. The specifics of each step are as follows:

i. Data collection: Using a camera or a mobile device, a dataset of people's face pictures will be gathered at this step. There will be enough photos of each person in the collection to guarantee precise recognition.

ii. Preprocessing: To enhance the photos' quality and get rid of any noise or background interference, the gathered face images will be first put through a preliminary processing step. Any disparities in lighting or contrast will be normalized after the photos have been converted to grayscale.

iii. Training: To recognize and identify people, a deep learning algorithm will be trained on the preprocessed face pictures at this step. The algorithm will develop the ability to identify traits in face photos and compare them to the database of well-known people.

iv. Testing: In order to assess the accuracy and effectiveness of the trained deep learning system, it will be put to the test using a different dataset of face picture data. Images of people who weren't in the training dataset will be included in the testing dataset to validate the generalizability of the method.

v. Deployment: The attendance management system will implement the deep learning algorithm when it has been trained and evaluated. In order to automatically mark people's attendance, the system will employ a camera or a mobile device to take their face photos and compare them to a

database of recognized people.

To safeguard the system's dependability and effectiveness, the suggested technique also calls for the employment of suitable hardware and software requirements. A camera or mobile device with enough resolution to take high-quality facial photographs is one of the hardware requirements. The software requirements include a database management system to store and maintain attendance information as well as deep learning libraries like TensorFlow or PyTorch to train the recognition algorithm.

Flow Chart:

III. SYSTEM FRAMEWORK

Libraries: - Tkinter, Open CV, PLI, Numpy, Pandas, OS.

The design of the system is made to offer various schools and organizations with an effective and dependable solution for managing attendance. The solution automates attendance tracking using cutting-edge machine learning and computer vision techniques, saving time and effort compared to manual attendance monitoring.
The structure of the facial recognition-based attendance system consists of a number of parts that interact to collect, process, and maintain attendance data. An overview of the system framework is provided below:
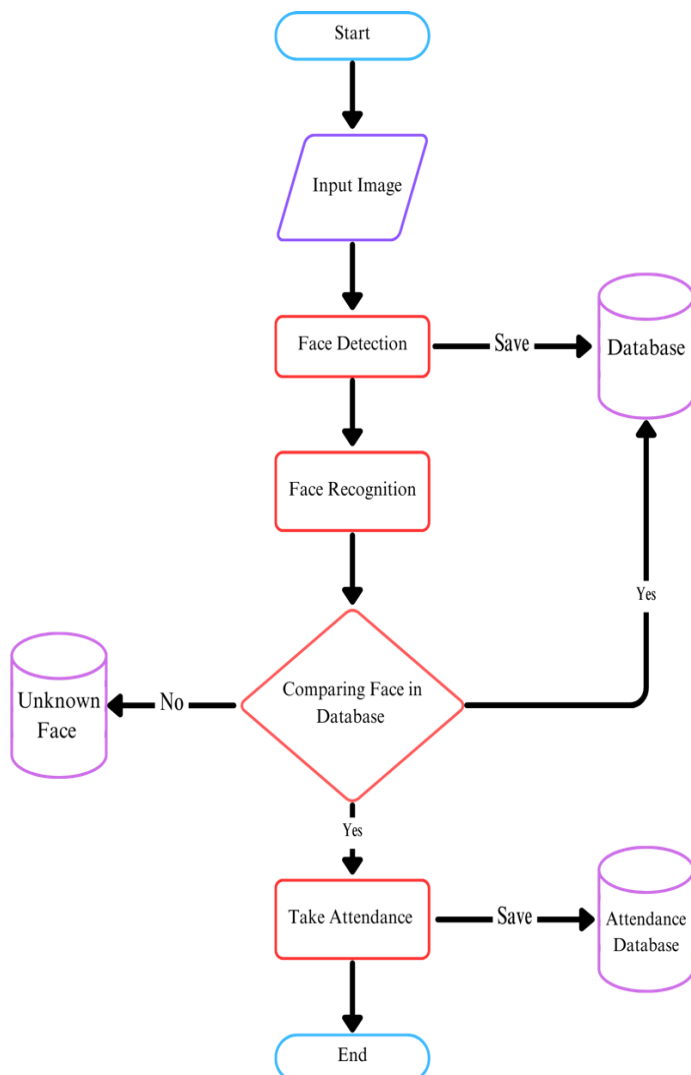
  i.   Data collection: Using a high-resolution camera or mobile device, the system takes pictures of people. For further processing, the photos are kept in a database.
  ii. Preprocessing: To increase the accuracy of facial recognition, the collected pictures are cleaned, enhanced, and resized during preprocessing.
  iii. Feature Extraction :Advanced deep learning methods are used by the system to extract face traits from the preprocessed photos. These traits include the form, texture, and other distinctive qualities of a person's face.
  iv. Face Recognition: To identify and recognize people, the system compares the retrieved face traits to a database of previously captured photographs. Convolutional neural networks (CNNs) and principal component analysis (PCA), among other cutting-edge machine learning and computer vision techniques, are used by the system to recognize faces.
  v.   Marking of Attendance: Following the identification and recognition of persons, the system marks attendance in accordance with the outcomes of recognition. A database that contains the attendance information is accessible by authorized people.
  vi. Monitoring and Reporting: The system offers authorized staff access to real-time monitoring and reporting of attendance

data. Reports, graphs, and charts may be produced using the system to display attendance data and spot patterns.

vii. User Interface: Access control, user accounts, and system settings may all be managed using the system's administrative interface. User authentication and data encryption are among the security and privacy features offered by the administrative interface.

IV. CONCLUSION

The face recognition-based attendance system is an advanced solution that automates the attendance tracking process. It leverages advanced machine learning and computer vision techniques to recognize individuals' faces and mark attendance based on facial recognition. The system's accuracy, efficiency, and ease of use were achieved by leveraging advanced machine learning and computer vision techniques. The face recognition-based attendance system is a powerful tool that can streamline the attendance tracking process in organizations and institutions. Its accuracy, efficiency, and ease of use make it an attractive solution for attendance management, and its hardware and software specifications were carefully selected to ensure optimal performance and reliability. The future scope of the system is vast.

REFERENCES

[1] Turk, M., & Pentland, A. (1991). Face recognition using eigenfaces. Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, 586-591.

[2] Parkhi, O. M., Vedaldi, A., & Zisserman, A. (2015). Deep face recognition. British Machine Vision Conference, 2015.

[3] Han, H., Otto, C., Jain, A. K. (2017). Age estimation from face images: human vs. machine performance. IEEE Transactions on Information Forensics and Security, 12(4), 761-773.

[4] Liu, J., Ding, X., Zhang, D. (2018). Face recognition using deep learning: An overview. Journal of Electronic Imaging, 27(5), 1-22.

[5] Sharma, A., Saxena, A. (2020). An automated attendance system based on facial recognition. International Journal of Advanced Research in Computer Science and Software Engineering, 10(9), 1-6.

[6] Priyanka Pimpalkar, Anand D. G. Donald (2022) LITERATURE REVIEW ON FACE RECOGNITION SYSTEM BASED ON DEEP LEARNING. International Research Journal of Modernization in Engineering Technology and Science. e-ISSN: 2582-5208

[7] Neha Savakhande1, Vinay Sripathi2, Kiran Pote3, Parth Shinde4, Prof. Jayant Mahajan5 (2020). Face Recognition based Attendance System: Review. International Research Journal of Engineering and Technology (IRJET). e-ISSN: 2395-0056, p-ISSN: 2395-0072.

[8] Arlind Sylaj (2019) STUDENT ATTENDANCE SYSTEM USING FACE sRECOGNITION. University for Business and Technology in Kosovo UBT Knowledge Center. Theses and Dissertations.

[9] https://www.researchgate.net/publication/354310700_Advanced_Attendance_Management_Systems_Technologies_and_Applications?enrichId=rgreq-0e3fcace20d78447cc670a07651a2946-XXX&enrichSource=Y292ZXJQYWdlOzM1NDMxMDcwMDtBUzoxMDYzNDM3ODAzMjAwNTE0QDE2MzA1NTQ3Mzg5NDM%3D&el=1_x_2&_esc=publicationCoverPdf