Face Recognition Attendance System

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Abstract — Record participation is one of the most important activities carried out every day in colleges, universities, organizations, schools and companies. It is usually done manually, such as searching by name or roll number. The main goal of this project is to create a unified attendance system based on facial recognition that will complement the current manual process. The program meets today's attendance standards and time management goals. This device is installed in the classroom and used to share student information such as name, roll number, class, seconds and photo. Extract images using OpenCV. Before the main lesson begins, students can access the machine that will begin taking photos and comparing them to appropriate items. In this project, Logitech C270 network camera and OPENCV are used as motherboards. The images are as follows: First, faces are recognized using the Haar Cascade classifier, then the LBPH (Local Binary Pattern Histogram) algorithm is used for recognition, first the histogram data is compared with the dataset and the device automatically verifies participation. The Excel file is updated every hour with the information provided by the classroom teacher. Keywords: face detection, face recognition. Attendance is very important for teachers and students in educational institutions. It is therefore important to keep attendance records. The problem arises when we consider how to participate in class. Calling student names or student numbers to check attendance is not only time-consuming but also energy-consuming. Therefore, automatic enrolment system can solve all the above problems.

Keywords: Attendance, Teachers, Students, Educational Institutions, Records, Automatic Enrolment System, Face Detection, Face Recognition, Logitech C270 Network Camera, OpenCV, Haar Cascade Classifier, LBPH Algorithm

I. INTRODUCTION

Nowadays, people are trying to make the experience better by using technology. Deep learning is an exciting topic where a machine can train itself by taking some generated data and deliver suitable products when tested using various learning algorithms. Today, attendance is considered an important factor among students and teachers in educational institutions. With the development of deep learning, machines determine children's attendance performances and track the data obtained. A student's attendance can be manual (MAS) or automatic (AAS)

Attendance management system is a method in which the teacher in charge of a particular course manually records students' attendance by calling students' names. Participating in the book will be seen as a way to pass the time; but there is a risk that the teacher will underestimate someone and the children will answer many times without a friend. Therefore, when we think about the attendance method in the classroom, the following question arises. We use Automatic Attendance System (AAS) to solve all these problems.

Automated Attendance Systems (AAS) use facial recognition to measure a student's presence or absence in class. It can also determine whether students are awake or asleep during the lesson, which can be used to check student attendance. Students' presence can be determined by recording their faces on a high-quality video streaming service, providing the computer with a reliable image of every student in the room.

II. LITERATURE SURVEY

Moreover, the latest changes imply the combination of different types of biometric and hardware improvements to create a more powerful and versatile facial recognition system. Future research directions could explore topics such as state training, edge work, and face-to face leadership to improve the effectiveness and integrity of these machines. Moreover, current trends suggest a combination of various biometric methods and hardware to create more reliable and flexible facial recognition. Issues such as state education, advanced studies, and leadership should be explored in future studies to improve the efficiency and integrity of these systems.

III. PROPOSED SYSTEM

Face Recognition Attendance combines the functions of OpenCV, LBPH and Haar cascade classifier to provide accurate and efficient attendance management. The system has several main components; the first part is the facial image capture module, which uses OpenCV to capture facial images. Histogram equalization and noise reduction are two methods that are pre-applied to these images to improve quality and reduce environmental effects. OpenCV's implementation of the LBPH algorithm facilitates face removal and access, ensuring reliability even in different lighting conditions and faces. Additionally, for face detection, the system uses the Haar cascade classifier, which can detect the correct face in the image. When registering, each person's personal information, along with their face, is stored in an attendance management database and then analyzed using OpenCV. The system uses the LBPH algorithm to instantly match the facial image with the registered person upon joining. With the help of the Haar cascade classifier, reliability is ensured by accurately detecting faces in the images. Successful campaigns enable timely and engagement tracking for immediate reporting and monitoring. Using the system's desired OpenCV development interface, administrators can easily create reports, track attendance and add members. It also leverages the diversity and compatibility of OpenCV and can be easily connected to existing engagement management. Strict procedures are in place to protect personal and sensitive

mugshots and profiles within the law. Selecting hardware that can meet OpenCV's facial image capture and processing capabilities is one of the considerations in use. Develop related software using OpenCV's extensive library to create facial recognition algorithms and user interfaces. In addition, regular support and user training is provided to ensure that the system operates smoothly and all problems are resolved quickly. In conclusion, the proposed face recognition attendance application uses OpenCV, LBPH and Haar cascade classifier to provide reliable, accurate and understandable attendance management. It promises to increase business productivity, protect the security and privacy of personal information, and streamline the process of tracking engagement through careful submission and continuous improvement.

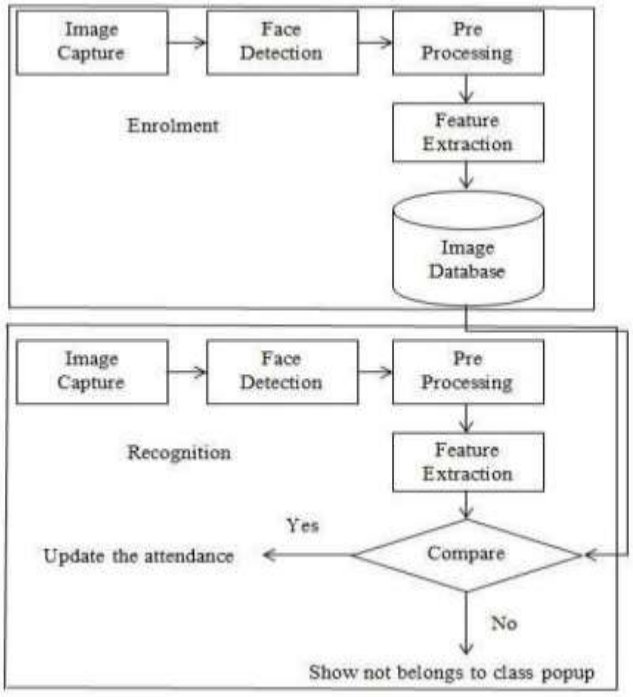

Fig. 1: System Architecture

Fig. 1: Use the Haar cascade classifier to capture facial images, use OpenCV and LBPH algorithms for processing, store registration information in the attendance management database, handle user interaction through the user layer, and combine external operations via API with security measures for data protection. shown in the system architecture diagram. With this setup, attendance management becomes easy and secure

1) Face detection:

This tool identifies and finds faces in photos or videosTechniques such as Haar cascades and deep learning-based algorithms. The Haar stage is a hierarchical classifier trained to recognize specific facial features such as eyes, nose, and mouth. Deep learning uses trained neural networks (CNN) to separate faces directly from raw pixel data, resulting in more accurate and powerful recognition.

2) Face Alignment:

After detecting the face, this step involves assessing its position, balance, and orientation. By aligning the face to a use case, variations in pose and lighting can be reduced, thus increasing the accuracy of recognition algorithms.

3) Feature Extraction:

Once a face is detected and enhanced, distinctive features are extracted to uniquely represent each face. The most common extraction methods include local binary pattern (LBP) and histogram of oriented gradients
(HOG).

4) Recognition algorithm:

In this step, the captured faces are compared with known people to find similarities. Many types of analysis can be used, including local binary pattern histogram (LBPH) algorithm, eigenfaces, Fishfaces, and deep learning such as convolutional neural network (CNN).

To effectively recognize faces, these algorithms understand patterns and relationships between extracted features.

5) Database Management:

The system manages the data of face templates or embeds and their symbols. During recognition, the system takes patterns from the data and compares them with the features obtained from the input face. Information is updated as new characters are added or existing characters change to ensure accuracy over time.

6) Participation data:

After the verification is completed, the system records the participation data by storing the personal data and information of the identified person. It's time to meet. These files are saved locally or sent to the central server for further processing. Integrate with existing attendance management systems or export data to Excel and other formats for easy access and analysis of attendance data.

7) System integration:

Facial recognition systems connect to classroom infrastructure or organizational systems to improve visitors. This may include connecting systems to existing attendance management, physical management or telecommunications to enable attendance and reporting.

8) Test:

The performance of the system is rigorously tested to be accurate, fast and robust in many cases. Metrics such as true positive rate (TPR), negative rate (FPR), and acceptance rate are used to measure performance and identify areas for improvement.

9) Privacy and security:

Steps have been taken to protect the privacy and security of biometric data. This includes accessing sensitive data, using access controls to prevent unauthorized access, and complying with relevant laws such as the General Data Protection Regulation (GDPR) to clarify personal data ethics.

10) Documentation and maintenance:

System architecture, algorithm and deployment methods are all data retained for future use and maintenance. We perform regular updates and maintenance to address any issues and advances in facial recognition to ensure the system remains accurate and reliable over time

IV. RESULT

The use of facial recognition engagement has produced many positive results. First, it can save a lot of time and work compared to traditional attendance management methods. Using facial recognition technology, the device eliminates the

need to shout names or roster numbers, making participation faster and more effective. Additionally, technology increases accuracy and reliability by reducing human error and providing instant information updates. This ensures that attendance records are accurate and up to date; This benefits both teachers and students in the school. Additionally, technology improves security by only allowing staff to enter the classroom or facility, thus increasing the overall safety of the school. In general, the facial recognition system replaces the control system by providing friction and flexibility.

REFERENCES

[1] Singh, R., & Gupta, P. (2020). "Real-Time Face Recognition Based Attendance System." In 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) (pp. 87-92). IEEE.
[2] Bhatia, A., & Bhalla, A. (2018). "Automatic Attendance System Using Face Recognition." In 2018 4th International Conference on Computational Intelligence & Communication Technology (CICT) (pp. 1-5). IEEE.
[3] Gupta, S., Soni, S., & Chugh, S. (2019). "Face Recognition Based Attendance System Using Raspberry Pi." In 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS) (pp. 210-214). IEEE.
[4] Kumar, S., & Sood, S. K. (2017). "Attendance System using Face Recognition." International Journal of Engineering Research and Applications, 7(5), 14-20.
[5] Choubey, D., & Bisen, S. (2019). "Smart Attendance System Using Face Recognition." International Journal of Engineering Science and Computing, 9(2), 19984-19986.
[6] Chatterjee, S., & Khan, S. (2018). "Face Recognition Based Attendance System Using Principal Component Analysis." In 2018 Second International Conference on Electronics, Communication and Aerospace Technology (ICECA) (pp. 579-583). IEEE.
[7] Sharma, S., & Jain, A. (2018). "Attendance System Based on Face Recognition." International Journal of Engineering and Computer Science, 7(3), 24807-24811.
[8] Jindal, R., & Kaur, M. (2019). "Automated Attendance System Using Face Recognition." International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 4(1), 153-156.
[9] Chauhan, P., & Kumar, M. (2020). "Smart Attendance System Using Face Recognition with Raspberry Pi." In 2020 3rd International Conference on Computing, Communication and Security (ICCCS) (pp. 1-5). IEEE.
[10] Singh, A., & Mishra, S. (2018). "Smart Attendance System Using Face Recognition." In 2018 International Conference on Computing, Power and Communication Technologies (GUCON) (pp. 1-4). IEEE.
[11] Patil, S., & Patil, S. (2019). "Real-Time Automatic Attendance System Using Face Recognition." International Journal for Research in Applied Science & Engineering Technology, 7(3), 1377-1381.
[12] Kapoor, A., & Bansal, D. (2018). "Face Recognition-Based Attendance Management System." In 2018 8th International Conference on Cloud Computing, Data Science & Engineering –
[13] Devi, K. S., & Das, M. S. (2020). "Face Recognition Based Attendance System Using Raspberry Pi." In 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) (pp. 87-92). IEEE.
[14] Sharma, A., & Sharma, V. (2018). "Smart Attendance System Using Face Recognition." International Journal of Engineering and Techniques, 4(5), 157-160.
[15] Mittal, M., & Rawat, S. (2019). "Face Recognition Based Attendance System." In 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS) (pp. 784-788). IEEE.
[16] Yadav, N., & Sharma, P. (2018). "Automated Attendance System Using Face Recognition." International Journal of Engineering Science and Computing, 8(8), 17642-17645.
[17] Suryavanshi, S., & Khairnar, S. (2019). "Real-Time Automatic Attendance System Using Face Recognition." International Journal of Trend in Scientific Research and Development, 3(5), 265-268.
[18] Tiwari, A., & Saini, P. (2018). "Face Recognition Based Automatic Attendance System." International Journal of Innovative Research in Computer and Communication Engineering, 6(5), 4963-4971.
[19] Agarwal, M., & Rana, S. (2017). "Smart Attendance System Using Face Recognition." International Journal of Science, Engineering and Technology Research, 6(3), 891-896.
[20] Bhargava, N., & Agarwal, P. (2019). "Automatic Attendance System Using Face Recognition." International Journal of Advance Research, Ideas and Innovations in Technology, 5(4), 409-413.
[21] Facial Recognition Attendance System Based on Deep Learning" by Xiaodong Liu, Junyan Li, and Zhenguo Huang. (Published in 2019 International Conference on Virtual Reality and Intelligent System)
[22] Real-Time Facial Recognition Attendance System for Education Environment by Wael F. Alsoudi, Kazi Mohammed Saidul Huq, and Abdullah I. Alshetwi. (Published in 2020 IEEE 21st International Conference on Information Reuse and Integration for Data Science)
[23] Development of Facial Recognition Based Attendance System using Raspberry Pi" by Aishwarya Shetty, Nitesh Sukhwani, and Rajeshwari N. (Published in 2018 International Conference on Computer Communication and Informatics)
[24] Automatic Attendance System Using Face Recognition" by K. Ramya and S. Saravanakumar. (Published in 2018 IEEE International Conference on Electrical, Computer and Communication Technologies)
[25] Face Recognition Based Attendance System Using Eigenfaces" by M. V. Hanmandlu, S. Arun Kumar, and K. Lalitha. (Published in 2016 International Conference on Computational Intelligence and Computing Research)

