AI Based Attendance System using Face Recognition

Siddharth S. Desai
Dept of Computer Science and Engineering
MIT ADT University
Pune, Maharashtra
siddharthdesai0602@gmail.com

Saurabh K. Vidyarthi
Dept of Computer Science and Engineering
MIT ADT University
Pune, Maharashtra
saurabhvidyarthi38@gmail.com

Prof. Sachin M. Jagadale
Dept of Computer Science and Engineering
MIT ADT University
Pune, Maharashtra
sachin.jagdale@mituniversity.edu.in

Shreyash P. Kalbhor
Dept of Computer Science and Engineering
MIT ADT University
Pune, Maharashtra
kalbhorshreyash@gmail.com

Rishikesh N. Gaikwad
Dept of Computer Science and Engineering
MIT ADT University
Pune, Maharashtra
gaekwadrishikesh@gmail.com

ABSTRACT
In the fast growing industry of the Artificial Intelligence and Machine Learning Applications, the face recognition also plays an important role in many sector including the one used in for the identification of the person. The Face Recognition system can be used in schools, colleges, offices etc. for marking of hassle free and fast attendance so that the teaching faculty gets time to focus on delivering the content rather than taking attendance. This research paper explores the implementation of such attendance management system which is based on face recognition, to eliminate the traditional method of attendance management system which is time consuming and highly prone to errors. The results indicate that the face recognition system is a viable and effective solution, significantly reducing the errors and saving time.

Keywords
Face Recognition; Face Detection; Haar-Cascade classifier; attendance management system.

1. INTRODUCTION
Presently, the method of marking the attendance is the tedious task in many institutions. The attendance is taken manually by the faculty itself which takes few minutes and there are also chances of proxy leading to false attendance, whereas the teaching time is reduced and the faculty is distracted as well. The methods like Radio Frequency Identification RFID [1], iris recognition [2], fingerprint recognition etc. are presently used in the institutions which requires a queue to be created which again becomes time consuming.

Face Recognition is an important biometric feature which is non-intrusive and consumes less time as compared to other methods available. The paper reviews the current literature on face recognition technology, attendance management systems, and the integration of both. Face recognition is based on 2 aspects or 2 steps are involved in it: Face Identification and Verification.

Here the face of an individual will be considered for marking the attendance with less or no errors. In this paper we proposed a system where a face of an individual is scanned and verified then matched with the existing dataset present in the module. If the person is verified successfully, his/ her attendance is directly marked in the csv file which can be used for further references.

2. LITERATURE SURVEY
Authors in [1] proposed a model using RFID technologies, the proposed system aims to overcome the limitations of traditional attendance systems which are time consuming and inefficient way of marking the attendance. The system used RFID readers for authentication. The model mainly focused on how to incorporate face recognition with the RFID detection for authorization of an individual.

Authors in [2], used the iris based biometric recognition technology. The system eliminates the need for manual attendance sheets and reducing the risk of proxy. It consists of camera and a Raspberry Pi computer with an iris recognition algorithm. The camera captures the image of student eye, and the iris recognition algorithm extracts the unique features for the iris to verify it with the individual's identity.

In paper [3], the machine learning algorithm were used for face recognition. This paper used the Local Binary Patterns (LBP) algorithm for feature extraction, and attendance data is stored in database. The system also includes a web interface for attendance management and reporting. Quantitative analysis was done on the basis of Peak Signal to Noise Ratio (PSNR)

Authors in [4], The system uses a camera for face recognition and an algorithm based on the Viola-Jones object detection method for face detection. The captured face images are processed using the Scale - Invariant Feature Transform (SIFT) algorithm for feature extraction, and the attendance data is stored in database. The system also includes a web interface for attendance management and reporting

Authors in [5], The system uses a camera for face recognition and an algorithm based on the Local Binary Patterns (LBP) method for face detection and recognition. The captured face images are processed, and the attendance data is stored in a database. The system also includes a web interface for attendance management and reporting.

3. PROPOSED SYSTEM

All the users of this facility should register themselves, which is a one-time registration needed along with their images which will be taken by the software itself.

With the start of each session the images will be captured by the live stream and the faces will be detected, and matched with the already present images in the database. If match is found then the data of the individual will be marked as present and the csv file will be generated after each session.

The module can also be made compatible to send the mail or pop up to the guardians of absentees. The module can recognize the faces of multiple people in one frame simultaneously.

The system architecture can be given as:

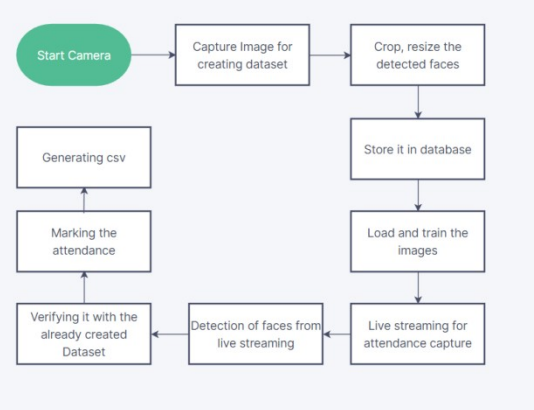

Fig 1. System Architecture

3.1 Create the Dataset

The required images of the users are captured using any camera module, for now we are using the webcamera. 100 images with different angles are captured of the users. After the images are captured, those are then pre-processed to reduce the dimensionality and capture only that part which is really useful for the recognition, deleting all the background noise.The captured images are already in grayscale and hence need not be converted to grayscale image later on. These later will be saved by the unique ID of the student with NOT NULL constraints.

3.2 Detect Faces

Face Detection in the project is captured by Haar-Cascade Classifier with OpenCV. The special part of OpenCV that is haarcascade_frontalface is used for detecting the faces of the individual. The frontalface library of Haar-Cascade is used to extract the features of the pre-set images

3.3 Recognize Faces

The facial recognition process can be divided into three steps: preparing training data, learning face recognition, and making predictions. The training data resembles to the dataset already created in the backend. The Details corresponding to the individual will be assigned accordingly. The images are later used for the recognition of the individual. The face recognizer used in this system is Local Binary Pattern histogram. Initially, a list of local binary patterns (LBP) of whole faces is obtained. These LBP are converted into decimal numbers and then a histogram is formed from all these decimal values. Finally, a histogram will be formed for each image in the training data. In the recognition process, the process calculates the histogram of the face to be recognized, then compares it with the calculated histogram, and gives the best match label linked to the pupil to which belongs [7].

3.4 Update the Attendance list

After the face is recognized with the help of Haar-Cascade and LBP, the unique ID associated with it will be taken out and the attendance will be marked for that particular individual in the csv file, which further can be exported to the excel sheet. Faculties can use the attendance for further references.

4. RESULTS

The GUI is created for the reference of the users and can interact using that. The GUI has an option of viewing the details of the students, Training the dataset, Detecting the face and marking attendance, Viewing Dataset of the students, the attendance of the students where we can export csv file, help desk and exit button.

The users are supposed to enter all the details along with unique ID allotted to them by the College or Institution, the Face recognized will be mapped with the unique id and rest of the information will be fetched from the MySQL Database in the backend.

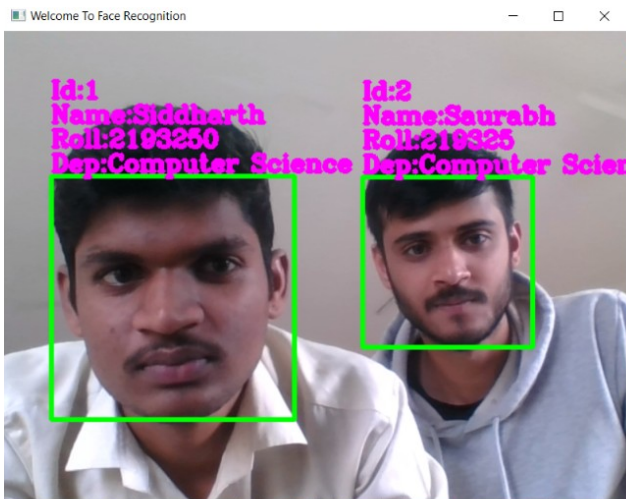

Fig 2. Results/output screen shot

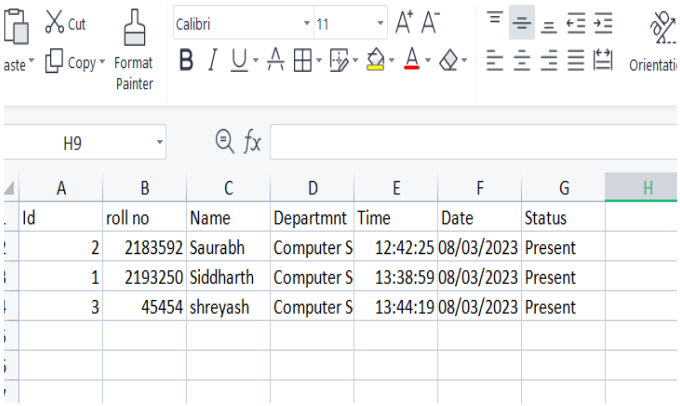

Fig 3. Attendance sheet

5. FUTURE SCOPE

Face recognition-based attendance management systems have gained a lot of popularity in recent years, and their use is expected to increase even further in the future. With the advancement of technology, these systems are becoming more accurate, efficient, and secure, making them an ideal choice for many organizations.

We are trying to involve drowsiness detection which will help to mark attendance of only those who are genuinely attending the lecture with full attention, and not just for the sake of P.

Improvement of accuracy can be achieved with further advancements in technology.

Increased security is the major concern as the data of the users shouldn't get leaked.

Cloud based solutions can be thought to take the project on the large scale.

6. CONCLUSION

In conclusion, our study has shown that the use of face recognition technology for marking attendance can be an effective and efficient alternative to traditional methods. With high accuracy rates and fast processing times, this system has the potential to significantly reduce administrative burdens and errors associated with manual attendance tracking.

Moreover, this technology has the ability to provide real-time tracking of attendance, which can facilitate better decision-making and improve student and employee accountability. In addition, the system is relatively easy to set up and use, with minimal hardware requirements and low maintenance costs.

Despite the many benefits of face recognition technology for attendance tracking, it is important to consider the potential ethical and privacy concerns associated with this technology. Adequate safeguards should be put in place to protect the privacy and security of individuals' biometric data.

7. REFERENCES

[1] Akbar, Md Sajid, et al. "Face Recognition and RFID verified Attendance System" 2018 International Conference on Computing Electronics and Communications Engineering (iCCECE). IEEE, 2018.

[2] Okokpujie, Kennedy O., et al. "Design and implementation of a student attendance system using iris biometric recognition." 2017 International Conference on Computational Science and Computational Intelligence (CSCI). IEEE, 2017

[3] Jayashree Somani, Mrs. Vaishali Kolhe, Student, Department of Computer Engineering, D.Y. Patil college of Engineering, Akurdi, Pune, Maharashtra, India, Jetir, June 2019

[4] Siswanto, Adrian Rhesa Septian, Anto Satriyo Nugroho, and Maulahikmah Galinium. "Implementation of face recognition algorithm for biometrics-based time attendance system." 2014 International Conference on ICT For Smart Society (ICISS). IEEE, 2014

[5] Lukas, Samuel, et al. "Student attendance system in classroom using face recognition technique." 2016 International Conference on Information and Communication Technology Convergence (ICTC). IEEE, 2016

[6] Smitha, Pavithra S Hegde, Afshin, Yenepoya Institure of Technology, Moodbidri. Ijert Vol.9 2020.

[7] https://www.superdatascience.com/blogs/opencv-face-recognition

[8] R.S, Dr.Sabeenian & S, Aravind & P, Arunkumar & Joshua, P. & G, Eswarraj. (2020). Smart Attendance System Using Face Recognition. Journal of Advanced Research in Dynamical and Control Systems. 12. 1079-1084. 10.5373/JARDCS/V12SP5/20201860.

[9] Chew, Cheah & Mahinderjit Singh, Manmeet (Mandy) & Chiang, Kam & Tan, Wei & Sheng, Wei & Husin, Heikal & Hashimah, Nurul & Malim, Nurul. (2015). Sensors-enabled Smart Attendance Systems Using NFC and RFID Technologies. International Journal of New Computer Architectures and their Applications. 5. 19-28. 10.17781/P001645.

[10] Basheer, Mohamed & Raghu, C.V.. (2012). Fingerprint attendance system for classroom needs. 433-438. 10.1109/INDCON.2012.6420657.