

Automated Attendance System Using Facial Recognition

Amit S Pawar¹, Shubham S Patil², Kaustubh A Rai³, Roshan Bauskar⁴

¹Amit S Pawar, Dept. of Computer Engineering College, Maharashtra, India

²Shubham S Patil, Dept. of Computer Engineering College, Maharashtra, India

³Kaustubh A Rai, Dept. of Computer Engineering College, Maharashtra, India

⁴Professor, Roshan Bauskar, Dept. of Computer Engineering, G.V. Acharya Engineering College, Maharashtra, India

Abstract - Facial recognition technologies have undergone large-scale upgrades and with the new human based facial recognition algorithm named as 'Haar-cascade' [5] which is used with the three classifiers that are skin classifier, mouth classifier & eyes classifier [5]. This proposed system works in real-time as automated attendance system which marks the attendance of employees in an organization. The proposed system uses the algorithm of 'Haar-cascade' [5] with three classifiers implemented using python's 'Open-CV library' [5] and this system uses Principle Component Analysis [PCA] [1] in order to maintain the accuracy of the facial detection.. This proposed system requires less hardware support also the processing time is also less in compare to other conventional system of signing papers, Radio Frequency Identification [RFID] [2] and biometrics [4] which proves this system to be more efficient for organization to use it in real time application.

Key Words: Open-CV; Computer Vision; CNN; PCA; LBP; human face detection; Haar-like features; face skin hue histogram match; eyes detection; mouth detection; cascade classifier

1. INTRODUCTION

This project presents the development and implementation of Smart Attendance System. Our system is designed in such a way that it manages the employee attendance record in a very efficient manner & time saving pattern that the employee doesn't require to fill the attendance sheet or put a thumb for biometric way or scanning Radio Frequency Identification [RFID][6] cards instead the Automated Attendance System concerns about the employee efforts and doesn't disturb his work and secretly captures the record of his/her presence at the time of employee visiting towards gate and exiting the gate and the record is stored into the database and which contributes hassle free and costless attendance of employee. This cost-saving and time-saving system results a huge profit for organization due to its efficiency. Our attempt is to develop and implement a Smart Attendance System for organization in hassle free manner just by facial detection using Haar-cascade algorithm [1] with classifier based on skin hue histogram matching, eyes detection and mouth detection. The organization has to just place our Automated Attendance System in the entry gate and exit gate of the working area of the employees. Whenever the employee will just pass through the gate and automatically our system will capture his face while during entry period and exit period and it will store that record into the database.

2. LITERATURE REVIEW

Our proposed system is produced by following all the previous gadgets and methods for marking and noting down the attendance. First model we referred was from the paper- "Attendance Management Using Facial Recognition" from this paper we note that the technologies used in this system was Principle Component Analysis(PCA), in this system we found that the accuracy is high and less processing time but it has difficulties to maintain database and it requires continues power-supply. The second thesis we referred was "Design of Intelligent Classroom Attendance System Based on Face Recognition" in this the technologies used were AlexNet Convolution Neural Network combined with RFID, the system was accurate to launch CNN but it wasn't efficient. Third thesis we referred was "Smart Attendance Monitoring System", in this technology we found that the Viola & Jones image classification algorithm was used and the results were it was accurate and compact but it doesn't work in areas where there is insufficient light and also it crashes when more entries are made into the database. Fourth paper we referred was "Class Attendance Management System Using Face Recognition" in this paper the technologies used were Local Binary Patterns algorithm(LBP) but it also requires more hardware components. The next system we referred from thesis "FaceTime- Deep Learning Based Face Recognition Attendance System" from this system we studied that the technologies used were Convolution Neural Network and CNN cascade, the result it gives is accuracy of 95.02% with monitoring feature but it takes more time for its functioning and also fails when there is not stable internet connectivity. We developed system which removes almost all the delimitation of referred systems as we use Haar cascade algorithm with three classifiers and it detects and marks attendance using face using minimal time & hardware equipment.

3. PROPOSED SYSTEM

The Proposed system overcomes the problem of the existing system. This project uses the face recognition technique using the employee records for marking attendance. In the proposed system application is active during working hours of the organization. The camera of the system (Computer application) will be fitted on entrance as such to scan the faces of anyone who enters the office, the application captures the image and sends it to the processing side. The processing part of the application recognizes the face of the employee. Finally, the application marks the employee if

he/she is present. If an employee is not recognized by the application i.e., he / she is not present, he / she is marked as absent for the day. Humans are prone to error. Automated attendance management systems ensure accurate time records and minimize the inevitable and costly errors with manual data entry. This accurate data thereby helps to provide accurate performance and payroll data.

Proposed System has the following Significance-

- Monitoring and managing attendance manually can be a time-consuming, laborious, and expensive affair. It takes time to process paper sheets and time cards, create schedules, authorize leave and overtime, and create payroll manually.

- The time and effort saved combined with data accuracy helps in optimizing the use of resources which lead to increased productivity and improves profits.
- An integrated attendance management system can provide good visibility of all data and can ease the workflow of payrolls, leaves and performance reviews. Notifications/alerts are automated and the manager can approve requests for early departure, overtime, etc., immediately without any specific need for communication.
- Cloud-based attendance management enables real-time tracking and provides automated inputs for payroll processing.

4. SYSTEM ARCHITECTURE

The System process can be separated into three working modules. They are face representation, feature extraction and classification. The first and foremost task is modeling a face. The way is face is represented determines the next two steps. The image acquired is transformed to match the positions of images already present. In feature extraction the features of the face are mapped as histograms with gradients and they are stored as binary values. The final step is recognizing a familiar face. The system compares the face seen in the camera with records that are already stored.

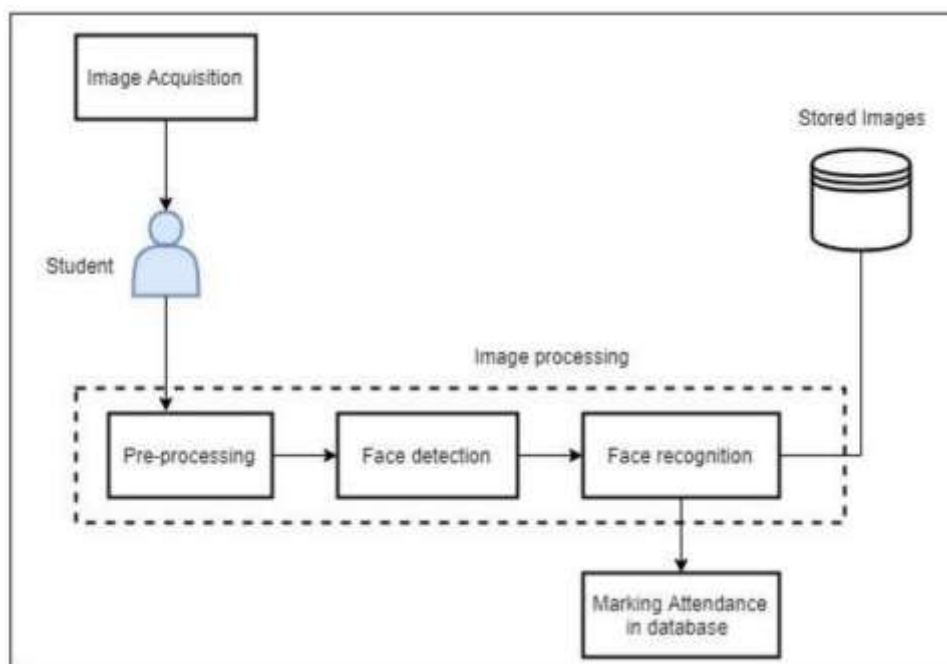


Fig 4.1 -: System Architecture

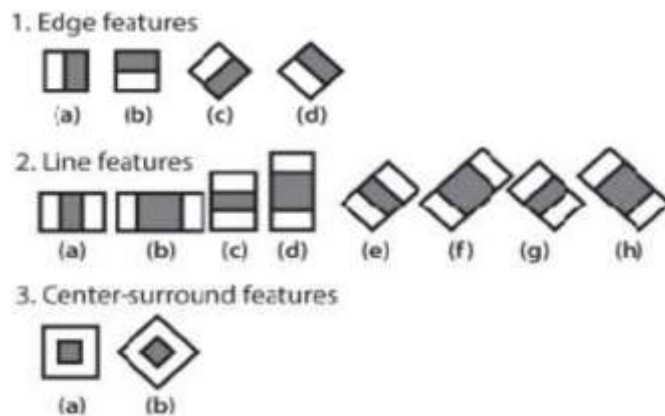


Fig 4.2 -: Haar like features from OpenCv

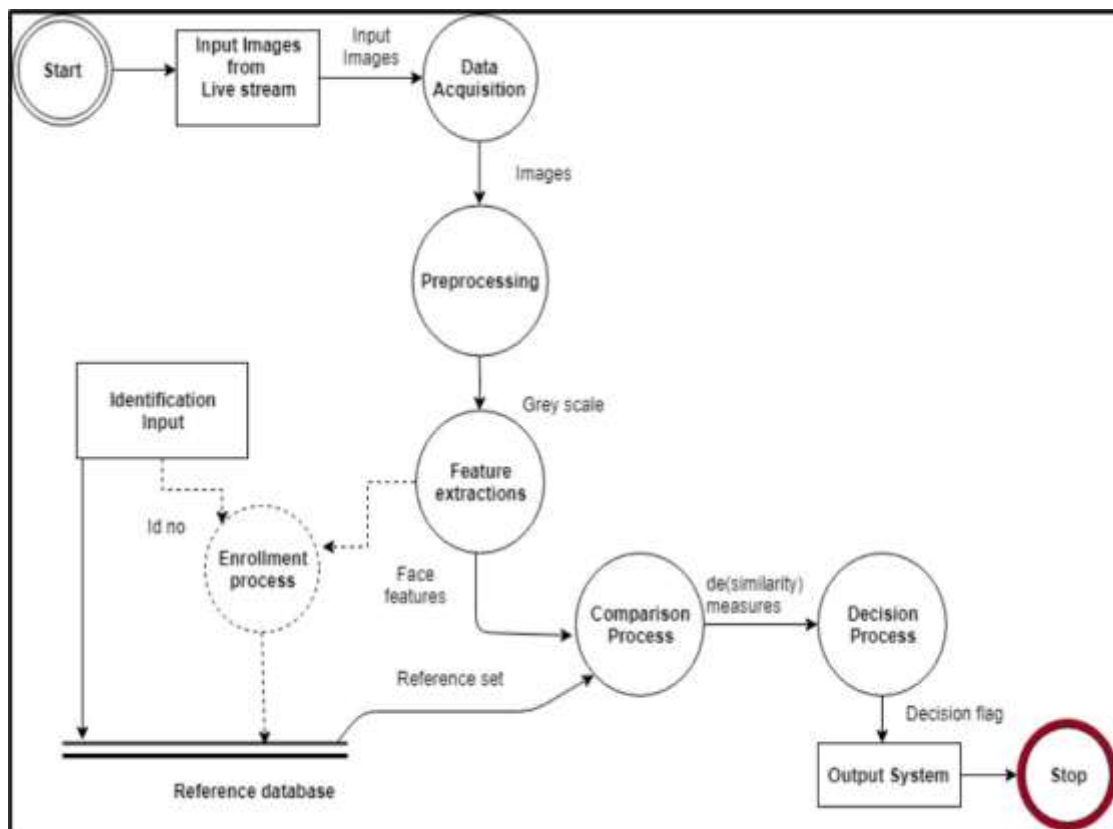


Fig -4.3: Flowchart of Proposed System

5. CONCLUSIONS

A new human face detection algorithm is proposed on a basis of cascade classifiers using Haar-like features. Three additional weak classifiers are subsequently appended to the primitive Haar-like features based cascaded classifiers. One is a decision node based on human skin hue histogram matching. The second and the third weak classifiers are based on eyes and mouth detections, respectively. Because eyes and mouth detections are also implemented with Haar-like features-based cascade classifiers, both of them have a sufficiently high detection rate, satisfying conditions of weak classifiers. Experimental results show that the proposed

human detection algorithm compensates the shortcomings of the primitive Viola-Jones' cascade classifier and makes the whole human face detection rate higher while keeping nearly zero wrong rejection.

The contributions of this work can be concluded as below:

- A weak classifier based on human face skin tone histogram can reject a big proportion of non-faces wrongly detected by the primitive Viola-Jones' Haar-like features-based cascade classifiers.

- 2 additional classifiers based on eyes and mouth detections further remove those non- faces whose colors happen to be in accordance with the human skin color, but there are probably no eyes- and mouth-like objects in it.
- The proposed human face detection system is simple to implement due to availability of modules in OpenCV.

REFERENCES

- [1] Rajath S Bharadwaj, Tejus S Rao, Vinay T R, "Attendance Management Using Facial Recognition", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-6, April 2019
- [2] Wenxian Zeng, Qinglin Meng, Ran Li, "Design of Intelligent Classroom Attendance System Based on Face Recognition", IEEE 3rd Information Technology, Networking,
- [3] Shubhobrata Bhattacharya, Gowtham Sandeep Nainala, Prosenjit Das and Aurobinda Routray, "Smart Attendance Monitoring System (SAMS): A Face Recognition based Attendance System for Classroom Environment", IEEE 18th International Conference on Advanced Learning Technologies 2018
- [4] Omar Abdul Rhman Salim, Rashidah Funke Olanrewaju, Wasiu Adebayo Balogun "Class Attendance Management System Using Face Recognition", Department of Electrical and Computer Engineering, January 2018 IEEE
- [5] Li Cuimei, Qi Zhiliang, Jia Nan, Wu Jianhua, "Human face detection algorithm via Haar cascade classifier combined with three additional classifiers", IEEE 13th International Conference on Electronic Measurement & Instruments 2017
- [6] Marko Arsenovic, Srdjan Sladojevic, Andras Anderla, Darko Stefanovic, "FaceTime- Deep Learning Based Face Recognition Attendance System", IEEE 15th International Symposium on Intelligent Systems & Informatics September 2017