

Face Recognition Attendance System

Manjiri Patil, Payal Binnar, Sanjana Binnar, Y. V. Chandratre

Department of Electronic and Telecommunication
Guru Gobind Singh Polytechnic, Nashik, India

Abstract: *In colleges, universities, organization, schools, and offices, taking attendances is one of the most important tasks must be done on a daily basis. The majority of the time, it is done manually, such as by calling by name or roll member. The Main goal of these project is to create a face recognition-based attendance system that will turn this manual process into an automated one. This project meets the requirements for bringing modernization to the way attendance is handheld, as well as the criteria for time management. This device is installed in the classroom. Where and students' information, such as name, roll number, class, sec, and photographs, is trained. The images are extracted using open CV. Before the start of the corresponding class, the student can approach the machine, which will begin taking pictures and comparing them to the qualified dataset.*

Keywords: Face Recognition, Attendance System, Biometric Authentication, Machine Learning, Deep Learning, Computer Vision, Facial Recognition, Student Attendance Management, Face Detection Algorithms, Automated Attendance Systems, AI-based Attendance System, Real-time Face Detection, Image Processing, Surveillance Systems, Identity Verification, Security and Privacy in Education, MSBTE Research, Educational Technology, Smart Classroom, Facial Features Recognition, Biometric Solutions for Attendance

I. INTRODUCTION

Traditional attendance systems rely heavily on manual processes, which are time-consuming and prone to inaccuracies. Biometric methods like fingerprint and iris scans are effective but may cause hygiene concerns and require physical contact. Face recognition offers a contactless, efficient, and scalable solution. Attendance management is a critical component of educational institutions, ensuring accountability and monitoring student participation. Traditional attendance systems, such as manual roll calls and register entries, are time-consuming, inefficient, and prone to errors. Even advanced methods like RFID cards or fingerprint scanning pose challenges, such as forgetting cards, hygiene concerns, or physical contact requirements. In addition, a lack of real-time communication with parents regarding student attendance further widens the gap in transparency and accountability. To address these challenges, this research introduces a Face Recognition Attendance System with Parent Notification, a contactless, efficient, and automated solution. The system leverages machine learning algorithms for facial recognition, enabling accurate and quick identification of students as they enter the classroom. Once attendance is marked, the system sends real-time SMS or email notifications to parents, ensuring they remain informed about their child's presence in school. The use of facial recognition technology ensures a seamless and secure attendance process without requiring physical interaction. This approach integrates advanced image processing techniques, such as Haar Cascades or deep learning models like Convolutional Neural Networks (CNNs), to detect and match faces from a pre-stored database. Furthermore, the system employs IoT communication frameworks to deliver instant notifications to parents, bridging the gap between institutions and families. By automating attendance marking and improving parental engagement, this system not only reduces administrative workload but also promotes greater transparency and accountability. It serves as a reliable and scalable solution tailored to modern educational needs, enhancing the overall management of attendance processes in a secure and effective manner.

II. LITERATURE SURVEY

Akbar, Md Sajid, et al. proposed a model of an automated attendance system. The model focuses on how face recognition incorporated with Radio Frequency Identification (RFID) detect the authorized students and counts as they

get in and get out from the classroom. The system keeps the authentic record of every registered student. The system also keeps the data of every student registered for a particular course in the attendance log and provides necessary information according to the need.

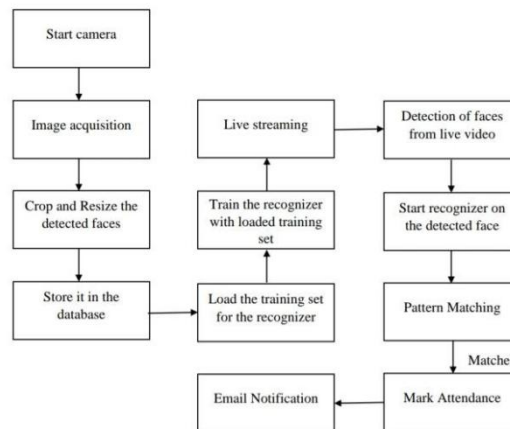
Okokpujie, Kennedy O., et al authors have designed and implemented an attendance system which uses iris biometrics. Initially, the attendees were asked to register their details along with their unique iris template. At the time of attendance, the system automatically took class attendance by capturing the eye image of each attendee, recognizing their iris, and searching for a match in the created database. The prototype was web based.

Rathod, Hemantkumar, et al, authors proposed an attendance system based on facial recognition. The algorithms like Viola-Jones and Histogram of Oriented Gradients (HOG) features along with Support Vector Machine (SVM) classifier were used to implement the system. Various real time scenarios such as scaling, illumination, occlusions and pose was considered by the authors. Quantitative analysis was done on the basis of Peak Signal to Noise Ratio (PSNR) values and was implemented in MATLAB GUI.

Siswanto, Adrian Rhesa Septian, Anto Satriyo Nugroho, and Maulahikmah Galinium are the researches to get best facial recognition algorithm (Eigenface and Fisherface) provided by the Open CV 2.4.8 by comparing the Receiver Operating Characteristics (ROC) curve and then implemented it in the attendance system. Based on the experiments carried out in this paper, the ROC curve proved that, Eigenface achieves better result than Fisherface. System implemented using Eigenface algorithm achieved an accuracy rate of 70% to 90%.

III. PROPOSED SYSTEM

All the students of the class must register themselves by entering the required details and then their images will be captured and stored in the dataset. During each session, faces will be detected from live streaming video of classroom. The faces detected will be compared with images present in the dataset. If match found, attendance will be marked for the respective student. At the end of each session, list of absentees will be mailed to the respective faculty handling the session. The system architecture of the proposed system is given below,



Typically, this process can be divided into four stages,

1. Dataset Creation

Images of students are captured using a web cam. Multiple images of single student will be acquired with varied gestures and angles. These images undergo pre-processing. The images are cropped to obtain the Region of Interest (ROI) which will be further used in recognition process. Next step is to resize the cropped images to particular pixel position. Then these images will be converted from RGB to Grey scale images. And then these images will be saved as the names of respective student in a folder.

2. Face Detection

Face detection here is performed using Haar-Cascade Classifier with OpenCV. Haar Cascade algorithm needs to be trained to detect human faces before it can be used for face detection. This is called feature extraction. The haar cascade

training data used is an xml filehaarcascade_frontalface_default. The haar features shown in Fig.2. will be used for feature extraction.

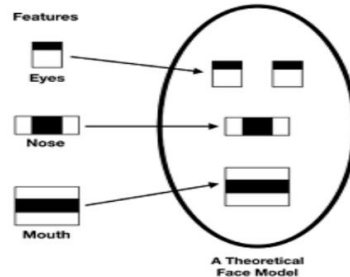


Fig.2. Haar Features

Here we are using detectMultiScale module from OpenCV. This is required to create a rectangle around the faces in an image. It has got three parameters to consider- scaleFactor, minNeighbors, minSize. scaleFactor is used to indicate how much an image must be reduced in each image scale. minNeighbors specifies how many neighbors each candidate rectangle must have. Higher values usually detects less faces but detects high quality in image. minsize specifies the minimum object size. By default, it is (30,30) [8]. The parameters used in this system is scale Factor and neighbours with the values 1.3 and 5 respectively.

3. Face Recognition

Face recognition process can be divided into three steps prepare training data, train face recognizer, prediction. Here training data will be the images present in the dataset. They will be assigned with a integer label of the student it belongs to. These images are then used for face recognition. Face recognizer used in this system is Local Binary Pattern Histogram. Initially, the list of local binary patterns (LBP) of entire face is obtained. These LBPs are converted into decimal number and then histograms of all those decimal values are made. At the end, one histogram will be formed for each images in the training data. Later, during recognition process histogram of the face to be recognized is calculated and then compared with the already computed histograms and returns the best matched label associated with the student it belongs to [9].

4. Attendance Updation

After face recognition process, the recognized faces will be marked as present in the excel sheet and the rest will be marked as absent and the list of absentees will be mailed to the respective faculties. Faculties will be updated with monthly attendance sheet at the end of every month.

IV. RESULTS AND DISCUSSIONS

The users can interact with the system using a GUI. Here users will be mainly provided with three different options such as, student registration, faculty registration, and mark attendance. The students are supposed to enter all the required details in the student registration form. After clicking on register button, the web cam starts automatically and window as shown in Fig.3. pops up and starts detecting the faces in the frame. Then it automatically starts clicking photos until 60 samples are collected or CTRL+Q is pressed. These images then will be pre-processed and stored in training images folder. The faculties are supposed to register with the respective course codes along with their email-id in the faculty registration form provided. This is important because the list of absentees will be ultimately mailed to the respective faculties.

V. CONCLUSION

This system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record.

REFERENCES

- [1]https://www.researchgate.net/publication/326261079_Face_detection_systemfor_attendance_of_class_students
- [2] Hapani, Smit, et al. "Automated Attendance System Using Image Processing." 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA). IEEE, 2018.
- [3] Akbar, Md Sajid, et al. "Face Recognition and RFID Verified Attendance System." 2018 International Conference on Computing, Electronics & Communications Engineering (iCCECE). IEEE, 2018.
- [4] 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.
- [5] Rathod, Hemantkumar, et al. "Automated attendance system using machine learning approach." 2017 International Conference on Nascent Technologies in Engineering (ICNTE). IEEE, 2017.