International Journal of Innovative Research in Engineering
Volume 3, Issue 4 (July-August 2022), PP: 19-23
www.theijire.com
ISSN No: 2582-8746

Smart Attendance System Based on Face Recognition

Prathyusha Mitte[1], Thota Avinash[2], Siripuram Arun Kumar[3]
[1,2,3] Computer Science and Engineering, CMR Technical Campus, Telangana, India.

How to cite this paper:
Prathyusha Mitte[1], Thota Avinash[2], Siripuram Arun Kumar[3], "Smart Attendance System Based on Face Recognition", IJIRE-V3I04-19-23.

Abstract: *Attendance monitoring system is very important process in almost all the organizations. In manual attendance system, the faculties and their presence call out the students. However, thesemanual techniques are time- consuming. This kind of problem is solved by using automated attendance system. The main idea of this project is marking the attendance using the facial recognition system. The system is based on face recognition that can be used to take the attendance of the students sitting in the classroom. It is an automated system for face recognition of human beings in a real time to mark attendance of students in a college and is a real time solution. Our system maintains the attendance records of students and then these detected faces are compared with the database for verification.*

Key Word*: Haar Cascade, LBPH, Face detection, Face recognition, Attendance*

I. INTRODUCTION

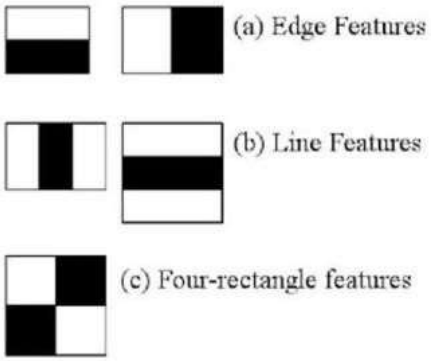
Our project provides a convenient, dependable automated attendance solution that does away with the disruption and time wastage caused by traditional attendance systems. Depending on the students recorded attendance rate, the system may evaluate their performance properly. This project's goal is to mark the students' attendance in a quicker and more straightforward manner. A personcan be recognized or verified using biometric technology using a digital image. We are able to record the attendance of the entire class at once by using this technology. In comparison to the traditional way, it saves a tonne of time.

II.MATERIAL AND METHODS

The practice of manually recording student attendance using an attendance sheet distributed by the instructor in class takes much time. The ability to compute the attendance percentage becomes a major task as manual computation produces errors and waste more time. To overcome the problem in existing attendance system we shall develop a biometric based attendance system over simple attendance system. In our proposed system, we have used facial recognition biometric system. A camera in this systemtakes pictures of the registered students and sends them to an image-enhancement module. The modules get the image once it has been enhanced, and then store the attendance in the excel file. Here, the algorithm finds every face in the input image and comparesit one by one to the face database.

Haar Cascade Classifier: Haar Cascade is an algorithm to recognize the faces in the video or a real time image. The technique makes advantage of edge or line detection features suggested by Jones and Viola. Using ML, a cascade function is trained by using a large number of both positive and negative images. Haar features are like convolutional kernel for image classification. To train this classifier, the algorithm first requires a large number of both positive faces and negative faces. Then we have to extract the facialfeatures from it. Each feature is a single value, which can be obtained by subtracting the sum of pixels within the white rectangle from the sum of pixels within the black rectangle. It requires numerous computations and features to handle large or variable-sizedimages, and the most of these will be unnecessary. The next step is to extract the Region of Interest (ROI), which includes faces.

Figure no 1: *Features of Haar Cascade*



LBPH (Local Binary Pattern Histogram): Because of its robustness and ability to distinguish both front and side faces, we choose to employ the Local Binary Pattern Histogram (LBPH) algorithm. They employ this algorithm to identify the qualities that best characterize a face in the image. There were other different facial recognition algorithms, but the LPBH method is the best. This approach is simpler since it localizes an image's characteristics within the dataset, and when an unknown replacement image appears, we run an equivalent procedure and compare the results to each of the images in the dataset. Compared with the other algorithms, it performs better in many settings and lighting circumstances. Local Binary Pattern (LBP) operation creates an image, which highlights the features of an image in a better way. It uses radius, neighbors, and the sliding window.

Algorithm:

Pseudocode for our model.
Input: live video with student face visible.
Output: attendance excel sheet.
1. Transform each frame to grayscale.
2. Apply the Haar Classifier for face detection and get the Region of Interest (ROI).
3. Now, apply the LBPH algorithm on the ROI to get the features.
4. if for enrollment then
Features are stored in the database.else if for verification then Capture images from input.
5. Do compare the image with the existing database.
6. if existing image found thenMark attendance.
else, do not mark attendance.

Procedure Methodology:

The system proposed is to maintain the attendance sheet with day-to-day activities who are present in the classroom. The automated procedure of recording attendance for the students in the classroom helps the lecturer save time because the traditional approach in use is a time-consuming process and risky process of proxy attendance. Our approach is categorized into two different phases namely Registration Window (Registration of students with student ID and student name with their images) and Face Recognition Window (Taking the attendance by recognizing the live images). First, we make the frame grayscale rather than color. For detection of face, we used Haar Cascade Classifier, where a cascade function is trained and detect features in other images. Edge, line, and four-rectangle haar characteristics are used for this. This system offers features like photographing pupils and recording their info for the database, training the photos in the image database and on the camera, and beginning to track persons entering the classroom. This system will recognize the faces of students walking into the classroom from the webcam and pre- processes them for further processing.

Architecture Description:

This project architecture shows the procedure followed for Smart Attendance System on Face Recognition using machinelearning, starting from input to final prediction.

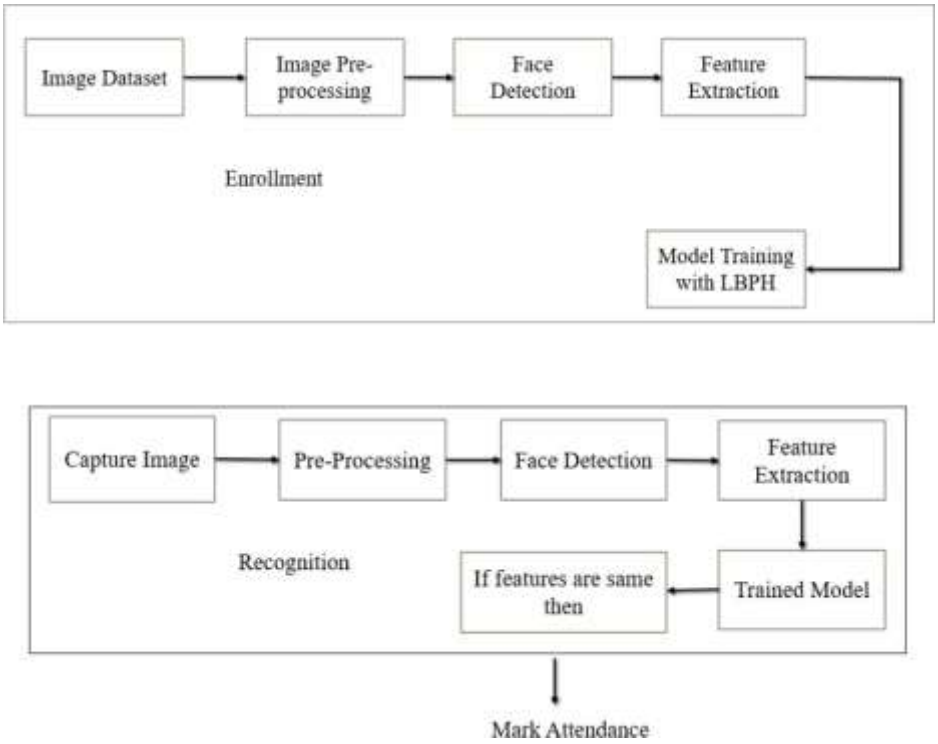
Enrollment Phase:

This approach operates by first adding each student to the system and storing his or her data. In this phase, the face is detected via a webcam using face detection algorithm- Haar cascade, initially the image acquisition module collects the face dataset.By using the feature extraction module, significant characteristics are extracted. These facial extraction features are used to analyzethe face landmarks (eyes, nose and lips), which represent the human identity information. After feature extraction, these are trained using LBPH. This algorithm uses four parameters namely radius, neighbours, grid-x and grid-y.

Recognition Phase:

The second phase is marking the attendance. In this phase, the marking of attendance using a webcam by detecting the face of student, and by using face recognition algorithm-LBPH algorithm where the model is trained in the enrollment phase, it determines whose face it is by comparing the data of students which are stored in a database. After recognition, it also updates the proxy of thatstudent in the excel file.

Figure no 2: *System Architecture*



III.RESULT

The Admin registers the new students by entering the student id and student name, after entering the details the admin clicks on “Take Images” button after that camera will pop up, captures 40 images. The admin saves the profiles and registers them in the directory. After the registration, the student images are pre-processed by converting the images to gray color and 167x167 pixels then by clicking “Take Attendance” button the camera will pop up and it will recognize the live image and attendance is stored in the excel file.

Figure no 3: *Detection of Face*

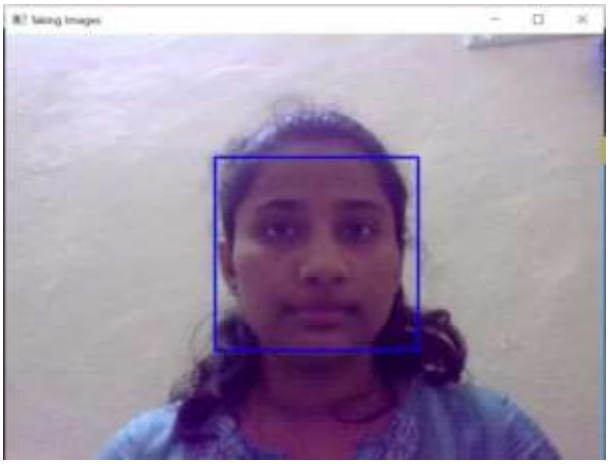


Figure no 4: *Pre-processed Images*

Figure no 5: *Recognition of faces*

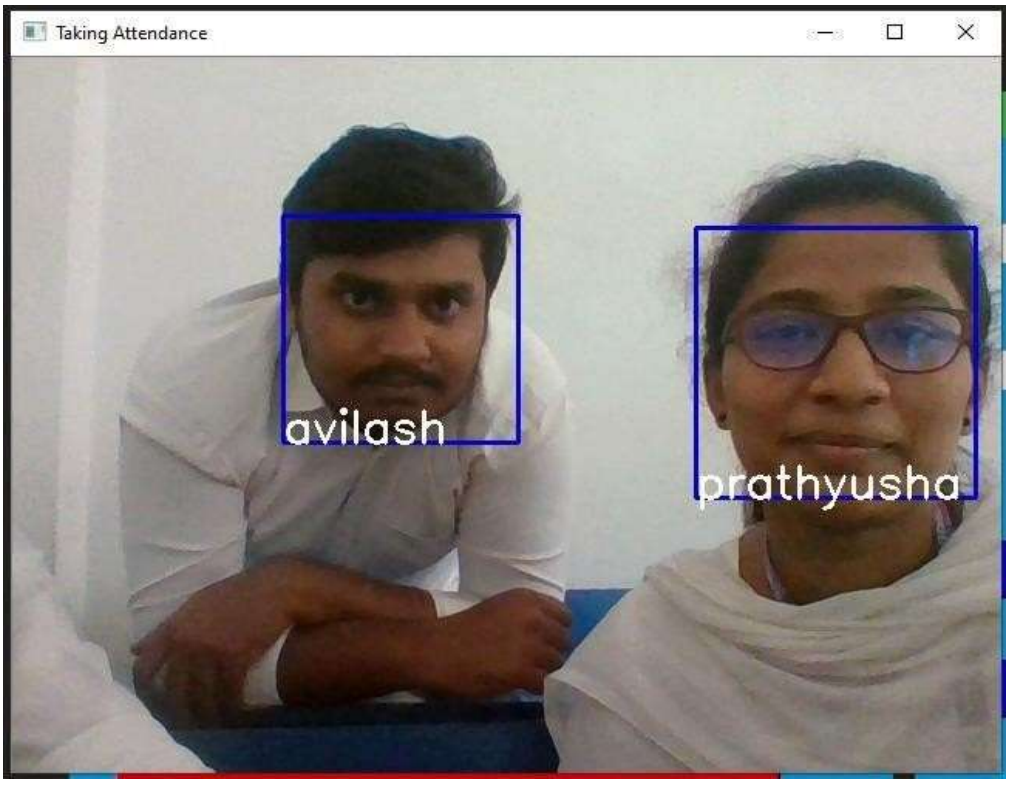
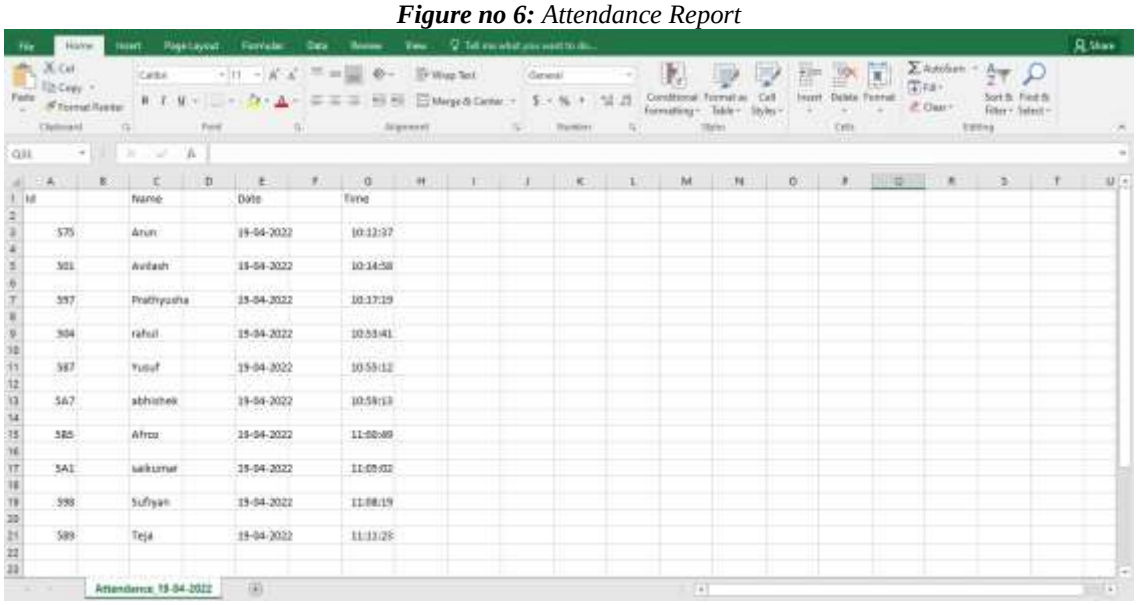


Figure no 6: *Attendance Report*



Id	Name	Date	Time
575	Arun	19-04-2022	10:12:37
501	Avitash	19-04-2022	10:14:58
597	Prathyusha	19-04-2022	10:17:19
304	rahul	19-04-2022	10:53:41
587	Yusuf	19-04-2022	10:55:12
567	abhishek	19-04-2022	10:58:13
585	Afroz	19-04-2022	11:00:49
541	saikumar	19-04-2022	11:05:02
598	Sufiyan	19-04-2022	11:08:19
589	Teja	19-04-2022	11:11:28

The recognized students are marked in the attendance report and the excel sheet is generated as shown in Figure no 6.Ifthe student face is not recognized then the attendance is not marked.

IV.CONCLUSION

Prior to the creation of this project, the existing techniques of taking attendance had numerous flaws that caused significantproblems for most institutions. The facial recognition feature technique is thus sufficiently safe, trustworthy, and usable. This solution uses facial recognition to mark students' attendance intelligently, which saves time and helps us prevent mistakes that can happen when taking attendance manually. This kind of initiative saves time and a great deal of effort for educational institutions.

Future work could include processing face recognition at various degrees of angle where the system is capable of recognizing faces. This work can be expanded to record attendance for identical twins, where a slight change in the identical twins'faces are seen. On this project, there are still some tasks to complete in order to notify the student through SMS of his or her attendance. This SMS notice can also be send to the student's parent.

The device can deliver a respectable level of precision when we have an adequate amount of lighting, but it cannot do so when it is none. We will develop a powerful algorithm for low light situations in the future. The dataset must be updated frequentlybecause the system relies on recognition of face, if a student with a beard shows up to class after shaving, the machine cannot identifyhim. We will create a better algorithm in the future to help us escape the situation.

V.ACKNOWLEDGEMENT

We thank CMR Technical Campus for supporting this paper titled with "SMART ATTENDANCE SYSTEM BASED ONFACE RECOGNITION", which provided good facilities and support to accomplish our work. Sincerely thank to our Chairman, Director, Deans, Head Of the Department, Department Of Computer Science and Engineering, Guide and Teaching and Non- Teaching faculty members for giving valuable suggestions and guidance in every aspect of our work.

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