

Face Recognition based Automated Attendance System

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Abstract—Student attendance is important withinside the mastering procedure. To document pupil attendance, numerous approaches may be done. The procedure has numerous shortcomings, consisting of requiring a long term to make attendance; the attendance paper is lost, and the management should input attendance records separately into the pc. To conquer this, the paper proposed a web-primarily based totally pupil attendance gadget that makes use of face recognition. In the proposed gadget, Convolution Neural Network (CNN) is used to hit upon faces in images, deep metric mastering is used to provide facial embedding, and the pc can understand faces. From the experiments conducted, the gadget becomes capable of understanding the faces of college students who did attend and their attendance records become robotically saved.

Index Terms— Face Detection, Face recognition, Attendance automation, Convolution Neural Network.

I. INTRODUCTION

Making participation and keeping the record is the most convoluted thing in the manual participation framework. Gauging participation physically is more difficult and causes a ton of useful class time misfortune also. Manual participation like putting a name and id on a paper is an alarming framework to at any point gauge participation. It requires a colossal measure of investment to gauge participation individually and has a tremendous possibility of being an intermediary. Over the most recent couple of years, a few computerized frameworks have grown essentially like unique finger impression and QR-code innovation. Notwithstanding, the time has the effect here with facial acknowledgement innovation. QR-code innovation enjoys a few benefits it's extremely simple and quick to utilize yet every time understudies neglect to ring their ID card, then, at that point, the understudy will not get participation. In this framework, understudies ought to examine their code individually thus the framework can consume an immense measure of time. Face acknowledgement-based participation frameworks have less tedious and fewer possibilities of being an intermediary for beating this issue. Face acknowledgement-based participation frameworks can be awesome. Be that as it may, in the past exploration have a few holes moreover. Many mechanized frameworks like facial acknowledgement-based frameworks can't gauge participation in a gathering. Understudies need to come individually before the camera. For delivering this issue, we proposed a savvy participation framework involving an AI-based Haar cascade strategy for identifying and perceiving face for its power of picture involving this calculation for face acknowledgement. With this framework, nobody can make an intermediary for another who doesn't present in the class. Utilizing this

innovation alongside face acknowledgement the intermediary will be essentially decreased and an immense measure of time could be saved. Control of machines and their interaction with different innovations in view of PC programming is called mechanization. Advancements, for example, save bunches of work. The paper-based strategy for stamping participation is tedious and its intricacy increments with the increment of general strength. This case is invalidated in this computerized form as it saves time and an extra accompanies security as it additionally assists with forestalling intermediary of participation. The target of our proposed framework is to make a face acknowledgement-based participation framework with getting a less misleading positive rate in recognizing obscure people by applying a limit and saving their pictures. We utilized Haar-overflow for face identification in view of their vigour and this calculation for face acknowledgement. It is vigorous against monotonic greyscale changes. Our System even identifies and saves the pictures of any obscure individual in the class whose Information isn't there in the data set.

II. RELATED WORK

Md Khaled Hasan et al.,[1] Face detection, which is an effortless task for humans, is complex to perform on machines. The recent veer proliferation of computational resources is paving the way for frantic advancement of face detection technology. Many astutely developed algorithms have been proposed to detect faces. The proposed model achieves an equal error rate of 8.41% and rank - 1 accuracy of 71.18%. F.M.

Javed Mehedi Shamrat et al.,[2] Human face recognition is distinguished by a method of identifying facts or confirmation that tests personality. The technique essentially relies on two stages, one is face identification, and another is face recognition. Facial recognition applies to a PC device with a few implementations in which human faces can be identified in pictures. "Image Processing Based Human Face Recognition Using Haar Cascade Classifier" Image Processing Based Human Face Recognition Using Haar Cascade Classifier. They got a true accept rank of 95.8%-98.7% and a false accept rank=0.2%.

Raktim Ranjan Nath et al.,[3] Face recognition has been a rapidly growing and intriguing region progressively applications. A huge number of face recognition calculations have been produced in a long time ago. In this paper, for face detection, we are using a HOG (Histogram of oriented Gradient) based face detector which gives more accurate results rather than other machine learning algorithms like Haar-Cascade. they got a 6.82% of equal error rate and 88.59% of rank one accuracy.

Sakina, Sehrish Larik.,[4] Machine Learning attracted huge attention due to its exemplary unique performance and solving a number of complex problems. This technology gained massive attention due to its training techniques. This paper discusses the successful implementation of face recognition using HOG and machine learning. It will analyze the attendance of students using machine learning to ease the daily routine of teachers and staff. Secondly, the Histogram of Oriented Gradients (HOG) is used to extract the features from the face using our dataset to classify the students. they got a 5.92% of equal error rate and 94.59% of rank-one accuracy.

In [5], the 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 were 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.

A) Motivation

Our main motivation is to make the attendance system easier, less time-consuming, and also protect from being proxy. The old manual-based attendance system was an arduous process and had a chance of proxy but we will be able to ameliorate the situation. This system can make a crystal clear concept to the machine whether it's a legal attendance or proxy. This system is a more secure and hassle-free system.

B) Problem Definition

Some institutions are using a register book for attendance so this will be difficult for teachers to keep track of a large number of students because by using a register book. A student can help the other students or his/her friend to punch their card even though the other student may be absent or come late to class, so it is not reliable. Parents can be directly looped in the student learning journey, as the student attendance can be conveyed via mobile app or SMS. This not only ensures security but also reminds parents to be in constant touch, thus improving student learning outcomes.

C) Problem statement

Up to date, the attendance system has been taken manually which causes time waste, and paperwork, besides it is inaccurate. Face recognition technology can be utilized to build an automated attendance system that makes counting and identifying students much easier and more convenient. Face occlusions, face scaling, and posture are still important problems in such a system. Every institute has its own method to keep a record of the attendance of students. But marking attendance manually is a lengthy process and takes a lot of time and effort. so we are implementing a system to automatically record the Student's attendance. This project deals with one of the possible solutions

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 the live streaming image of the classroom. The faces detected will be compared with images present in the dataset. If a match is found, attendance will be marked for the respective student. At the end of each session, a list of absentees will be mailed to their parent's.

IV. METHODOLOGY

Before the attendance management system can work, there are a set of data needed to be inputted into the system which essentially consists of the individual's basic information which is their ID and their faces. The first procedure of portrait acquisition can be done by using the Camera to capture the faces of the individual. In this process the system will first detect the presence of a face in the captured image, if there is no face detected, the system will prompt the user to capture their face again until it meets a certain number of portraits which will be 10 required portraits in this project for each student. Then, the images will undergo several pre-processing procedures to obtain a grayscale image and cropped faces of equal-sized images because those are the prerequisites of using the Face Recognizer. Both of the processes mentioned above can be represented in the diagram below.

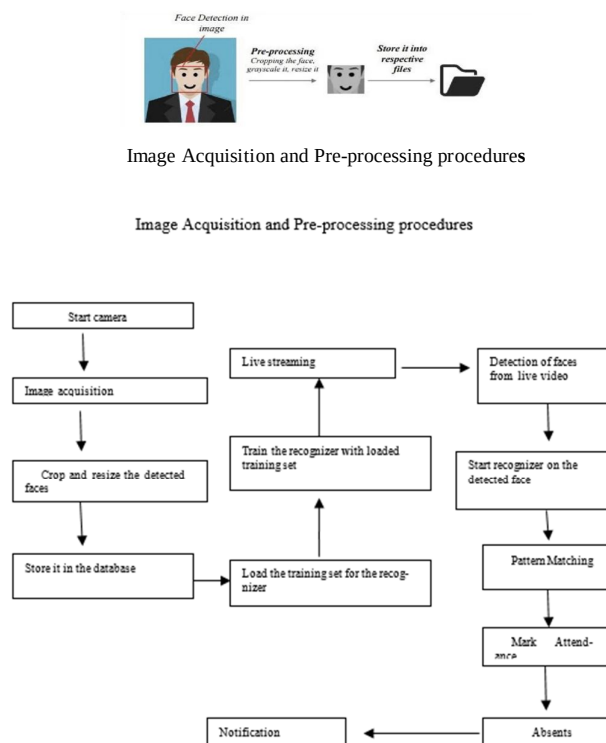


Figure 1: Block diagram of face recognition-based attendance system

The above figure shows After the images are processed, they are stored in a file in a hierarchical manner. In this project, all the faces will be stored in a hierarchical manner under the database folder. When expanding through the database folder, there will consist of many sub-folders each of them will represent an individual and a series of face portraits belonging to the same individual will be stored in that particular sub-folder. The subfolders that represent each individual will be named upon the ID no. of that individual which is unique for every single individual in the institution. The below figure shows It comprises the Input area, pre-handling unit, Face recognition, Features Extraction, PCA characterization, distinguished face and name show segment. At the pre-handling stage, a picture is changed over from RGB to dim scale and the picture resized. Face identified and separated. HAAR overflow perceives separated pictures. The general framework can be isolated into different sensible stages like catching picture, location of the face, recognition of milestone focuses on the identified face, grouping those element focuses with the assistance of HAAR overflow classifier, and afterwards showing approved individual's name. After individual perceived participation is refreshed consequently in the framework. For every individual acknowledgement, mail sending capacity is planned which makes limitless distance observing and work on the security. The data set stores understudy participation logs or information. This information sends messages through the mail.

V. SYSTEM DESIGN

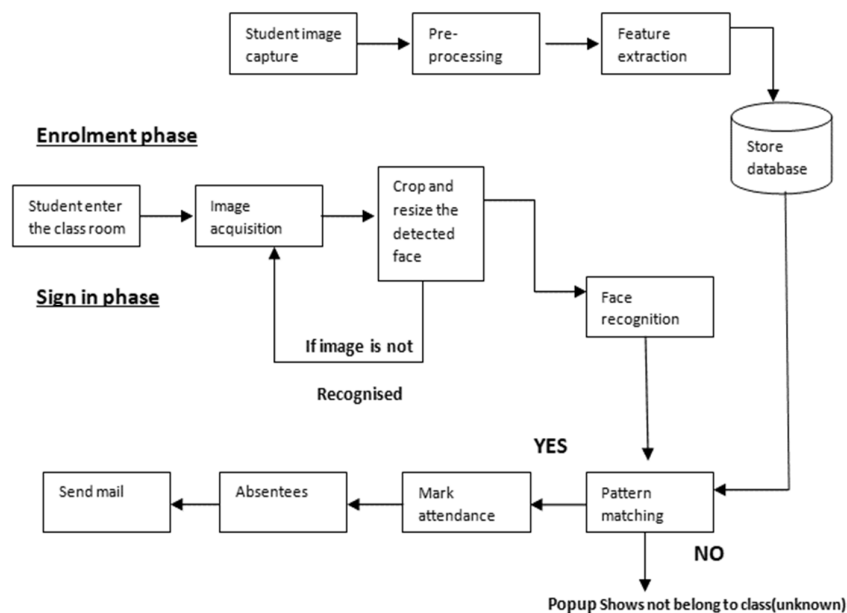


Figure 2. System architecture

A) Input Image:

In spite of the fact that our own data set ought to be utilized to configuration ongoing face acknowledgement understudy participation framework, the data sets that are given by the past specialists are likewise used to plan the framework all the more successfully, productively and for assessment purposes. face data set is utilized as both preparation set and testing set to assess the exhibition. face data set contains one hundred and 65 dark scale pictures of fifteen people. There are eleven pictures for every person; each picture of the individual is in various conditions. The circumstances included focus light, with glasses, cheerful, left-light, without glasses, typical, right-light, miserable, drowsy, shocked and wink. These various varieties given by the information base can guarantee the framework to be worked reliably in an assortment of circumstances and conditions.

B) Pre- processing:

In this stage input, RGB Raw images are converted as greyscale images. The luminance of a pixel value of a grayscale image ranges from 0 to 255. The conversion of a colour image into a grayscale

image is converting the RGB values (24 bit) into grayscale values (8 bit). Various image processing techniques and software applications convert colour images to grayscale images. Python Converts RGB images or colour maps to grayscale.

C) Face Detection:

It is significant for a picture to be sufficiently bright and conspicuous for the framework to distinguish the face. The framework ought to peruse faces in low light yet in the event that the light is underneath a sure acknowledged limit the framework gives a brief to retake as no face is identified

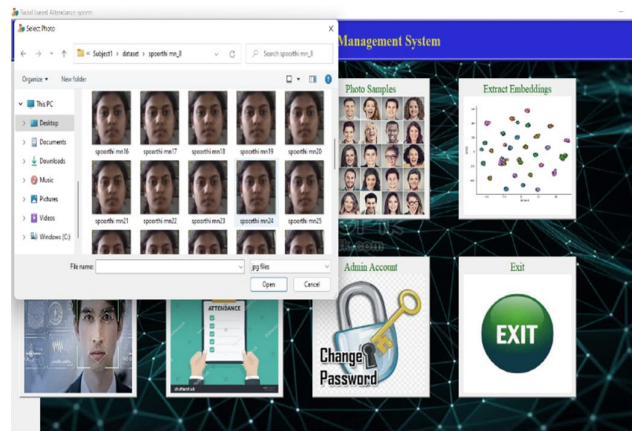


Figure 3: Training the student's face

D) Feature Extraction and Classification:

The feature extraction part extricates facial elements and it tends to be ordered. This module comprises the Haar Cascade approach in which higher layered pictures are changed over into lower layered ones, consequently holding the essential picture data. It is an AI-based approach where an outpouring capacity is prepared from a ton of positive and negative pictures. Distinguishing objects in different images is then utilized. Here we will work with face identification. At first, the calculation needs a ton of positive pictures (pictures of appearances) and negative pictures (pictures without faces) to prepare the classifier. Then we really want to remove highlights from it. For this, Haar highlights displayed in the beneath picture are utilized. They are very much like our convolution bit. Each component is a solitary worth got by deducting the number of pixels under the white square shape from the number of pixels under the dark square shape.

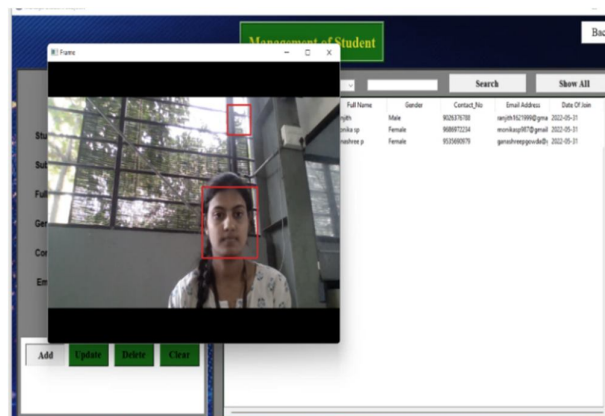


Figure 4: Face Detection

E) Haar Cascade Classifier

Loading the entered photo the usage of constructed-in characteristic `cv2.imread(image course)`, right here the passing the photo course as an enter parameter.

- Converting it to greyscale mode after which showing it
- Loading the haar cascade classifier. It includes facet characteristics and line characteristics. In the grey-scale photo, the white bar represents the pixels which are towards the mild source. Haar fee calculation:

$$\text{Pixel fee} = (\text{Sum of the Dark pixels} / \text{Number of Dark pixels}) - (\text{Sum of the Light pixels} / \text{Number of Light pixels})$$
 Haar Classifier is a piece of writing identity calculation. To understand the object and to differentiate its miles; the highlights may be eliminated from the photo. Utilizing Equation haar pixel really well worth may be determined. When the digital dig cam obtains the photo it adjustments the photo to dim scale. Yet once more the fountain classifier identifies the face, with inside the occasion that the face is distinguished, the classifier assessments for the 2 eyes inside the identified face and assuming eyes are identified it standardizes the face pics length and direction. Then the photo is dealt with for face acknowledgement in which the photo is contrasted and the face check assortment. The importance of Haar Cascade classifier is that the Perception accuracy is greater and the Positive fee is less.

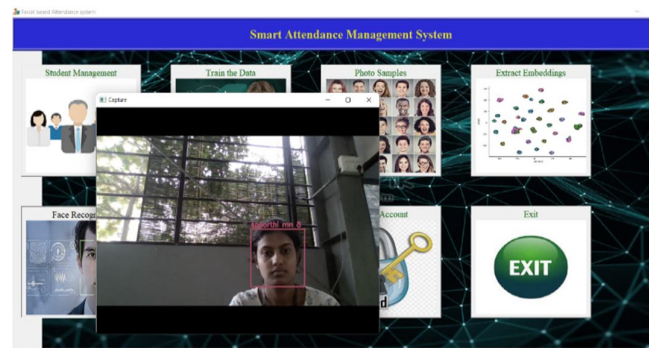


Figure 5: Face Recognition

F) Database:

Dataset of the understudy is made earlier than the acknowledgement interaction, which includes one photo of each person. This is completed via way of means of the seemed trainer via the administrator board. During this cycle, the administrator will at an equal time input the understudy's name. In the wake of taking pics utilising a digital dig cam, a prevail sheet may be made giving the facts set of the multitude of understudies.

ID	Name	Date	Time	Status
1	gaurav p	2022-05-31	10:00:00	Absent
2	Harsh	2022-05-31	10:00:01	Present
3	meera k	2022-05-31	10:00:01	Present
4	gaurav k	2022-05-31	10:00:01	Present

Figure 6: Attendance Sheet

G) Sending Email:

As the attendance sheet is ready, inside one-minute e mail maybe ships to the absentee's agency or determine asserting that their worker or toddler is absent in today's task challenge or class.

VI. 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.4. pops up and starts detecting the faces in the frame. Then it automatically starts clicking photos until 50 samples are collected. These images then will be pre-processed and stored in training images folder. This is important because the list of absentees will be ultimately mailed to their parent's. It provides monthly report for the lecturers.

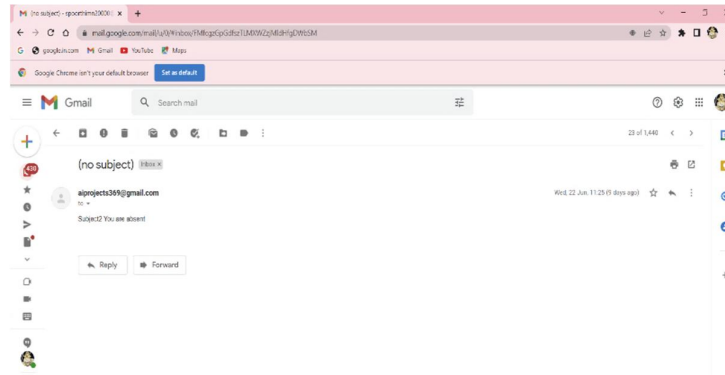


Figure 7: Sending Mail

VII. CONCLUSION

An understudy participation framework it's miles proposed to make use of facial acknowledgement. By utilising Convolution Neural Network to differentiate a face. CNN or profound size mastering for facial installing, the framework efficiently perceives the substance of an understudy who's creating participation. Understudy records have been identified because the understudy's ID number, date and time, are agreed upon by the framework to file understudy participation. This framework makes the understudy Attendance technique carried out therefore and is meant to have the choice to supplant the antique guide participation technique, that is proper now utilized.

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