Attendance System Using Face Recognition

PROJECT SYNOPSIS

OF MAJOR PROJECT

BACHELOR OF TECHNOLOGY
CSE

SUBMITTED BY :-

ARIJIT JAYASWAL 2000290100027

AMRENDRA SINGH 2000290100018

ANSHUL PRATAP SINGH 2000290100026

August 2022

KIET Group of Institutions, Delhi-NCR, Ghaziabad (UP)

Department of Computer Science and Engineering

TABLE OF CONTENTS

INTRODUCTION

The Attendance System is a web based application that uses face recognition technology to mark the attendance of the student. Face recognition is a part of biometric identification that extracts the facial features of a face, and then stores it as a unique face print to uniquely recognize a person. Biometric face recognition technology has gained the attention of many researchers because of its wide application [1]. The traditional method of marking attendance is a tedious task. This project will solve that problem of marking the attendance of the students manually by the teachers which results in wastage of time. This system will take the help of a camera which will keep a track of students entering and leaving the class and will mark their attendance by matching it with the face present in the database. We will first take photos of all the students from different angles and store it in our database and use face recognition algorithm to match the student's face with the one in the database.

Our project will not only save the time of both students and teachers but it will also decrease the chances of proxy attendance as no attendance can be marked without actually being present in the class. We will first take photos of all the students from different angles and store it in our database and use face recognition algorithm to match the student's face with the one in the database.

Technologies used

Languages:

- HTML
- CSS
- JavaScript
- Python
- SQL

RATIONALE

Traditional method of attendance marking is a very tedious task. The teachers waste about 5 minutes on average while taking the attendance by calling the names of every student. This is a very time consuming process. There is also a high chance of proxy. Therefore many institutes have started using other techniques to record attendance like use of Radio Frequency Identification(RFID), fingerprint scanner, iris scanner etc. But these systems are queue based and will take some time to mark the attendance and are intrusive in nature. Here face recognition comes into play.[4]

Face recognition technology is better than other biometric based recognition techniques like finger-print, palm-print, iris because of its non-contact process. Recognition techniques using face recognition can also recognize a person from a distance, without any contact or interaction with person.[1]

In this system we will consider the face of an individual for marking the attendance. Face recognition is an important biometric feature, which can be easily acquirable and is non-intrusive.[3] For face recognition purpose, there is a need for large data sets and complex features to uniquely identify the different subjects by manipulating different obstacles like illumination, pose and aging. During the recent few years, a good improvement has been made in facial recognition systems. In comparison to the last decade, one can observe an enormous development in the world of face recognition.[1] Face recognition based systems are relatively oblivious to various facial expression. Face recognition system consists of two categories: verification and face identification. Face verification is an 1:1 matching process, it compares face image against the template face images and whereas face verification is an 1:N problems that compares a query face image with all the images present in the database.[3

OBJECTIVES

To build a system that marks the attendance of students using face recognition using Haar Cascade Classifier with OpenCV library.

- All the students will have to register themselves by taking multiple photos in different angles and their dataset will be created. Their images will then be stored in grayscale and stored in a folder with the student's name.

- The camera present in the class will detect the students entering in the class and will perform face identification and face verification. If match is found in the database, attendance will be marked of the respective student.

- At the end of the period, the list of attendees will be mailed to the respective faculty handling the period so they can easily mark the attendance.

- This system will also detect the students who leave the classroom before the period is over and will then remove them from the list of attendees hence the students who the chance of faulty attendance will be very low.

LITERATURE REVIEW

1) *Attendance System Using NFC Technology with Embedded Camera on Mobile Device*

"NFC (Near Field Communication) Technology with a camera incorporated in a mobile device," according to a study publication (Bhise, Khichi, Korde, Lokare, 2015). NFC technology and a mobile application are used to improve the attendance system. At the time of enrolment in the faculty, each student is issued an NFC tag with a unique ID, according to the research article. The travelling instructor will then take attendance at each lesson by touching or distributing these tags. The integrated camera will then take a picture of the student's face before sending all of the data to the college server for verification. The benefits of this technology include the ease of use of NFC and the fast connection speed. It greatly facilitates the process of being in the present moment.

However, if the NFC tag was not tagged by the user, the system would not be able to identify infringement automatically. Aside from that, the usage of a mobile app was necessary since the NFC student was interrupting the teacher. Would it be a support system to record everyone present if a pastor failed to bring his mobile phone to work? Furthermore, because of a confidential topic, most professors would not want their iPhones to be used in this manner. As a result, instead of the NFC marker, unique student information such as biometrics or face recognition, guanine to the student should be employed. This ensures that a specific student will be the first to take attendance.

2) RFID based student attendance system

According to the fourth research journal “RFID based Student Attendance System” (Hussain, Dugar, Deka, Hannan, 2014), the proposed solution is almost identical to the first research journal in which RFID technology was used to enhance the adult attendance program. during this process, the tag and the student are also used as a way to track the presence of students. The difference between the original journals and that is where the information for the participants will be available through the web site. Provides very easy to retrieve information. Also, this method is not perfect in the sense that, first of all, it is not portable, because the RFID reader can only work if it is connected to a PC. Second, the RFID tag is not guanine information that can specifically identify the reader, thus, leading to

inaccuracies in the data collected by attendees.

3) *Face Recognition Based Attendance Marking System*

Face recognition is used in the second research publication, "Face Recognition System Based on Face Recognition" (SenthamilSelvi, Chitrakala, Antony Jenitha, 2014), to overcome prior system challenges.

This method involves taking images of the employee using a camera in order to capture their faces and visions. When the result is located on the face website, the taken image is compared individually with the face mask to display the employee's face, where presence is noted. The key benefit of this method is that the presence is recorded on a highly secure server that no one else can access. Furthermore, the face detection algorithm in this suggested system is built employing a skin-splitting approach to improve the accuracy of the detection process. Despite ongoing efforts to improve the accuracy of the face detection algorithm, the system remains unaffected at this time. This application needs a stand-alone computer with a constant power source that is not portable.

This sort of system is prepared to mark staff attendance since they only need to submit attendance once a day, unlike students who must indicate that they are present in each class on a certain day. If marking is present, it will be tough. The system is out of control.

To address this issue, the whole old system management system is converted to a portable module, which is then used to operate a Python system

4) Student Attendance System in Classroom Using Face Recognition Technique

In this paper composed by Samuel Lukas, Aditya Rama Mitra, Ririn Ikana Desanti, Dion Krisnadi, the author says the quantity of highlights of any facial understudy picture is made to be consistent, for example 16 DCT coefficient. The process is finished entirely performing grayscale standardization, histogram balance, Discrete Wavelet Transform (DWT), and Discrete Cosine Transform (DCT). Further examination of the disappointment in perceiving the rest facial pictures demonstrates that an understudy might be perhaps perceived as other student(s). By considering the all-out degree of acknowledgment as came about because of the investigation which doesn't meet exclusive requirement

5) An Attendance Marking System based on Face Recognition

The paper “An Attendance Marking System based on Face Recognition" written by Khem Puthea, Rudy Hartanto and Risanuri Hidayat, says that the proposed system uses a machine learning technique named as principal component analysis or PCA for face recognition and other machine learning algorithms used in computer vision. A technique called Haar classifier is used to train the system to detect a face. When the faces are captured by a camera, they are first converted to grayscale and then to that image subtraction process is applied. The image after this is stored on the server for further processing which is done later.
The author proposed a strategy where the framework was used as an online Web Server, so the participation results can be open to a verified web customer. The facial acknowledgment is finished by actualizing Local Binary Patterns (LBP) first handling venture is to identify and edit the locale of intrigue ROI which is the human face, then apply the Haar Feature-based Cascade calculation After that, the picture highlights are extricated utilizing LBPs, at that point LBPs calculation contrasts the separated highlights and the prepared datasets. Later, by clicking ‘c' as in catch on the console framework, the participation results are put away in MySQL database, so it tends to be available to the web server.

METHEDOLOGY

The function of the proposed system is to capture the face of every student and keep it on the website for them to attend. The face of the student must be taken in such a way that everyone can see what the student's face is like, even the seating area and the way the students stand.[4] All individuals must register themselves by entering the information they require so that their photos can be taken and stored within the database. During each session, a face is found in the live streaming video of the class. The recovered faces are compared with the existing images in the database.[4] Once a match is found, attendees are marked and at the end of each session, a list of absentees will be sent to the appropriate faculty in charge of the session

The process of attendance system can be divided into 5 major stages 1) Pre Processing, 2) Dataset Creation 3) Face Detection, 4) Face Recognition, 5) Attendance Updation

1) Pre Processing

Images of students are captured from different angles and gestures. These images undergo pre processing which will further be used in recognition process. Extracting facial features from these images is called pre processing. This step involves specifying the extracted facial image and transform to 100x100. This improves the contrast of the image as it extends beyond the intensity of the image, making it even more clear and constraint.[2]

2) Dataset Creation

As we choose biometric based attendance system every individual’s data is required. This database development phase consists of an image capture of each individual and extracting the bio- metric feature, and then it is enhanced using pre-processing techniques and stored in the database.[2]

3) 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 file haarcascade_frontalface_default. [3] Here we are using detectMultiScale module from OpenCV. 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.

4) 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(LBP) Histogram.[3] 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.[3]

5) Attendance Updation

After face recognition and detection, the program creates an entry in the .csv file and exports and name and time in which the face was detected and marks the attendance.[4] The system does not allow overwriting of a single entry. The list of attendees will be mailed to the respective faculties at the end of the day.

FACILITIES REQUIRED

For our project we will be using Haar Cascade Classifier with OpenCV library of Python.

Software Requirements

- HTML
- CSS
- JavaScript
- Python
- OpenCV Library
- MySQL

Hardware Requirements

1. Webcam/CCTV Camera

EXPECTED OUTCOMES

- We plan on making an attendance system which is scalable at college level.
- We will try to make it such that it isn't fooled by an image for actual person so that it is free from proxy attendance.
- We expect it to be working smoothly and not get overloaded with the data coming to it from all the attendance being marked at the same time.
- It will detect face via webcam and recognize it using face id and mark the attendance of the recognized students and update it on the excel sheet. This sheet will be mailed to the faculties.
- We plan on writing a research paper on our attendance system and getting it published.

REFERENCES

1. Face Recognition based Attendance System by Dhanush Gowda H.L1, K Vishal, Keertiraj B. R, Neha Kumari Dubey, Pooja M. R.

2. Face Recognition System by Shivam Singh and Prof. S. Graceline Jasmine (Department of SCSE Vellore Institute of Technology)

3. Face Recognition based Attendance Management System by Smitha, Pavithra S Hegde, Afshin

4. Face Recognition Attendance System by Shrey Bhagat, Vithal Kashkari, Shubhangi Srivastava, Ashutosh Sharma