



Implementation of Face Recognition based Attendance Management System

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Abstract:-

Automatic face recognition (AFR) technologies have seen dramatic improvements in performance over the past years, and such systems are now widely used for security and commercial applications. An automated system for human face recognition in a real time background for a company to mark the attendance of their employees. So Smart Attendance using Real Time Face Recognition is a real world solution which comes with day to day activities of handling employees. The task is very difficult as the real time background subtraction in an image is still a challenge. To detect real time human face are used and a simple fast Principal Component Analysis has used to recognize the faces detected with a high accuracy rate. The matched face is used to mark attendance of the employee. Our system maintains the attendance records of employees automatically. Manual entering of in logbooks becomes a difficult task and it also wastes the time. So we designed an efficient module that comprises of face recognition to manage the attendance records of employees. Our module enrolls the staff's face. This enrolling is a onetime process and their face will be stored in the database. During enrolling of face we require a system since it is a onetime process. You can have your own roll number as your employee id which will be unique for each employee. The presence of each employee will be updated in a database. The results showed improved performance over manual attendance management system. Attendance is marked after employee identification. This product gives much more solutions with accurate results in user interactive manner rather than existing attendance and leave management systems.

Keywords:

Employees ,Face, Automatic ,Recognition ,Manual , Handling,

1.Introduction:-

Maintaining the attendance is very important in all the institutes for checking the performance of employees. Every institute has its own method in this regard. Some are taking attendance manually using the old paper or file based approach and some have adopted methods of automatic attendance using some biometric techniques. But in these methods employees have to wait for long time in making a queue at time they enter the office. Many biometric systems are available but the key authentications are same is all the techniques.

2.Problem Statement:-

Attendance is an important part of daily office evaluation. At the beginning and ending of office time, it is usually checked by the HR. Sometimes employee may forget to mark attendance by biometric fingerprint sensor system. Some times it doesn't work as finger is wet or system fails to analyze at the time more time is required. Face recognition-based attendance system is a problem of recognizing face for taking attendance by using face recognition technology based on high definition monitor video and other information technology.

3. Working Model:-

Registration Page:-



The screenshot shows a web application window titled "Registration Form". The background is dark purple. The title "Registration Form" is displayed in a stylized, orange-outlined font at the top center. Below the title, there are five pairs of white input fields arranged in two columns. The labels for these fields are "Name", "Last Name", "Address", "Status", and "Mobile No.", positioned to the left of each input field. At the bottom of the form, there are two red rectangular buttons with white text: "Submit" on the left and "Display" on the right.

Login Page:-



The screenshot displays a desktop application titled "Attendance Using Face Detection". The main window has a dark purple background and a title bar. Inside, there is a sub-window titled "Registration Form" which contains the same input fields and buttons as seen in the previous screenshot. The background of the application is a photograph of a row of metal lockers with numbers 574, 614, and 624 visible. On the left side of the application, there is a vertical sidebar with a light gray background. It contains a section titled "Registration Of User" with four buttons: "Create Face Data", "Train Face Data", "Face Attendance", and "Exit". The "Exit" button is red, while the others are purple.

4. Methodology:-

The proposed system is designed for automating the attendance of the different organization and reduces the flaws of existing manual system. The system calculate the attendance subject wise, that is the data of students and subjects are added manually by administrator, and whenever time for corresponding subject arrives the system automatically starts taking snaps and find whether human faces are appear in the given image or not. We have used Histogram of Oriented Gradient for face detection and deep learning techniques to calculate and compare 128-d face features for face recognition. Once faces are detected and recognize with the existing database, system calculate attendance for the recognize students with the respective subject id in real time. And an excel sheet generated and saved by the system automatically. Our system splits into two parts, First the front end side which consist of GUI which is based on Electron JS that is JavaScript stack which is serving as a client and the second is the backend side which consist of logic and based on Python which is serving as a server. And we know that both the languages cannot communicate with each other directly so we have used IPC (Inter Personal Communication) techniques with zero library as a bridge to communicate these two languages.

4.1 Data Acquisition

4.1.1 Image acquisition:

Image is acquire using a high definition camera which is placed in the classroom. This image is given as an input to the system

4.1.2 Dataset Creation:

Dataset of students is created before the recognition process. Dataset was created only to train this system. We have created a dataset of 5 students which involves their name, roll number, department and images of student in different poses and variations. For better accuracy minimum 15 images of each students should be captured. Whenever we register student's data and images in our system to create dataset, deep learning applies to each face to compute 128-d facial features and store in student face data file to recall that face in recognition process. This process is applies to each image taken during registration.

4.1.3 Storing:

We have used JSON to store the student's data. JavaScript Object Notation (JSON): To represent a structured data based on JavaScript object syntax, a standard text based format is introduced. JSON is used for transmitting data in web application. It is a perfect solution for storing temporary data that's consumed by the entity that's creates the data. JSON can store data in String, Number, Object, Array, Boolean, Null form which means it has limitation of storing data in functions, dates and undefined data form. If you are trying to store or exchange data in functions or dates than JSON is not right choice for you.

4.2.1 Face Detection and Extraction:

Face detection is important as the image taken through the camera given to the system, face detection algorithm applies to identify the human faces in that image, the number of image processing algorithms are introduce to detect faces in an images and also the location of that detected faces. We have used HOG method to detect human faces in given image.

4.2.2 Face Positioning:

There are 68 specific points in a human face. In other words we can say 68 face landmarks. The main function of this step is to detect landmarks of faces and to position the image. A python script is used to automatically detect the face landmarks and to position the face as much as possible without distorting the image.

4.2.3 Face Encoding:

Once the faces are detected in the given image, the next step is to extract the unique identifying facial feature for each image. Basically whenever we get localization of face, the 128 key facial point are extracted for each image given input which are highly accurate and these 128-d facial points are stored in data file for face recognition.

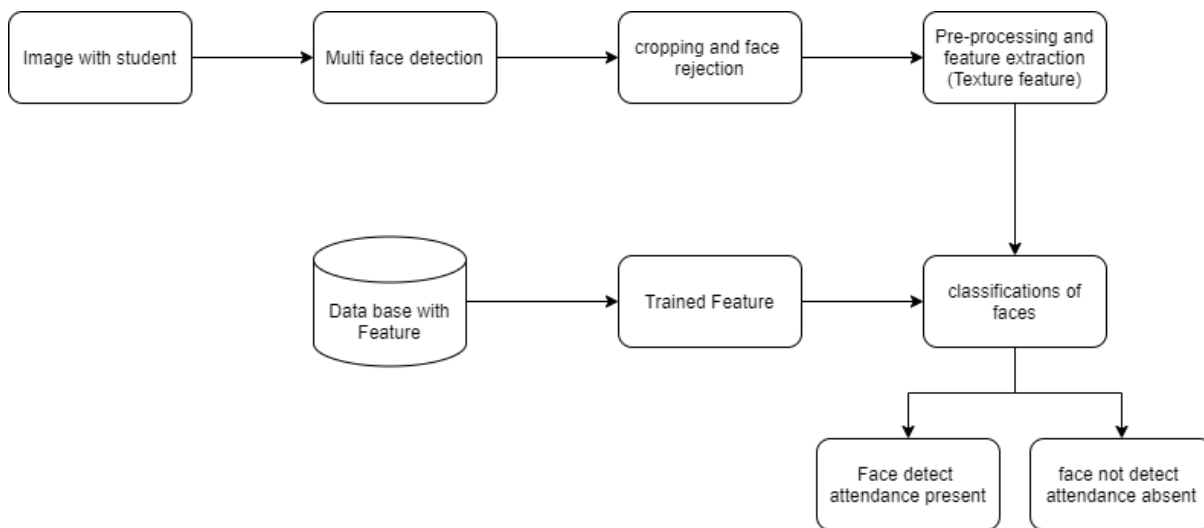
4.2.4 Face matching:

This is last step of face recognition process. We have used the one of the best learning technique that is deep metric learning which is highly accurate and capable of outputting real value feature vector. Our system ratifies the faces, constructing the 128- d embedding (ratification) for each. Internally compare_faces function is used to compute the Euclidean distance between face in image and all faces in the dataset. If the current image is matched with the 60% threshold with the existing dataset, it will move to attendance marking

4.3 Attendance Marking:-

Once the face is identify with the image stored in JSON file, python generate roll numbers of present students and return that, when data is returned, the system generates attendance table which includes the name, roll number, date, day and time with corresponding subject id. And then passes the data to python to store the table into an excel sheet automatically. Each sheet is saved according to the subjects which already entered by the administrator, for example when system generates excel sheet by sending the compiled sheet in an array to python, the python first checks whether there exit any excel sheet of that date, if yes then it create separate worksheet by subject id, so that attendance is differentiated for different subjects.

5.System Architecture:-



6.Conclusion:-

Automated Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional (manual) attendance taking system. The aim is to automate and make a system that is useful to the organization such as an institute. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This method is secure enough, reliable and available for use. No need for specialized hardware for installing the system in the office. It can be constructed using a camera and computer.

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