

Face Attendance System

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Abstract

Attendances are taken in every school and college. The convention attendance system consists of registers marked by teachers which may lead to human error and a lot of maintenance. The system proposed in this study is to deviate from such a traditional system and introduce a new approach to taking attendance using image processing. The system uses a Histogram of Oriented Gradients (HOG) and python libraries such as OpenCV, Dlib, and NumPy. As a human, the brain automatically recognizes a face instantly, but the computer is not capable of this high-level generalization. The system automatically starts taking snaps and then applies face detection and recognition technique to the given image the recognized students are marked as present and their attendance is updated with the corresponding time^[2]. The working of the system is that it first looks at a picture and finds all the faces in it. second, it focuses on each face and can understand that even if a face is directed in a weird direction or under bad lighting. Third, the system comes up with 68 specific points called landmarks, that exist on every face example the top of the chin, the inner edge of each eyebrow, etc., and then picks out unique features of the face that can be used to tell it apart from other people. Finally, compare the unique features of that face to those already determined faces. Then the person can clock in into the system after the person clocks out, the system automatically transfers the data into an excel sheet.

Keywords: Image processing, Face recognition, Histogram of Oriented Gradients (HOG)

1. Introduction

This study aims at improving the traditional attendance system by introducing technology to the existing attendance system. Attendance plays an important role in any organization whether it be educational institutions or companies. So, it is very important to keep a record of attendance. The problem arises when one has to manually take the attendance which is not only time-consuming but exhausting as well. The system is developed using a method invented in 2005 called Histogram of Oriented Gradients (HOG) for face detection. The database of all the students in the class is stored in a folder and when the face of the individual student matches with one of the faces stored image, then the person can clock in for attendance, else the face is ignored and attendance is not marked.

2. Literature Review

2.1. Face Attendance

Attendances are taken in every academic institution as well as industries. The conventional attendance system consists of registers marked by teachers which may lead to human error and a lot of maintenance, to deviate from such a traditional system and introduce a new approach to taking attendance using image processing is our aim. The system uses a Histogram of Oriented Gradients (HOG) and python libraries such as OpenCV, Dlib, and NumPy [6]. As a human, the brain automatically recognizes a face instantly, but the computer is not capable of this high-level generalization. The working of the system is that it first looks at a picture and finds all the faces in it. second, it focuses on each face and can understand that even if a face is directed in a weird direction or under bad lighting. Third, the system comes up with 68 specific points called landmarks, that exist on every face example the top of the chin, the inner edge of each eyebrow, etc. [3][4], and then picks out unique features of the face that can be used to tell it apart from other people. Finally, compare the unique features of that face to those already determined faces. Then the person can clock-in into the system after the person clock-out, the system automatically transfers the data into an excel sheet.

2.2. Marking attendance

Attendance system using Face recognition proposes that the system is based on a face detection and recognition algorithm which is used to detect the student's face when he/she comes in front of the camera and then compare the face with the images present in the folder if the match is found it will mark the attendance. This system has an advantage over the traditional system as it saves time and there is no chance of proxy (that is no other student will mark the attendance of his/her friends).

2.3. Image acquisition

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

2.4. Dataset Creation

A dataset of students is created before the recognition process. The data of students' faces are stored in a folder. Whenever the system comes across a face the system will compare the face with the faces stored in the database.

2.5 Face Detection and Extraction

Face detection is important as the image taken through the camera is given to the system, a face detection algorithm is applied to identify the human faces in that image, and several image processing algorithms are introduced to detect faces in images and also the location of that detected faces. The HOG method has been used to detect human faces in a given image.

2.6 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 position the face as much as possible without distorting the image.

3. Material and Methods

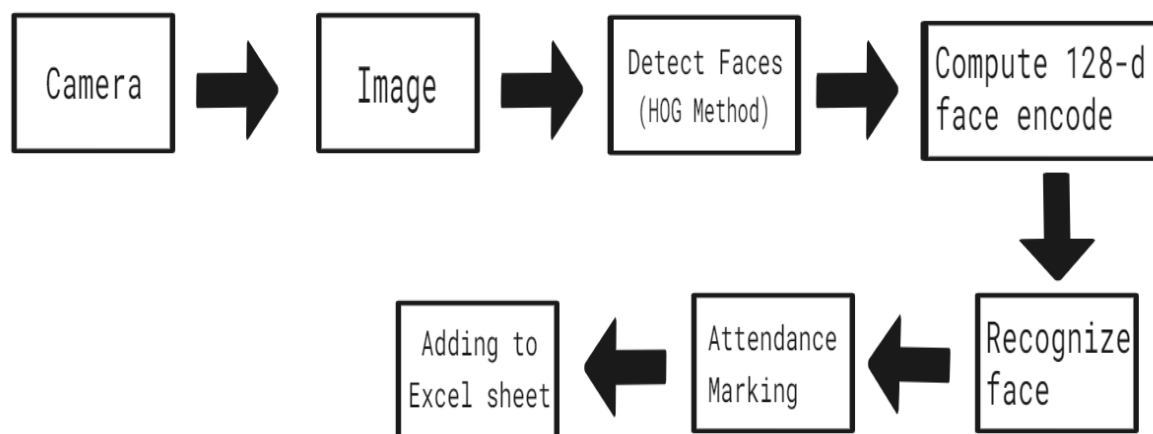
3.1 Software development

The facial recognition software is developed in Python programming language. This project uses several Python libraries such as OpenCV, Numpy, dlib, and Mediapipe. The graphical user interface (GUI) is developed using a Python library called PyQt. The project is built on the concept of advanced computer vision technology. The software development lifecycle model that was followed for creating this project is the Waterfall Model.

3.2 Trial rounds

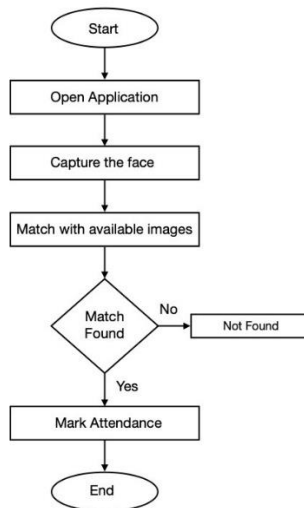
After the completion of prototype development, it will undergo software testing to ensure that there are no bugs. It is necessary to conduct trial runs to ensure the smooth working of the application and to receive user feedback.

3.3 Methods



Block Diagram

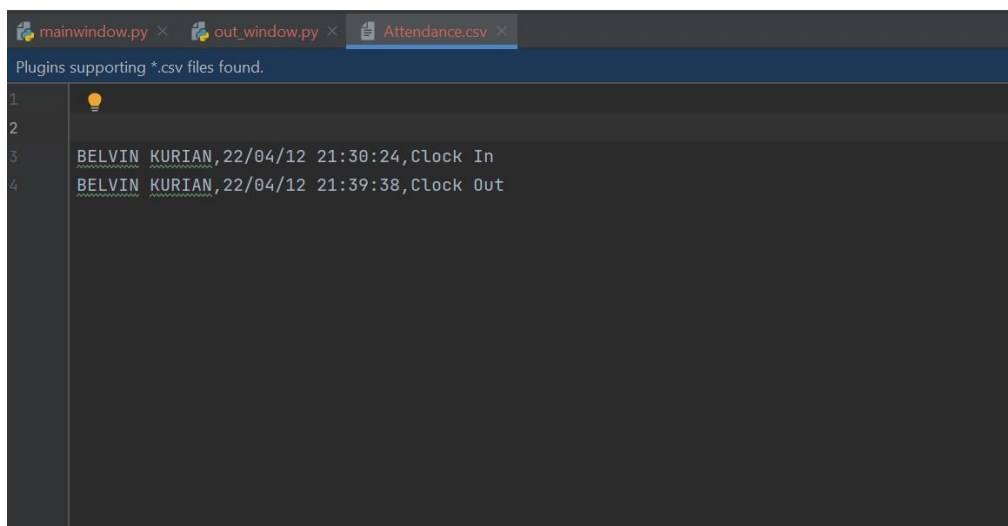
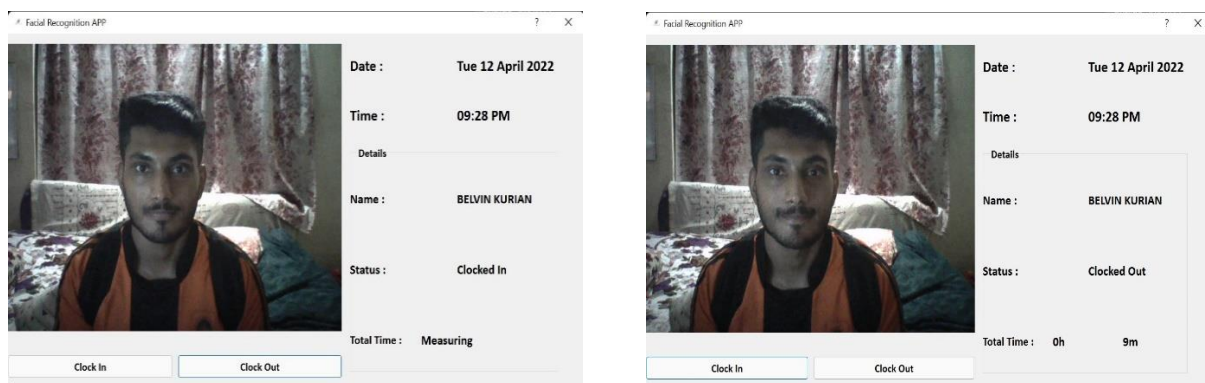
The system acquires images from a high-definition camera placed in the classroom, if the system detects any faces using the Hog method, then it extracts features from the detected face and compares the data with the database. If the system finds a match, then the attendance will be allocated to that person.



Activity Diagram

4. Results and Discussion

We aim at ensuring a system that Reduces manual process errors by providing an automated and reliable attendance system that uses face recognition technology which is Efficient, time-saving, simple, and easy. Also to encourage the use of technology in daily lives.



5. Conclusion

This system can be implemented as a solution to tackle the problems that arise from the traditional attendance system. Some of the common problems are the high chances for errors and the maintenance and storing of attendance records safely. The traditional attendance system can be digitalized by implementing the automatic facial detection system which requires little to no effort. It reduces the need for human intervention and thereby reduces the chances for error. The attendance records are automatically saved and exported to an excel sheet. It is an all-in-one system that handles both the attendance process and the storage of data. The traditional attendance system requires one to keep separate attendance records for each interclass and combined class sessions. The face attendance system eliminates this burden and automatically generates and stores attendance records. The face attendance technology can be further enhanced and developed to incorporate additional functionalities such as detecting the students that are not present in the class and informing the teacher by sending them real-time alerts. The Face Attendance System is an effective and efficient option that schools and universities can adopt in their classrooms. Furthermore, this system can also be implemented in offices, shops, etc to take the attendance of the staff.

6. References

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