Automated Attendance Management System using Face Recognition from Classroom Camera Feed

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Abstract:
This project includes a detector for detecting, localizing and recognizing faces of the students in a given input image or a video. This input will be passed to the proposed algorithm in which faces will be detected and recognized using Computer Vision and Machine Learning algorithms in Python. The proposed algorithm will give the list of the students present inside the classroom and this will be used to mark the attendance in the database. A successful implementation of this project will save time for faculties from taking attendance of students at the beginning of every class and it will also remove the hassles of manually entering the data in the database.

Keywords: Dataset, Face Detection, Face Recognition, OpenCV, Automated Attendance, Haar Cascade Classifiers, Local Binary Pattern Histogram (LBPH) algorithm.

I. INTRODUCTION
In recent years, colleges and universities still promote the process of education and teaching reforms, various teaching modes are introduced for continued evolution of the process. The elemental purpose of the event of assorted teaching modes is to resolve the matter of classroom teaching efficiency and improve the standard of students' education. Classrooms, as a vital place for college students to accumulate knowledge, have an important impact on the development of students. Classroom attendance is an important part of classroom teaching activities. The aim of attendance in class is to count the number of students and urge them to attend classes on time. The traditional classroom attendance is mainly done by the teacher through the manual way of roll-call. Although this method can ensure the accuracy of naming, it usually wastes a lot of time and is prone mistakes, which not only occupies the classroom time. But also affects the enthusiasm of teachers and students, and reduces the quality of the classroom. A high participation rate within the classroom may be a motivating factor for teachers and contributes to an appropriate environment for more willing and informative teaching. Computer vision technologies have rapidly developed in recent years. Face detection is a hot research direction within the field of computer vision. Face-detection algorithms target the detection of frontal human faces. It is analogous to image detection within which the image of someone is matched bit by bit. Images are compared with the stored images in the database. One key advantage of an identity verification system is that it's ready to perform mass identification. These recent techniques combined with Convolutional Neural Network (CNN) and Deep learning can be used to provide a solution for the above problem.

II. LITERATURE SURVEY
Vasutan Tunbunheng [1] proposed an automated attendance system that uses Google forms and sheets to register the attendance time of the students in the classroom. Speech recognition technology has also been included into the system supported Droid Script for registering students who reach late for lectures. These Google forms consists of the list of all the students along with their ID numbers and corresponding checkboxes for marking the attendance. The teacher mark the attendance of the students present inside the class and submit the form which is then saved in Google sheets. Now if there are students who are coming late to the class for them an android application developed using DroidScript is proposed. Here the author has used speech recognition to mark the attendance. The app is launched and the student ID along with the name is read into the microphone. This data is then sent to the G-mail account of the teacher. After the class is over, the teacher will verify the data from the mail account and mark the attendance in the Google sheet. One the drawback of this system is that the speech recognition might fail, consequently the teacher has to mark the attendance manually. The proposed system involves tedious and redundant work for the teacher i.e. taking the attendance using the sheets and then again using the app for students coming late to the lecture halls.

Rishi Raj, Abhinav Das, Subhash Chand Gupta [2] in their paper have proposed an approach towards Bluetooth attendance monitoring system which will allow the faculty to attend the classes without carrying physical attendance register and mark the attendance of the students sitting inside the classroom with just a tap. In this approach, website and mobile app will be deployed in order to achieve the proposal and provide the implementation of the same. It will help the faculty members to give their maximum percentage of lecture time to the student. This system also allows the ease for faculties as in this approach the attendance of the students is marked automatically with the help of the Bluetooth mac identification.

When the faculties turn on the system for the particular hour of lecture, the Bluetooth tracks the mac identity of the students mobile and identify the specific student based on the previous stored database. The student will be able to get their attendance details together with many other educational benefits associated with the actual lecture.

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III. EXISTING SYSTEM

There are many systems that are used to mark the attendance of the students present inside the lecture rooms. These include use of Google forms, Bluetooth connections, RFID tags, fingerprint biometrics, etc. These systems in some way require the involvement of either the faculty or students or in some cases both. This in turn hinders the right decorum of a classroom.

A. Drawbacks of Existing System
   - Time consuming.
   - High chances of failure.
   - High implementation cost.
   - Data might not be reliable.
   - Less Efficient.
   - More manual work for faculty.

IV. PROPOSED SYSTEM

Proposed system is an efficient automated attendance system for classrooms that uses face recognition techniques to detect and recognize faces of the students whose data is stored in the database. The advantage of this technique is that there is no installation of additional hardware because it uses the camera previously installed within the classrooms by the institution.

B. Advantages of Proposed System
   - Proposed system requires no involvement of neither the faculty nor the students.
   - Saves the faculty the manual entry of information within the institution database.
   - The system is reliable because the information is directly stored within the database and there's no scope of anyone hampering with the information.
   - Saves time for faculties which successively is devoted for effective and smooth running of classes.

V. SYSTEM DESIGN

C. System Architecture

V. IMPLEMENTATION

The implementation of the proposed system is completed in phases as described

D. Methodology

- Enrolment
- Model Training
- Face Detection
- Face Recognition
- Attendance Marking

a) Enrolment:
   In this step, the students have to be registered in the system with their registration number along with their images which on later stages for facial detection and recognition inside classrooms. We use Haar Cascade Classifier to detect faces of the students. The number images to be taken can be determined by the administrator.

b) Model Training:
   After we have saved the collected data, we initiate a face recognizer in this project we are using Local Binary Patterns Histogram algorithm (LBPH) for face recognition which trains our model with the prepared dataset.

c) Face Detection:
   We use our trained model to match the faces of the registered students from the input video feed. In this step as well we use Haar Cascade Classifier for frontal faces to detect the faces.

d) Face Recognition:
   The students who are registered in the system and are recognized in the video feed get a bounding box with their registration numbers and the percentage of confidence showing how confident the recognizer is with this match. A list is made containing the registration numbers of the students recognized in the classroom.
E) Attendance Marking:
From the list prepared in the previous step, the attendance is marked for the students present inside the classroom along with the timestamp and saved in Excel Sheets so that it can be referred later by the faculty members.

VI. CONCLUSION

I hereby conclude that the development of automated attendance system has been paid more and more attention. Technologies like Computer Vision, Convolutional Neural Networks and deep learning which uses techniques like face recognition can be successfully used to develop a system for this purpose. The advantage of this system is that without the involvement of the faculties and the students the attendance is marked for the students attending the classes. Saving the faculties from manual work and ensuring effective conduct of classrooms.

VII. REFERENCES

[1]. Vasutan Tunbunheng. Automatic Attendance System for Late Student using Speech Recognition corresponding with Google Forms and Sheets. 10th International Conference on Ubi-media Computing and Workshops (Ubi-Media). 2017

