IOT BASED STUDENT ATTENDANCE AND FACULTY ATTENDANCE CAPTURING IN CLASSROOM USING RASPBERRY PI

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The importance of student attendance in the classroom cannot be overstated. When done manually, it typically wastes a significant amount of class time The proposed alternative for the current challenge is use face detection to digitize the attendance capturing system, because the face is the primary means of human identity. The Open-Source Computer Vision Library is a strong technique that uses an open source image processing framework to discover and through using Raspberry Pi, detect and recognize in real time. We can control the device through mobile phone using telegram bot. A Telegram bot is used to send captured attendance to the mobile phone and also turn on the system to add new user or remove existing user from the system at any time using mobile phone through telegram bot.

1. Introduction

The attendance list is one of the important tasks, whether in Industry, university, schools etc. In the existing system, we can turn on or off the system only by physical switches. Adding and removing users in the existing system is difficult as it requires physical presence. Thus, we chose this paper to neglect these disadvantages by using IOT based attendance capturing system. Here we can add or remove users by giving command through telegram bot. Another advantage is that the captured attendance can be viewed directly through mobile phone. The result of the data was collected through this system and it will be stored on the web server.

Produci E. Varadharajan explained the automatic Attendance Management system based on Face Detection. The author describes how faces are sensed and then cut, before which background subtraction is performed on the image in order to improve system performance efficacy [1]. Smit Hapani has magnified the system which approbated the model which contributes face distinguishing. Haar classifiers which uses cascade approach and followed by recognition which uses Fisher face. The system optimally gives the efficacy up to 50% within 15 pupils when modelling with more than one face with respective to variations such as hat, spectacles & lens etc [2]. Krishna Dharavath has produced excellent preprocessing results on a

noisy image and this work recommended for pre-processing are face cropping, resizing, normalizing & filtering. Low pass filter is used here to eliminate the components of high frequency noise. PCA, DCT and combined Spatial and Frequency Domain approach are compared before and after pre-processing. The proposed combined form has the highest rate of face recognition and is not much influenced by pre-processing [3]. Nazare Kanchan Jayant explains the automatic attendance capturing system. This system is working based on the Viola Jones facial detection and face recognition algorithm. The face finding algorithm was then applied, and its efficiency was determined depending on the number of faces detected. The same process is followed for calculating the facial recognition algorithm's efficiency [4]. Firoz Mahmud approbated use of 2 database types including UMIST database and ORL database. PCA and LDA both are used for face knowing purposes. The accuracy of the face recognition is determined using the above listed algorithms, depending on the face alignment. It is observed that front aligned faces have a much better accuracy of recognition than those of face side alignment [5].

Sathyanarayana N launched Automated Attendance system using facial recognition. The system suggested algorithms are Jones' Purple algorithm for face detection and MSE face recognition. The document stated and elaborated about the system's level of security and accuracy improves as the number of training images increases [6]. Viola Jones is used as a face detection tool, and the Fisher face algorithm is used for face identification. It works well in good lighting conditions, but at different lighting conditions it decreases the face recognition rate (up to 54%) [7]. Nilesh D. Veer an automatic attendance system has been developed in which a video is collected as input. Frames are captured when there is human presence detected. For a limited number of students, the facial recognition rate is approximately 100%, and the student's attendance is recorded together with the student's arrival time [8]. Yong-ik Yoon the focus of this article is to establish a movement sensor alert using only a Passive Infrared (PIR) sensor module. A lot of options sell PIR sensor modules, all of which are essentially the same here in terms of capability. The PIR sensor detects changes in the IR levels emitted by individuals. PIR sensors are capable of distinguishing between different levels of infrared radiation. In this paper, When the output from the sensor module becomes dynamic, the microcontroller monitors it constantly and automatically switches on a bell [9]. This paper stated the algorithm offers better results in various lighting conditions and the authors have clubbed the multiple Haar classifiers to achieve better results up to 30-degree angles. The preprocessing phase relates to the histogram equalization of the facial image obtained in which it is scaled down to 100x100. Images are converted to grayscale; the equalization of histograms is applied and images are scaled to size of 100x100. The system employed the LBPH algorithm to extract the characteristics and the SVM classifier for classification purpose This document used 80- person database with approximately 20 images of each persons was collected for the project [10].
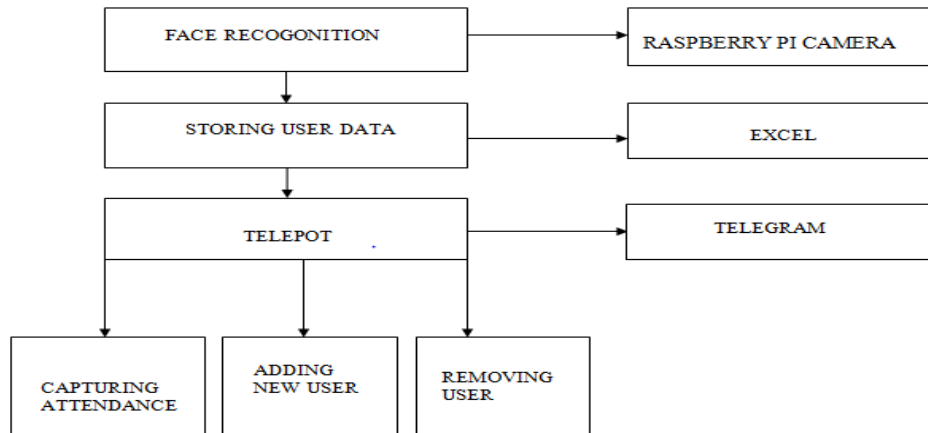
2. Methodology

Figure 1. Block diagram

The block diagram of the proposed methodology is shown in Figure 1. In this work, first step is to identify the face recognition in Raspberry pi camera using Haar Classifier algorithm and the next step is to storing the data in CSV format using Excel. Further we are using the technology called telepot to capturing the student Attendance, adding new user command is by sending the image of the particular student & removing the user by sending removing user command. The python programming is used to execute the whole process automatically & also this paper having an advantage of adding the new user and removing the user through mobile phone in telegram application.

3.1 Raspberry Pi

The SD device that plugs into the slot on the panel that serves as the hard drive for the Raspberry Pi. It is energized by USB, as well as the video output must be linked to an RCA TV or an advanced monitor that use the HDMI connector. This computer provides all of the essential functions of a regular computer while using only three watts of power. To put this power consumption into context, you could operate over 30 Raspberry Pis in place of a standard light bulb. Figure 2 depicts the Raspberry Pi model B.
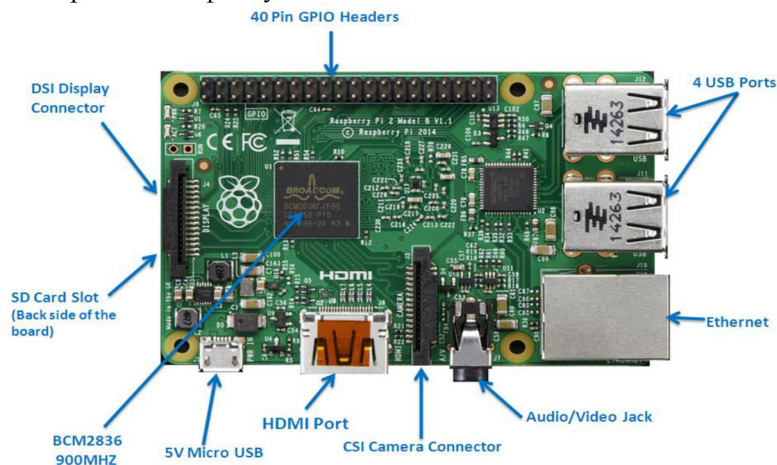

Figure 2. Raspberry pi Model B

3.2 Raspberry pi Camera

A Raspberry Pi Camera Module is a traditional design that enhances the functionality of the Raspberry Pi. It is connected to the Raspberry Pi through one of tiny ports on the board's top surface, as shown in Figure 2. The CSI interface is used in this interface, which was specifically designed for linking to camera systems.

Figure 3. Raspberry pi camera

The board is itself small, measuring 25mm x 20mm x 9mm and weighing 3grams, making it a great choice for mobile or any other applications where size and weight are essential. It is connected by a short ribbon cable. The sensor has a basic resolution of 5 megapixels as well as an on-board fixed focus lens. In terms of still images, the camera is capable of 2592 x 1944pixel static images as well as it supports 1080p30, 720p60, and 640x480p60/90 video [2]. Raspbian, Raspberry Pi's ideal software platform, supports the camera in its latest edition.

4 Results

4.1 Face Recognition
1. The first stage in facial recognition software is to examine a photograph and look for the all the faces in it.
2. In the Second Stage, we will concentrate on each face and acknowledge that even when a face is turned in a strange direction or in dim light; it continues to remain the same.
3. In the next stage, we will be able to distinguish multiple face features that can be used to make a distinction from other individuals, such as big eyes, a big nose, and a big forehead.
4. In the final stage, in order to identify the person's name, we should always consider the different pieces in that face to all of the individuals we already know.
As humans, our brains are wired to do all of this instantly and speedily. In fact, humans are too good at remembering things and end up viewing faces in common life. Because computers are unable to do such tasks, we should teach them every step of the process separately. As a consequence, we require that a channel be built and that each process of face recognition be solved individually, with the result of the current step being passed on to the next step. In other words, we will connect several algorithms together.

4.2 Storing Data in Excel

The CSV module is being used to integrate classes for reading and writing tabular data in CSV format, enabling developers to write records in the Excel-friendly format. Programmers can further explain the CSV formats by creating their own special-purpose CSV formats as shown in the figure 4.
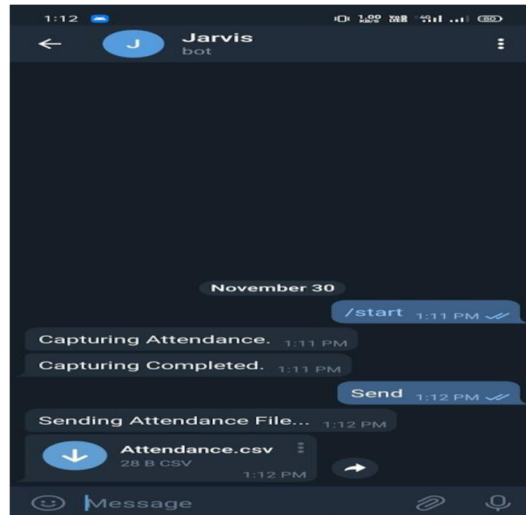

Figure 4. Data Stored in Csv file

4.3 Telepot

Telepot aids in the development of Telegram Bot API applications. It is Python 2.7, Python 3, and Python 3.5+ compatible, and it has an async style based on asyncio.

5. Commands to Bot

5.1 Capturing Attendance

If we give command as 'start' to the telegram bot, its starts capturing attendance and shows the message capturing stated. It will capture the attendance for predetermined time. After capturing completed, it shows the message capturing completed. After capturing is completed if we give the command 'send' to the system, it will send the captured attendance to the telegram bot as a csv file as shown in the figure 5.

Figure 5. Command for Capturing Attendance

5.2 Adding New User
User can add a new user to the system by giving the command 'new user' to the system.
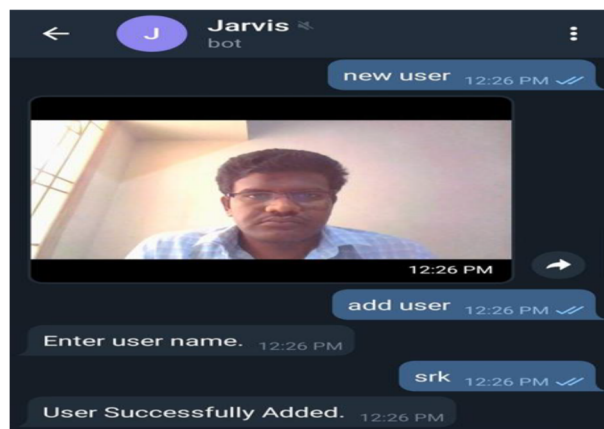

Figure 6. Command for adding new user

The system will capture the image of the user and sends it to the telegram bot. We can verify the image and give the command 'add user' to the system. The system will ask the name of the user. We can give the name of the user. The system will add the user to the database and gives the message 'User Successfully Added' as shown in the figure 6.

5.3 Removing User
User can remove the existing user by giving the command 'remove' followed by the name of the user. The system will check for the user in the database and removes if present and sends

the message 'User Successfully Remove'. If user not present, the system will give the message 'User Not Found' to the telegram bot as shown in the figure 7
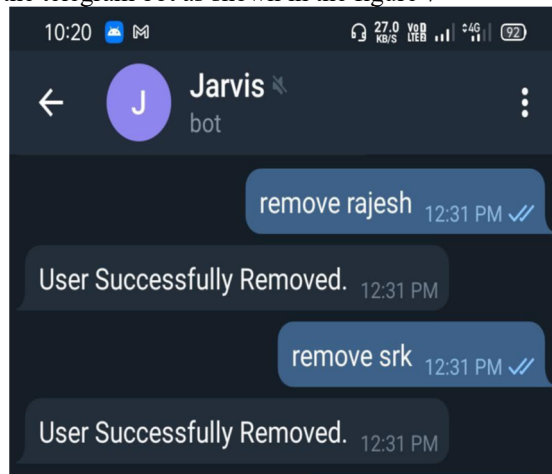

Figure7. Command for removing user

6 Conclusion

The attendance capturing System using OpenCV was designed and fabricated successfully. If start command is given to the system, the system captures the image and detects the face in the image. The system finds the encodings of the face and verifies it with the stored faces in the database. If captured face is matches with the stored faces, the system marks the attendance with name, date and time in the csv file. If send command is given to the system, it will send the attendance file to telegram bot. If new user command is given to the system, it will add the user to the database. If remove command is given, it will remove the specified user from the database.

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