

Face Detection & Face Recognition System by Using Raspberry Pi

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ABSTRACT: Attendance management system is a necessary tool for taking attendance in any environment where attendance is critical. However, most of the existing approaches are time consuming, intrusive and it requires manual work from the users. This research is aimed at developing a less intrusive, cost effective and more efficient automated student attendance management system using face recognition. It detects the faces captured by the camera and compares it with the enrolled faces in the database. On identification of a registered face on the acquired image collections, the attendance register is marked as present otherwise absent. Based on this, the messages are sent to the absentee's respective mobile numbers. The system is developed on Open Source image processing library; hence it is neither vendor hardware nor software dependent. This project deals with face detection of student's attendance monitoring and recording.

I. INTRODUCTION

Maintaining attendance is very important in all education institutions. Every institution has its own method of taking student attendance. Some institutions use paper-based approach and others have adopted automated methods such as fingerprint biometric techniques. However, these method subject's students to wait in a queue which consumes time and it is intrusive. Human often use faces to recognize individuals be advancement in computing capability over the past few decades now enable similar recognitions automatically. Face recognition technology is one of the least intrusive and fastest growing biometric technologies. It works by identification of humans using the most unique characteristics of their faces. Face recognition has characteristics that other biometrics do not have. Facial images can be captured from a distance and any special action for authentication. Due to such characteristics, the face recognition technique is applied widely, Not only to security applications but also to image indexing, image retrievals and natural user interfaces. The importance of developing a new solution to improve the performance of face identification methods has been highlighted and CC is the one of the most promising technology and paradigms that can be used to achieve it. Face recognition technology is also used for both verification and identification of students in an institution. This is research is aimed at developing a less intrusive and cost effective and more efficient automated student attendance management system using face recognition, leveraging CC infrastructure.

II. BLOCK DIAGRAM

Raspberry pi is a small size computer which can be used with more applications. The processor at the heart of the Raspberry Pi processor. This means that the clear majority of the to prepare a blank SD card for use with the Raspberry Pi, you'll need to flash an operating system onto the card. While this is slightly more complicated than simply dragging and dropping files onto the card, it shouldn't take more than a few minutes to complete. Although no current models of the Raspberry Pi include Wi-Fi networking hardware onboard, it's possible to add wireless Connectivity with a simple USB Wi-Fi adapter. However, you will need to configure the adapter before you can use it to get your online. Here the raspberry pi is connected with the Raspberry pi camera, personal computer. The multi-tasking raspberry pi use with a PYTHON platform for the image processing to find the attendance system So that the final result of the attendance will be sent to an authorized person mobile no. The SD card is used to store the database of the class students. Similar images of same student of nearly ten will be stored in the database. In order to get exact image as an output. This will be done for every student in the class. In the Below block diagram, power supply is given to the D-Link, Raspberry

pi(processor), IP Camera. D-Link is connected to the Lan ports of the Raspberry pi, (processor), IP Camera, Monitor (source).

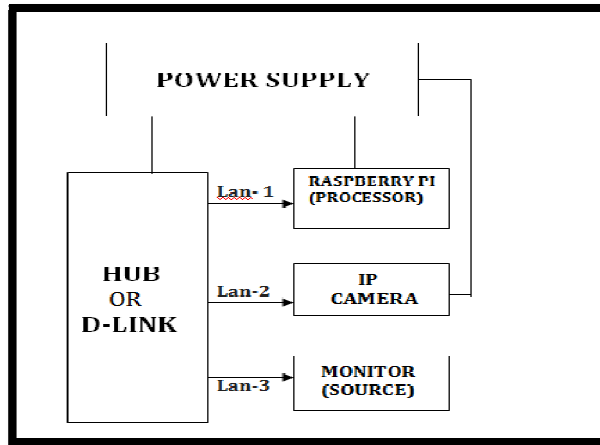


Figure: BLOCK DIAGRAM

III. STUDENT ENROLLMENT

We are going to maintain person details in the database which includes information like Branch, SEM, Name, ID number etc. and we also store the image of many persons in the database for further process. These unique features are then stored in the face database with certain id of that person. At the time of enrollment templates of face images of individual students are stored in the database. This will be helping us to give the details of a person when his face is detected and recognized in given group image. In case person face in the group image is not stored in the databases then it will give an error message like “this person details are not stored in the database”

FLOWCHART: The image taken by the cam is a color image. Processing on the color is difficult so that the image is converted to a gray scale image. That is of 256 values. For the elimination of noise histogram is calculated. From that noise removed image face will be detected individually. The images of students in the class room are stored in the database before the process is started. So that the face detected images are correlated with the images in the database. If ever there is any image not be matched by the captured image those images will be send to a particular mail ID. The following is the algorithm which will give the brief information about the project.

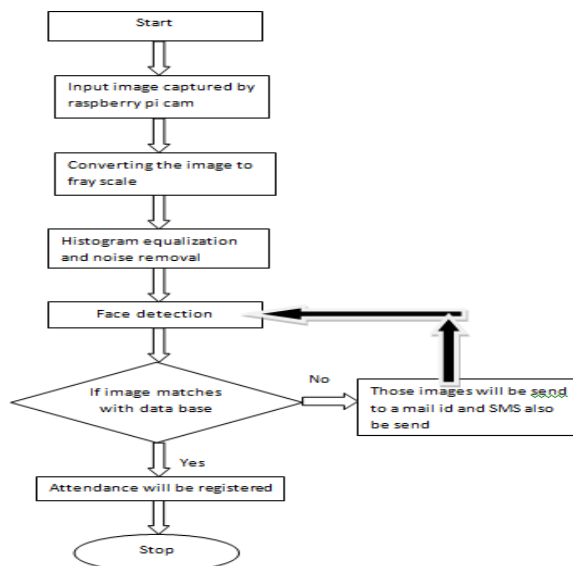


Figure: FLOW CHART

IV. FACE DETECTION

Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images. Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene. [8] Face detection was tested on variety of images with different face positions and lighting conditions and then was applied to detect faces in real time video.



Figure: FACE DETECTION

After the detection of faces from the images next step is cropping of each detected face. Each cropped image is assigned to a separate for the recognition purposes.

FACE RECOGNITION: A face recognition system is a technology capable of identifying or verifying a person from a digital image or a frame from a video source. [1] There are multiple methods in which face recognition systems work, but in general, they work by comparing selected face features from given image with faces within a database[3]. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shapes. [4]

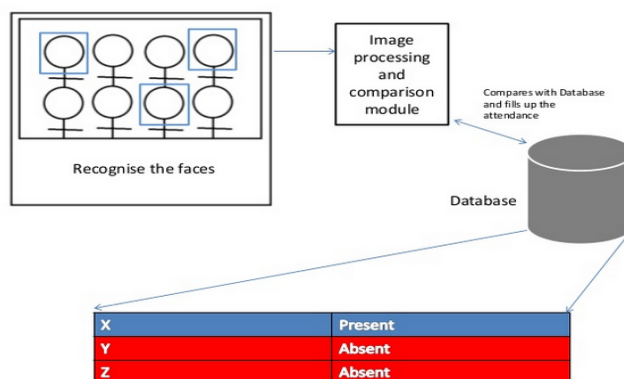


Figure: FACE RECOGNITION

The full specs for the Raspberry Pi 3 include:

- CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz.
- GPU: 400MHz Video Core IV **multimedia**.
- Memory: 1GB LPDDR2-900 SDRAM (i.e. 900MHz)
- USB ports: 4.
- Video outputs: HDMI, composite video (PAL and NTSC) via 3.5 mm jack.
- Network: 10/100Mbps Ethernet and 802.11n Wireless LAN.

IPCAMERA: An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via the Internet. They are commonly used for surveillance. Unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, but only a local area network. Most IP cameras are webcams, but the term *IP camera* usually applies only to those used for surveillance that can be directly accessed over a network connection. [2]

SOFTWARE: -

- Wheezy Raspbian
- OpenCV

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. Raspbian is an unofficial port of Debian wheezy armhf with compilation settings adjusted to produce code that uses "hardware floating point", the "hard float" ABI and will run on the Raspberry Pi. The port is necessary because the official Debian wheezy armhf release is compatible only with versions of the ARM architecture later than the one used on the Raspberry Pi (ARMv7-A CPUs and higher, vs the Raspberry Pi's ARMv6 CPU). An IP camera can be accessed in OpenCV by providing the streaming URL of the *camera* in the constructor of `cv2.VideoCapture`. [5]The easiest way to stream video via IP Camera. Officially launched in 1999, the OpenCV project was initially an *Intel Research* initiative to advance *CPU*-intensive applications. [6]

V. CONCLUSION

This paper introduces the accurate and efficient method of taking attendance while compared to the other biometric methods, and this method is more reliable and secure enough. Face recognition has always remained a significant focus of research because it is people's effortless method of personal identification.

VI. FUTURE SCOPE

The same paper can be utilized for several security applications where authentication is needed to access the privileges of the respective system. It can be used in recognizing guilty parties involving in unauthorized business. Face recognition algorithm can be improved with respect to the utilization of resources so that the project can recognize more number of faces at a time which can make the system far better. Many variants of the project can be developed and utilized for home security and personal or organizational benefits.

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