

Attendance Automation System Using Raspberry Pi

Amruta Holmukhe¹, Akshaya Parkhe², Pranita Desai³

^{1, 2, 3} Dept of Computer science and engineering

^{1, 2, 3} AGTI's Daulatrao Aher College of Engineering Karad Maharashtra, India.

Abstract- The project deals with face detection for an attendance system for the purpose of maintaining attendance details of the students. Students faces are stored in class databases. Webcam camera capture the student face and compared to database image if it is matched means that student attendance register with time. This system describes the method of detecting and recognizing the face using Raspberry Pi model. Raspberry Pi B+ 3 model is used for computation in the detection and recognition modules. The face database is stored into face data set for recognize the faces of the students and mark the attendance into database. The system is initially trained with the students faces which stored in face database. This project uses modified algorithm of Haar's cascades.

Keywords- Camera, Raspberry Pi, Database, Recognition, Preprocessing, Detection.

I. INTRODUCTION

Attendance maintenance has become the most important aspect in all educational institutions to check the performance of the students. This system deals with face recognition for mark attendance in database for the purpose of maintaining attendance details of the students. Students faces are stored in face databases. Webcam camera capture the student face and compared to database image if it is matched means that student attendance register with time. This system describes the method of detecting and recognizing the face using Raspberry Pi model. Raspberry Pi B+ 3 model is used for computation in the detection and recognition modules. The face database is collected into face data set for recognize the faces of the students. The system is initially trained with the students faces which are stored in student database. This project uses modified algorithm of Haar's cascades.

II. LITERATURE SURVEY

Ashish Choudhary, Abhishek Tripathi has implemented by "Automatic Attendance System Using Face Recognition" system International Journal of Modern Trends in Engineering and Research (IJMTER) Volume 03, Issue 04, [April– 2016] uses Viola Jones algorithm for face detection and PCA algorithm for face recognition.[1]

Refik Sametand Muhammed Tanriverdi has proposed a new system" Face Recognition-Based Mobile Automatic Classroom Attendance Management System"2017

International Conference on Cyber worlds, uses a three appearance-based face recognition techniques such as Eigen faces, Fisher faces and LBP method The system's architecture based on mobility and flexibility.[2]

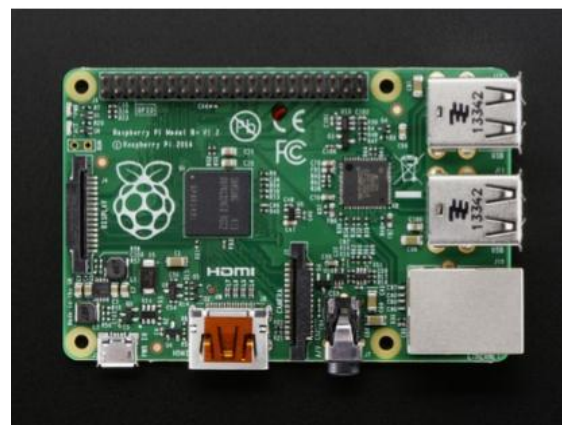
Jiang Lu and Xingang Fu has mentioned "A Smart System for Face Detection with Spatial Correlation Improvement in IoT Environment",2017.the Spatial Correlation Improvement in IoT, The system run face detection algorithm.[3]

III. PROPOSED SYSTEM

The proposed system makes use of face recognition technique to identify the student's presence and mark attendance. For every period the attendance can be updated same as the previous period's value.

IV. COMPONENTS USED IN PROPOSED SYSTEM

A. RASPBERRY PI



- Dual step-down (buck) power supply for 3.3V and 1.8V
- 5V supply has polarity protection, 2A fuse and hot-swap protection.
- New USB/Ethernet controller chip.
- 4 USB ports instead of 2 ports.

- 40 GPIO pins instead of 26. Composite (NTSC/PAL) video now integrated into 4-pole 3.5mm 'headphone' jack.
- MicroSD card socket instead of full size SD.

B. LCD MONITOR

LCD Monitor act as a server in this system. It is used to store the students attendance database. LCD Monitor operate by only Admin person i.e Staff members or HOD.

C. CAMERA



- Inbuilt sensitive microphone and image sensor quality CMOS sensor
- Image resolution 16 mega pixels (interpolated)
- Light sensor to switch on 8 lights automatically when in dark
- Image control saturation, brightness, sharpness and brightness is adjustable
- Snap shot switch for taking still pictures
- Anti-flicker 50Hz, 60Hz or outdoor
- Resolution hardware: 500K pixels
- Image quality: RGB24 or I420
- Exposure: auto or manual and angle of view: 58 degrees
- Interface: USB2.0

D. SD CARD

The OS required for raspberry pi is Raspbian and minimum recommended SD card size is 16GB.

V. SYSTEM ARCHITECTURE

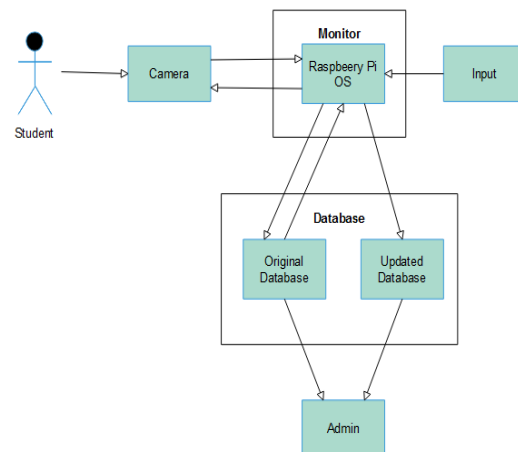
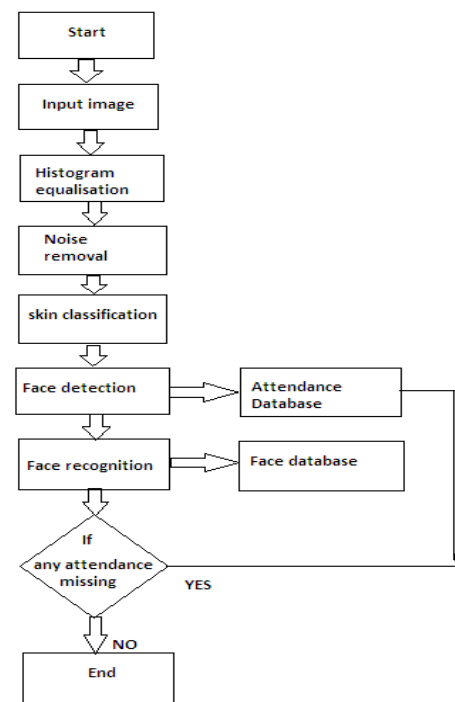


Fig. 1. Block diagram of proposed system.

The attendance automation is achieved through face recognition using the above components as shown in the figure 1. Each student's presence is marked by analyzing his/her face pattern by the camera. The Raspberry Pi B+ 3. Model carries out the process by comparing the test image(image captured then) and checks for similarity in the database, where a collection of patterns are already stored.

VI. IMPLIMENTATION DETAILS



1) Histogram Normalization

Captured image sometimes have brightness or darkness in it which should be removed for good results. Histogram normalization is good technique for contrast enhancement in the spatial domain.

2) Noise Filtering

Many sources of noise may exist in the input image when captured from the camera. In our system median filtering in is used for the purpose of noise removal in the histogram normalized image.

3) Skin classification

This is used to increase the efficiency of the face detection algorithm. Voila and Jones algorithm is used for detection.

4) Face Detection

Haar's classifiers have been used for detection. Initially face detection algorithm was tested on variety of images with different face positions and lighting conditions and then algorithm was applied to detect faces in real time video.

5) Face Recognition and Attendance

After the face detection step the next is face recognition. This can be achieved by cropping the first detected face from the image and compare it with the database. This is called the selection of region of interest. In this way faces of students are verified one by one with the face database using the Eigen Face method and attendance is marked on the server.

PROGRAMMING LANGUAGES AND PLATFORMS USED

- Languages : Python
- Platforms : RaspbeeryPi

OPEN CV

OpenCV is a library of programming functions mainly aimed at real-time computer vision. It has a modular structure, which means that the package includes several shared or static libraries. We are using image processing module that includes linear and non-linear image filtering, geometrical image transformations (resize, affine and perspective warping, and generic table-based remapping), color space conversion, histograms, and so on. Our project

includes libraries such as Viola-Jones or Haar classifier, LBPH (Lower Binary Pattern histogram) face recognizer, Histogram of oriented gradients (HOG).

VII.ALGORITHM

Haar's Cascade

Haar's cascade face detection is done using Viola Jones algorithm using Haar's cascades as classifier. Firstly, the algorithm needs a lot of positive images and negative images to train the Haar's cascades classifier. Positive images are images with clear faces where negative images are those without any faces. Haar's cascades are similar to convolutional kernel which are shown below fig

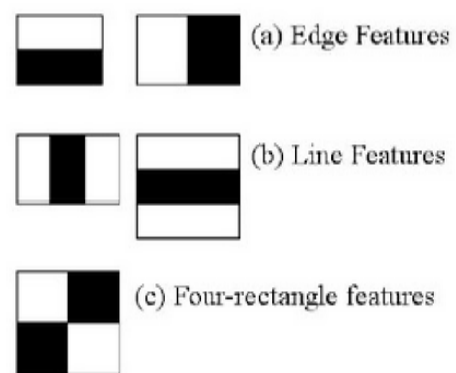


Fig2: Haar's cascade

Each feature is represented as a single value obtained from the difference of the sums of pixels in white rectangle from the sum of all pixels in the black rectangle.

As the number of classifiers increase the arithmetic computations seems to take a To avoid this, we use the concept of Integral Image. Although it is very vague to classify with one strong classifier we use the cascade of classifiers. Classification takes place in stages, If the selected region fails in the first stage, we discard it. The region which passes all the stages i.e. all strong classifiers is treated as the detected face. Detected Faces are passed to the Face recognition phase. The detected integral image is subjected to the Local binary pattern which results in decimals are represented as histogram for every integral image.

VIII. MODULES

CAMERA MODULE

The camera module connects to the Raspberry Pi board via the CSI connector designed specifically for

interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data to the processor.

RASPBERRY PI MODULE

This project describes the method of detecting and recognizing the face using Raspberry Pi. Raspberry Pi B+ 3 model is used for computation in the detection and recognition modules. The face database is stored into face data set to recognize the faces of the students. This Raspberry pi equipped with ENC28J60 which is a Ethernet chip to get connected with internet.

DATABASE MODULE

Database can be divided into two types i.e. Original database and Updated database. Two databases are displayed in the experimental setup. The Original database, also called as, Face Database is the collection of face images and extracted features at the time of enrollment process and in the second Attendance database, also called as, Updated database, contains the information about the students and also use to mark attendance. These two databases are managed by the teachers (Admin).

IX. EXPECTED OUTCOMES

The proposed system automatically captures the image with the help of smart webcam camera at a time 4or5 student's. The system can recognize the face to identify the student's presence and mark attendance. For every period the attendance can be updated same as the previous period's value. In case, if the students go out in between, then their faces are to be again analyzed and the attendance is hold on for 15 minutes (excluding break and lunch hours). While re-entering the attendance is marked "present" again if the students come back within 15minutes. If not then the attendance is marked "absent". Hence periodic attendance is automated. The stored data can be further used for attendance calculation

X. FUTURE SCOPE

The system can be further implemented Attendance automation system and cloud can be used for data storage. To increase level of security in the automation system for database or cloud. It will help to maintain the attendance in different organizations, Industries or Institute by taking a attendance for all employees at a time.

XI. CONCLUSION

This paper introduces the efficient and accurate method of attendance in the classroom environment that can replace the old manual method. This method is secure enough, reliable and available for installing the system in the classroom. It can be constructed using a camera and computer. There is a need to use some techniques that can recognize the faces in veil to improve the system performance.

XII. ACKNOWLEDGEMENT

We would like to thanks our college, DACOE. Computer Science and Engineering Dept. HOD Prof. Ashish N. Patil and our project guide Prof. A.T. Mulik to have their guidance and our teachers For providing us an opportunity to present our project and for guiding us through it.

REFERENCES

- [1] AshishChoudhary, AbhishekTripathi, Abhishek Bajaj, MuditRathi and B.M Nandini, Department of Information Science and Engineering. The national Institute of Engineering. "Automatic Attendance System Using Face Recognition". International Journal of Modern Trends in Engineering and Research (IJMTER) Volume 03, Issue 04, [April– 2016]
- [2] RefikSamet, MuhammedTanriverdi, Department of Computer engineering, Ankara University, Turkey. "Face Recognition-Based Mobile Automatic Classroom Attendance Management System" 2017 International Conference on Cyberworlds.
- [3] Jiang Lu, Xingang Fu, Ting Zhang, Department of Computer Science and Electrical Engineering. "A Smart System for Face Detection with Spatial Correlation Improvement in IoT Environment", 2017.
- [4] AalamGumber, NavneetKaur, Department of Computer Engineering, Punjabi university, Patiala, India, "Face Recognition Based Automated Attendance Management System using Principal Component Analysis"