



Automatic Attendance Monitoring in IoT Using Face Recognition

¹Dr. M. Savithri, ² Dr. K. Thenmozhi, ³Dr. A. Nirmala

¹Professor, ²Associate Professor, ³Professor

¹Department of Computer Science, ²Computer Science with Cognitive Systems, ³Information Technology
^{1,2,3}Dr.N.G.P. Arts and Science College, Coimbatore, India

Abstract : Attendance for the students is a vital task at college. When done manually it generally wastes lots of productive time of the category. This proposed solution to this problem is through automation of the attendance system using face recognition. The face is the primary identification for any human. This project describes the tactic of detecting and recognizing the face in real-time using a Raspberry Pi. This project describes an efficient algorithm using an open-source image processing framework mentioned as OpenCV. The face database is collected to acknowledge the faces of the scholars. The system is initially trained with the students' faces which is collectively observed by the student database. The system uses a user-friendly interface to maximize the user experience while both training and testing which are collecting student images and taking attendance with the system.

IndexTerms - IoT, Face Recognition

I. INTRODUCTION

This report describes the capabilities which can be provided by the software application "Student Attendance Management System". The aim of developing this attendance management system is to computerize the normal way of taking attendance in classes and also manage student information together with their classes and subjects. Another purpose for developing the software is to urge the reports automatically whenever required, -in between the semester or after the semester. During this project, we are using many python modules. Like, Pandas, Numpy, Open CV, Tkinter, etc. During this project, first detect the face with the assistance of a pre-trained face detection file. Then next it goes to the popularity process. Finally, we got the students'details.

Literature Review

Abhishek Jha [1] proposed the face is the identity of a personal person. The methods to require advantage of this physical feature has seen a wonderful chance of image processing techniques. The accurate recognition of an individual is the aim of a face recognition system and this identification is also used for coming processing. The methods are often bio-metric authentication are: International Conference on Audio and (AVBPA) and (AFGR). The face recognition method is usually divided into two stages: processing before detection where face detection and alignment and recognition occurs through feature extraction is face detection, face alignment, feature extraction, face matching and so on . It provides an automatic attendance system for all the scholars that attend a particular lecture, section, time, effort and reduces distractions and disturbances.

Bhawna Dhupia, Nabil Litayem, Sadia Rubab [2] proposed the large form of mobile devices available . The challenge is developing innovative mobile learning solutions for sophistication. But an important challenge here is to substantiate the presence of scholars within the class. They use two methods are electronic attendance systems and mobile learning system. Attendance could also be an awfully basic task. Students during class using mobile send the teacher's photo through email and teacher checks email and marks the attendance of the coed. A platform independent mobile learning system is also a web based application and it provides a which could be a mobile implementation of a student response system providing fast feedback to teachers about student performance.

Chrisford Ling, Patrick Laytner, Qinghan Xiao [3] proposed that bio-metric systems have become an increasingly popular solution for security-related applications. Retina and fingerprint scanners to accurately perform a large selection of tasks including the authentication of personnel to restricted sites and identification of individual persons. face recognition may be a rapidly growing area its non-contact nature, somebody's face, detecting a face in a very picture, step one to performing Principal Component Analysis (PCA), Hidden Markov Models (HMM), and HAAR-like features, the complexion properties in several common colors spaces like RGB, Normalized RGB, and HSV.

Dennis Haufe, Manuel Gunther, Rolf P.Wiirtz [4] proposed the Gabor wavelet responses at single locations, facial images are collected at offset positions and assembled into a Gabor graph G. Often, the identity of a research image, is compared with several gallery images and assigned the identity of the foremost similar gallery image. Elastic bunch graph matching (EBGM), the

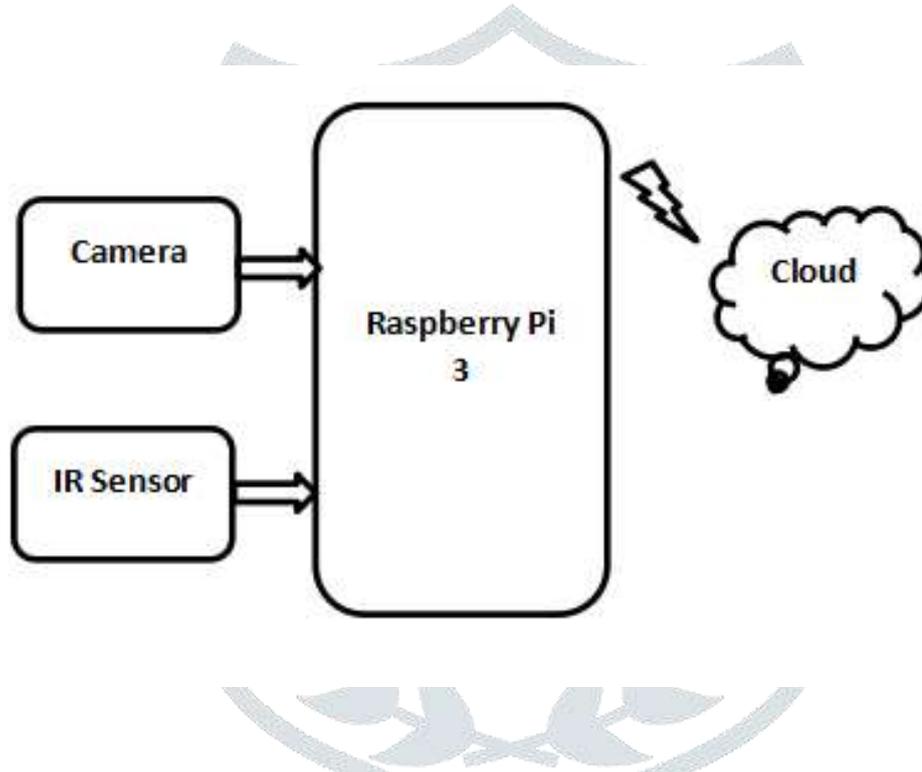
correspondence problem is solved locally by computing offset position corrections, so-called disparities. The CAS-PEAL images are partitioned into a gallery of 1040 images with ambient illumination and neutral countenance, and different probe sets. We here process the probe sets Expression and Lighting. The Expression probe set contains 1570 images with ambient illumination, showing one in every of five facial expressions. The lighting probe set consists of images with neutral expression, but strong fluorescent illumination from fifteen different directions and one frontal incandescent illumination.

Divyaharitha P, Gayathri B, Safiya Parvin A [5] proposed that attendance plays an important role in schools and universities as a previous record of a student. Fake attendance is becoming to be common nowadays, thanks to which problems of misbehaving arise. Ultrasonic may be a sensor, which is used to detect a person's movement. These actions are through with MATLAB software application. Face recognition is suggested to avoid fake attendance there's a possibility of marking fake attendance just by showing the cardboard to even bunking students by their friends, The sensor which is employed in detecting misbehaving students within the class time.

Proposed System

This application is created to automate the processing of attendance. It also makes it easier to manage as well as capture attendance. It also generates periodic reports to remain a check on the scholars who are regular & who aren't. The Admin has to login into the system & then within the attendance option they need to pick out the suitable class, semester, and subject. Now the admin has to simply select the students' names from the manual attendance sheet consistent with their roll number and so submit the sheet. This could add the chosen students as present students in this particular session.

Block Diagram



Methodology

We will build a viable solution to our problem based on the literature survey since we've fully investigated many areas that are directly related to our project. In this section, we'll present a method that will provide an overview of our project's approach and how it should be carried out. Because the prior effort was insufficient, we decided to create this project in the most viable and efficient manner possible. The Viola Jones method is the suggested face detection module for this project. Neural specification with LBPH is also proposed for facial recognition modules in this project.

Step 1: The primary step is to set up the Raspberry Pi.

Step 2: Navigate to the Attendance Monitoring System's Graphical interface. After the professor has selected the acceptable day and scheduled ID for the current class session, the attendance-taking session can begin.

Step 3: Launch the python script After receiving the lecturer's button click, action within the main window, a python script to be launched from a bash file.

Step 4: The initial step is to load the trained data (.yml) file that was saved during the face database building procedure into the python script.

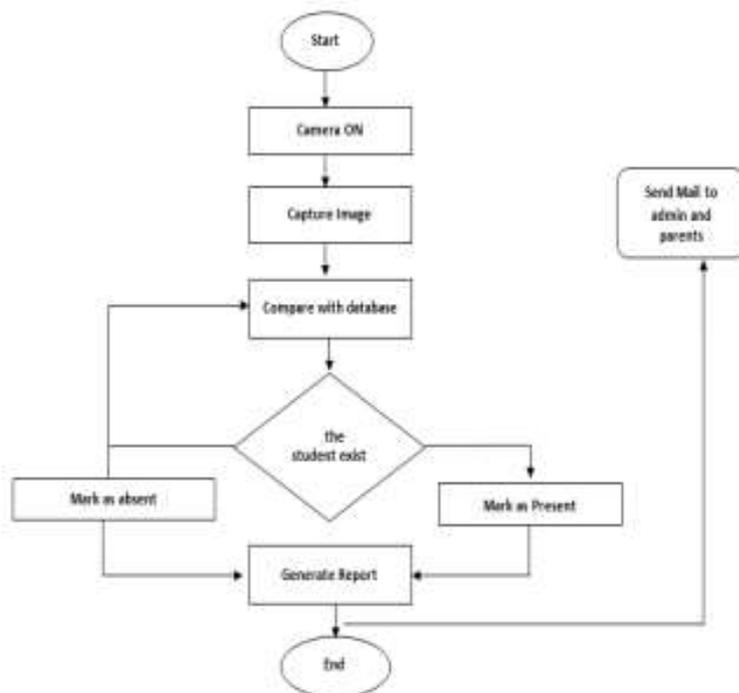
Step 5: Obtain Faces The device will next begin to accumulate student portraits, which can be subjected to the same preprocessing and face detection procedures as before.

Step 6: Valid portraits will next be matched against the recognizer's loaded gallery to identify the captured faces.

Step 7: Make a note of who is attending. Following the identification of the relevant student through the capturing procedure, a record of current attendance is going to be added to a database-managed attendance table.

Step 8: The student's attendance is recorded on an excel sheet.

Step 9: This excel sheet is then uploaded on Google drive.

Proposed System Flowchart:**Hardware Requirements:****Raspberry Pi-3**

The Raspberry Pi may be a tiny computer about the size of a deck of cards. It uses what's called a system on chip, which integrates the CPU and GPU in a single integrated circuit, with the RAM, USB ports, and other components soldered onto the board for an all-in-one package.

It doesn't have onboard storage, but it's an SD card slot you can use to house your operating system and files. The Raspberry Pi is little, doesn't use much power, and is comparatively inexpensive.

USB Camera

A USB webcam may be a camera that connects to a raspberry pi, usually by plugging it into a USB port on the port. The video is fed to the raspberry pi where a software application allows you to view the pictures and also transfer them to the Internet.

IR Sensor

It allows individuals to work with electronic equipment like communication aids and environmental controls hands-free. Each blink of attention is detected by an infrared sensor, which is mounted on dummy spectacle frames. The attention blink switch can be set up to operate on either eye and may be worn over normal glasses.

Software Requirements**Python**

Python is derived from many other languages, including ABC, Modula-3, C, C++, Algol-68, SmallTalk, and Unix shell and other scripting languages. Blocks of code are denoted by line indentation. The number of spaces in the indentation is variable, but all statements within the block must be indented the same amount.

Open CV

Open Computer Vision is shortly denoted as Open CV. Officially launched in 1999 the OpenCV project was initially an Intel Research initiative to advance CPU-intensive applications, a part of a series of projects including real-time ray tracing and 3D display walls. The most contributors to the project included several optimization experts in Intel Russia, also as Intel's Performance Library Team.

OpenCV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. All of the new developments and algorithms appear within the C++ interface.

Digital Image Processing

The identification of objects in a picture. This process would probably start with image processing techniques like noise removal, followed by (low-level) feature extraction to locate lines, regions, and possibly areas with certain textures.

e.g. cars on a road, boxes on a conveyor belt, or cancerous cells on a microscope slide. One reason this is often an AI problem is that an object can appear very different when viewed from different angles or under different lighting.

CONCLUSION

With the event of science and technology, face recognition technology has made great achievements, but there's still improvement in practical application. During this project, face detection and recognition in a Python environment by using OpenCV. In our project, first, we collect the scholar's details, then next we train that detail with student images. Finally, our face recognition-based student detail collection works alright.

Results:

The image given below shows the details about the list of student absent during the hour

```

Python 2.7.9 Shell
File Edit Shell Debug Options Windows Help
>>>
Importing Face Recognition Modules
[INFO] Loading encodings...
Sensor Ready...
Person Detected
PERSON: karthikayan
Data: ['KARTHIKEYAN', '220E37', 'IN', '19:09:15', 'PRESENT']
{ 'arun': {'out_time': '', 'mail': 'karthikayan154@gmail.com', 'status': 'PRESENT', 'in_time': '', 'Roll': '220E30'}, 'ashok': {'out_time': '', 'mail': 'karthikayan154@gmail.com', 'status': 'PRESENT', 'in_time': '', 'Roll': '220E30'}, 'karthikayan': {'out_time': '', 'mail': 'karthikayan154@gmail.com', 'status': 'PRESENT', 'in_time': '19:09:15', 'Roll': '220E37'}, 'arahul': {'out_time': '', 'mail': 'karthikayan154@gmail.com', 'status': 'PRESENT', 'in_time': '', 'Roll': '220E30'}}
['karthikayan']
Time Over
Absent List: ['arun', 'ashok', 'arahul']
Mail Sent to: arun
Mail Sent to: ashok
Mail Sent to: arahul
>>>
  
```

The below image shows the details of attendance sent to the teacher.

Name	Roll No	Mail	In Time	Out Time	Present
arun	220E30	NO			PRESENT
ASHOK	220E30	NO			PRESENT
ARAHUL	220E30	NO			PRESENT

References:

- [1] Abhishek Jha, "Class Room Attendance System Using Facial Recognition System", IEEE The International Journal of Mathematics, Science, Technology and Management (ISSN: 2319-8125) Vol. 2 Issue 3, 2015.
- [2] Chirsford Ling, Patrick Laytner and Qinghan Xiao "Robust Face Detection on Still Images", in IEEE in 2014 IEEE Symp. on Comp. Intell. in Biometrics and Identity management (CIBIM), pp. 76–80, Dec 2014.
- [3] Dennis Haufe, Rolf P. Wiirtz and Manuel Gunter "Face Recognition With Disparity Corrected Gabor Phase Differences" pp. 411–418, Springer-Verlag, 2012.
- [4] Divyaharitha p, Gayathri B, Safiya Parvin A "Automated Of Attendance and Student Tracking With Face Recognition And Ultrasonic Sensor" IEEE transaction 2013.
- [5] Nabil Litayem, Bhawna Dhupia, Sadia Rubab " Automatic Attendance and Mobile Learning System in Sensor Enabled Heterogeneous and Dynamic University Environment" International Journal of emerging technology and advanced engineering (ISO 9001:2008 certified Journal, Volume 4, Issue 12, December 2014).
- [6] Eu Jun Chin, Wei Jen Chen and Florence Choong "Automatic Attendance Capture and Tracking System" Journal Of Engineering Science and Technology EURECA 2014 Special Issue January (2015) 45 – 59.
- [7] Ahonen, Timo, Abdenour Hadid, and Matti Pietikäinen. "Face recognition with local binary patterns" Computer vision ECCV 2004 (2004): 469–481.
- [8] Paul Viola, Michael J. Jones, Robust Real-Time Face Detection, International Journal of Computer Vision 57(2), 137–154, 2004.
- [9] Mamtha G, Rajeshwari M, Srivardhini P "Automated Attendance Marking" International Journal For Research in Applied Science and Engineering Technology (IJRASET), Volume 4, Issue 4, April 2016.
- [10] A. Arjun Raj, M. Shoheb, K. Arvind and K. S. Chethan, "Face Recognition Based Smart Attendance System," 2020 International Conference on Intelligent Engineering and Management (ICIEM), London, UK, 2020, pp. 354-357, doi: 10.1109/ICIEM48762.2020.9160184.