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FACE RECOGNITION ATTENDANCE SYSTEM USING RASPBERRY PI

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ABSTRACT:

Record your presence using identification strategies such as RFID, iris recognition, and fingerprint recognition. Of all these personal identification strategies, including facial recognition, it's the most natural, fast, and highly efficient, difficult to implement, but a continuous observation to overcome. There are multiple applications in the attendance management system and security system. This paper implements a system that uses facial recognition and recognition techniques to detect the presence of students, industrial workers, etc. in a lecture. The participation period is set and the database is automatically uploaded to the web server over the internet connection. This process takes place without human intervention. A Raspberry Pi with the OpenCV library is installed on the system and a Raspberry Pi camera module is attached for face detection and recognition. The data is stored on a memory card connected to the Raspberry Pi and can be accessed via the internet. The results show that continuous observation improves accuracy and maximizes output.

Keywords: RFID, Face recognition, detection, accuracy, OpenCV, Raspberry pi

[1] INTRODUCTION

The current system used to automatically renew attendance is typically based on RFID, biometrics, and MATLAB. The manual method of attendance tracking is usually a difficult and time-consuming process. Therefore, it is important to build an efficient way to manage attendance automatically. Another advantage of these types is that you can avoid including fake presence. Open Command Visualization (OpenCV) is an open source library whose source code is open and useful in visual domains such as image processing. The main motto of this paper is attendance registration and management using facial recognition using Raspberry pi, Image processing with Python.

[2] LITREATURE SURVEY

Many organizations, companies and institutions attend regularly using [1] RFID, [2] biometric fingerprinting, and cash registers. These methods are usually slow to calculate. RFID (Radio Frequency Identification) [1] uses electromagnetic fields to automatically identify and track tags attached to humans. RFID can compromise people's privacy and security. RFID strategies ultimately affect software that allows each individual to be analyzed from the primary database. This environment can be easily attacked by hackers. If the RFID reader and receiver do not match properly, the reading speed will slow down. The bio-fingerprint identification system [2] uses the fingerprint as a unique ID. This is one of the most accurate systems running effectively today. However, recognizing a single fingerprint from a set of registered fingerprints is a difficult process. The fingerprint system does not reveal any information about the original fingerprint. This may prove wrong, as many algorithms [3] show that fingerprints can be reconstructed using a small template. Iris recognition [4] is another type of implementation that scans, saves, and retrieves people's irises for comparison, with the server automatically managing their presence. However, it is difficult to capture the iris of students and employees, so a fast implementation of facial recognition [4] with reduced lighting effects can be used.

[3] PROPOSED MODEL

The proposed system is used to detect attendance through facial recognition and manage attendance in appropriate environments such as colleges and offices. The system architecture is shown in Figure 1. The Raspberry Pi camera module V2 connects to the Raspberry Pi 3 and is placed where employees enter the office.

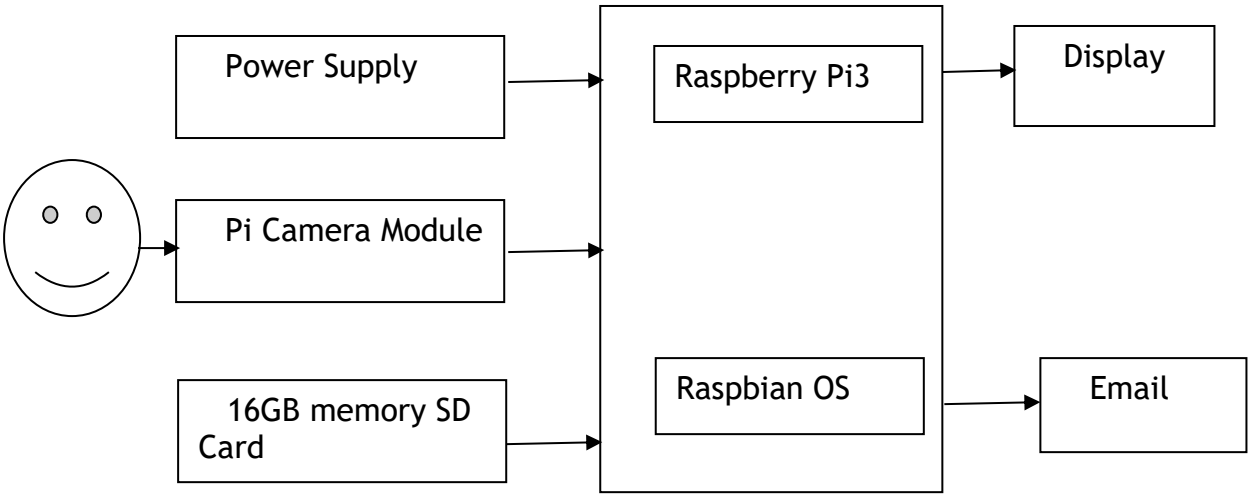


Fig.1 Block Diagram

The camera module is used for video recording. Which human face image is extracted. Face recognition is then done and automatically validated in the existing database via the library files that exist in OpenCV. Face recognition is generally more sophisticated and efficient than other systems

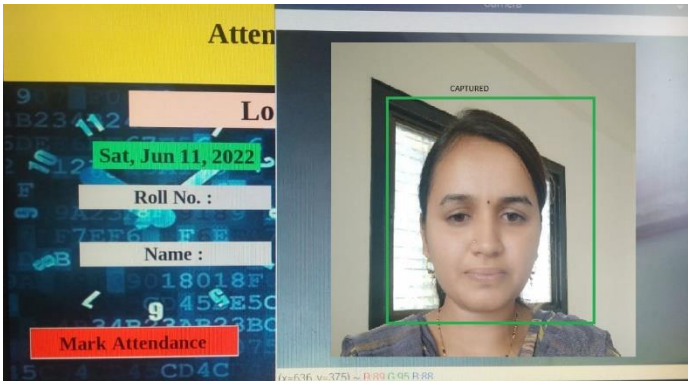


Fig.2 Captured Image

The steps involved are given as follows.

A. Take a picture

Camera modules are placed where people enter colleges and offices, and videos are recorded at distances of less than 5 meters. The camera is used to record video with many frames, and each frame can be used for face recognition and presence marking.

B. Create a database

Since biometrics are selected for implementation, it is important to enroll everyone who needs to record their presence. Here, each person's face is captured and stored in the appropriate database, including that person's name and other IDs. Here, some samples are taken for one person with different lighting conditions. A database of 5 students and 10 photos of each individual.

C. Recognize face

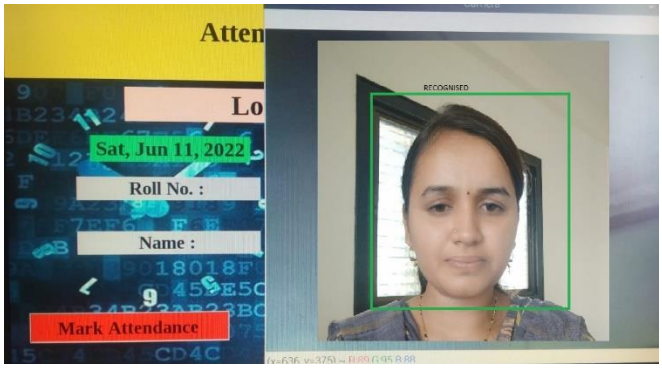


Fig.3 Detected Face

In this proposed task, it is important to choose an efficient facial recognition algorithm. Many face recognition algorithms are available in OpenCV. B. Eigenface, Fisher Face, and Local Binary Pattern Histogram. Considering the need for real-time detection, one algorithm chosen was the Haar Cascade Algorithm [5] for face detection and detection. It is available in the OpenCV source library [6] and has proven to be robust [7].

A. Preprocessing

Since a picture may also include pointless heritage noises and factors apart from faces it's far crucial to dispose of the one’s factors. Thus, function extraction is fundamental for decreasing the picture to handiest a face to be had within side the picture. By this technique, the picture is decreased to a

length of 150x150. Histogram equalization is carried out at the decreased picture and hence the picture will become less difficult to process.

B. Face Recognition and Classification

The capacity of a set of rules to recognize faces [8] lies on how properly it could extract and classify the faces. In this work, function extraction is completed via Principal Component Analysis (PCA). Based on assessment of many strategies for function extraction and feature arrived at this technique primarily based totally at the evaluation and outcomes of numerous strategies. Principal Component Analysis (PCA) changed into the primary technique to symbolize faces quickly. Here face pictures are represented as eigenfaces and their corresponding running are used. An Image in PCA is represented mathematically as,

$$\chi = AY + \mu$$

where χ is the face vector, Y is the vector of eigenfaces, is the average factor and $A$is the feature vector.

Now that the face has been detected, the next step in this task is to perform face detection on the detected face, but detecting a face in a regular photo will be less accurate. Therefore, PCA is used to transform the high dimensionality of 2D images into a smaller set of uncorrelated variables. The PCA finds the direction in which the data shows the greatest variance. This direction is called the principal component.

Feature extraction and classification are two phases of face recognition. These are executed by the cascade classifier that exists in the OpenCV source library cv2.CascadeClassifier ("haarcascade_frontalface_default.xml"). These are compared to the features obtained in real-world scenarios such as: B. Various types of facial expressions, lighting conditions [9]. Continued training in facial recognition systems will improve work performance as accuracy begins to improve by considering over 30 real-time images. The distance from the camera to the face is important for training and recognition, and the ideal distance has been found to be 1-5 meters with high accuracy.

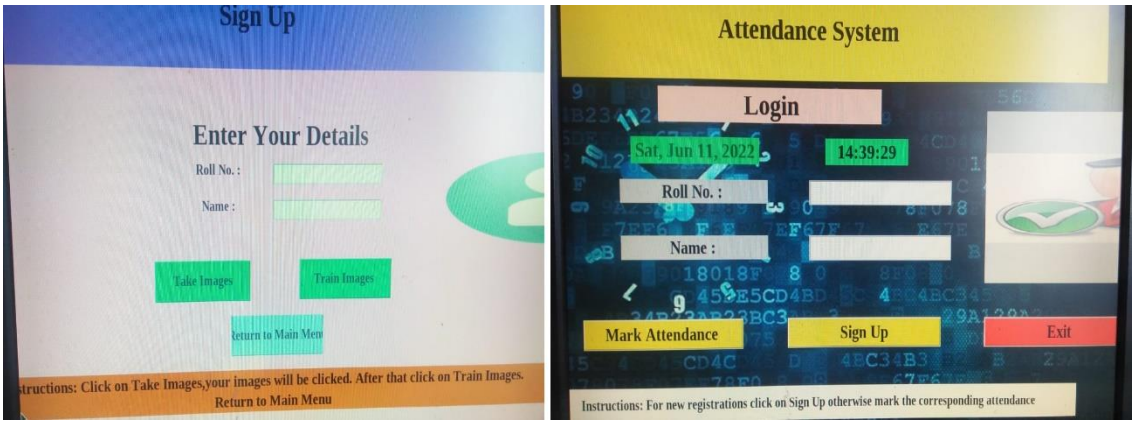


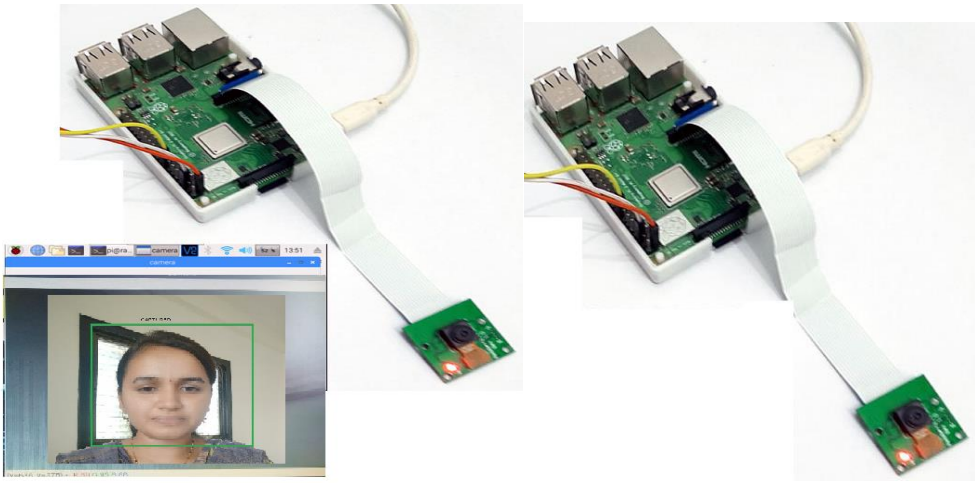
Fig4. GUI images

(4) GRAPHICAL USER INTERFACE(GUI)

The GUI was developed using the Python Tkinter package format found in the Python libraries

installed on Raspberry Pi 3. Open date, time, and other windows to create a database, train your model, and use pi-cam to test student attendance live.

(5) RESULTS



(5) CONCLUSION

Therefore, attendance systems with facial recognition can prove to be safe and efficient. In real-time scenarios, the Haar Cascade Classifier is superior to other algorithms [10] and has proven to be suitable for implementing this task.

The false positive rate is low and the detection rate is high. Individual use of the Raspberry Pi improves work mobility and acts as stand-alone hardware. You can further develop your work by improving the detection rate [11], and you can use this system as a security monitoring system by using the Raspberry Pi infrared camera module.

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