Face Recognition System Attendance System using Raspberry Pi

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ABSTRACT

This Paper shows how to bring in effect, face identification and recognizing algorithms in picture processing to create a frontal face detection and recognition system. Today, industries and organizations are implementing person detection techniques called as Radio frequency identification, pupil recognition, and fingerprint recognition to participate in conferences. Among these recognition techniques, including facial identification, the most natural method was to spend less time, although it is difficult to implement, but very efficient, this is a continuous observation to continually overcome that. It has numerous applications in the participation the executives' framework and the security framework. In this work, a framework was carried out that gives help to understudies, industry representatives, and so forth during gatherings. Use face acknowledgment and identification innovation. A participation time-frame is set and the information base is naturally transferred to the web worker by means of the web association. This interaction can be finished with no manual mediation. In the framework, a Raspberry Pi with OpenCV library and a Raspberry Pi camera module are associated for face identification and acknowledgment. The information is put away on a memory card associated with the Raspberry Pi and can be gotten to through the Internet.

Keywords: *Internet of Things (IoT), ESP32, Raspberry Pi, Pi cam.*

1. Introduction

Since face recognition is used in many fields, this might be an application which is needed for picture processing. One of these applications of personally identifiable facial recognition within an organization for the purpose of attending. Keeping and monitoring attendance records plays an important role in any organization's performance analysis [1][15]. The purpose of developing the attendance management system is to computerize the existing attendance management method. Automatic attendance management system reduces human intervention and performs the daily activities of attendance management and analysis [14]. Common techniques and methodologies for face detection and recognition cannot overcome problems such as scaling, poses, lighting changes, spinning and occlusion. The system which is proposed aims to overcome the defectives of the existing system and provides functions called as face detection, feature extraction, extracted feature detection, and student attendance analysis. The system incorporates technologies such as image contrast, integrated image color features, and cascading classifiers for feature detection.

The framework utilizes an assortment of facial highlights (shape, shading, LBP swell auto-connection) to improve exactness. Countenances are perceived utilizing the Euclidean distance and k most limited point calculation. The framework considers the progressions that happen in the face throughout some stretch of time and uses the suitable learning calculation so the outcomes are more exact [16]. It was developed to show teacher attendance without personal interference and is very convenient for colleges and offices to easily show attendance. This framework helps individuals by saving time when they can know their participation capacity from anyplace through the staff enrollment on the web page developed in this paper. Current systems used to automatically update attendance are generally RFID-based, biometric-based, and MATLAB-based. By and large, going to physically is a troublesome and tedious cycle [17]. Hence, it is imperative to construct an effective method to oversee participation naturally. Another benefit of this kind is that it can forestall

counterfeit participation [18]. Open-CV (Open Command Visualization) is an open-source library whose source code is available to general society and is helpful in the field of vision, for example, picture handling. The principle adage of this errand is to utilize facial acknowledgment to distinguish and oversee participation [19]. Face acknowledgment and acknowledgment are not new in our general public where we reside.

The human mental capacity to perceive the individual is noteworthy. It is astonishing how the human brain can stay consistent with the distinguishing proof of a specific individual, even though the progression of time, regardless of little changes for all intents and purposes [20].

2. Related Works

The authors have proposed that numerous calculations that were partitioned advance towards dependent on prototype and looks. Three straight subspace examinations are depicted in the strategy's dependent on looks. Likewise, for face acknowledgment non-direct complex investigation is clarified [1].S.T. Gandhi gives, Face acknowledgment way to deal with distinguish the individual utilizing distinctive experimentation. This framework gives the validation to the framework by face as a biometric. This framework proposed various applications like distinguishing proof framework, access control and report control [2].

Anil K proposed, Layout coordinating with calculation for face acknowledgment. This methodology tends to the presented issue in face acknowledgment. In the first place, the appearances are addressing in edge see. At that point layout coordinating is applied ludicrous. Restlessness based methodology addresses the picture in 1 measurement. The individual ID is performed dependent on the coordinating with score [3].

Sujatha G proposed, Face recognition frameworks audits. This paper is for the most part centered on the delicate processing techniques like SVM, ANN and so forth to distinguish the face. These methodologies may give better outcomes. This paper talked about the various highlight's extraction calculations like ICA, PCA and LDA [4]. A few issues are likewise referenced which diminish precision like picture quality, present varieties and enlightenment changes [5].

Rhiddi Patel proposed Face acknowledgment and examines the technique and its working. It likewise thinks about various procedures of face acknowledgment. It features the methods that give great proficiency for enlightenment changes and distinctive ecological conditions [6].

3. Existing System

The current system for face acknowledgment depends on AI calculations. The information base is made by catching recordings of 11 people glancing in various areas [7]. At that point from these recordings, the face is recognized, and outlines are removed. The data base is made through a 13MP camera of a cell. Every class carries 234 pictures. The objective of the image is 244x244 [8]. The photos contain face similarly as non-faces parts. Along these lines, for face affirmation, the particular face part is relied upon to improve precision.

The essential objective of this cycle is to recognize the face [9][21]. In this strategy, Deep Neural Network (DNN) Based face area technique is used. DNN based strategy is more precise than the state of craftsmanship face recognizable proof systems [10]. The pre-arranged module of Caffe prototxt archives for significant

learning face acknowledgment is used to perceive the face. This limit is associated with the Open CV library. The DNN based face locater utilized the Single Shot Detector (SSD) framework with ResNet as the base association [11]. The trimmed pictures might be of various sizes, so, we have to reshape all pictures to a similar size. Subsequently the recognized pictures were trimmed and resized to 128x128 goals. The resized pictures were once more resized to a 1D cluster of size 1X $(128)^2$. Highlight extraction assumes a crucial part in the face acknowledgment calculation [12]. Each face has novel qualities that assistance to recognize one individual from another. In this methodology, PCA and LDA are utilized for highlight extraction. The data set is isolated into train and test pictures [13].

4. Proposed System

The work aims to reduce office processing, save time, and generate accurate results from employee attendance. It also calculates the sum of the number of days backends exist and the number of days absent to reduce backend work.
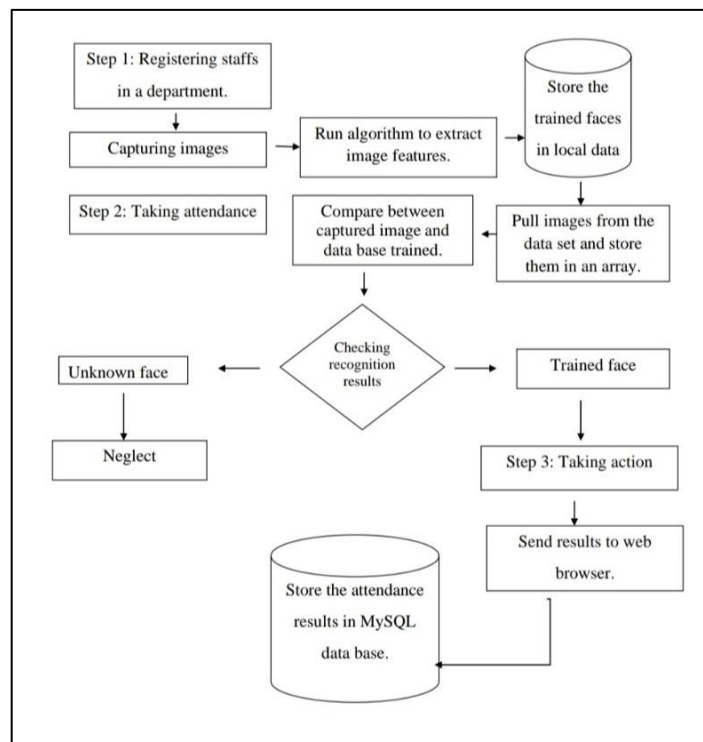

Fig.1. Proposed System

The Raspberry Pi Camera Module V2 appended to the Raspberry Pi 3 is set where individuals come into the workplace. The camera module is utilized to catch a video where a picture of an individual's face is extricated. From that point forward, face acknowledgment happens and naturally checks the current information base utilizing the OpenCV library record. Facial acknowledgment is for the most part more viable than different frameworks.

The raspberry pi camera is mounted in an area where staff go into school or college and video is taken inside the length under 5 meters of distance. A raspberry pi cam is used for taking video which contains various edges from which any of the housings can be used for face affirmation and indicating the investment. This is

significant for the enrollment of all people who need to join in, as the biometric verification strategy is picked for execution. Here, each individual's face is caught and put away in a fitting information base containing that individual's name and different qualifications.
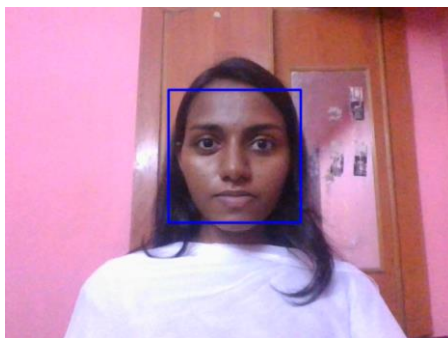

Fig.2. Face Detection

Here, a few examples are taken from one individual with various lighting conditions. A data set of 5 understudies and 10 photographs of every person. In this proposed work, it is essential to pick an effective calculation for face acknowledgment. OpenCV has many face acknowledgment calculations, including a one of a kind face Fisher face neighborhood paired example histogram. The calculation picked considering the requirement for constant acknowledgment is the Haar Cascade calculation for face discovery and acknowledgment. Accessible in the OpenCV source library, it is hearty and demonstrated.

It is critical to eliminate these components as pictures may contain undesirable commotion or components other than faces. Consequently, the component extraction picture is the way to decreasing just the accessible appearances in the picture. This technique diminishes the picture to a size of 150x150. Picture handling is simple since histogram leveling is performed on the diminished picture. First, faces of all staffs are captured and registered to extract the facial features using Haar Cascade algorithm.

The trained faces are now stored in a data base. Now while taking attendance, the real time images are captured and they are compared with the trained images. Images are pulled from data set and stored in an array. Now, while comparing the images, if it is an already trained image, then attendance is marked and the results are stored in the web browser. If it is an unknown image, then neglect it.

(a) Raspberry Pi

The Raspberry Pi 3 with the quad-center ARM Cortex-A53 processor is depicted as multiple times better compared to the Raspberry Pi 1. As per benchmarks, the Raspberry Pi 3 is around 80% more equal than the Raspberry Pi 2. Most Raspberry Pi frameworks on-chips can be overclocked up to 800MHz and some 1000MHz.

(b) Raspberry Pi cam

The camera board is attached to the Raspberry Pi through a ribbon cable. One end of the ribbon cable connects to the camera PCB and the other end connects to the Raspberry Pi hardware itself. You need to connect the ribbon cable in the correct way. Otherwise, the camera is not working. The blue back side of the camera PCB

cable should face the other side of the PCB, and the Raspberry Pi hardware should face the Ethernet connection.

(c) Open CV

OpenCV is an open-source library for PC vision, AI, and picture handling. Presently, it assumes a significant part continuously handling, which is vital in the present frameworks. With this library, anybody can handle pictures and recordings to perceive articles, faces, and surprisingly written by hand characters. I can do it. It incorporates with different libraries (like NumPy and Python) and can handle OpenCV cluster structure for examination. Recognize examples and qualities of pictures in the vector space used to perform numerical tasks.

(d) My SQL data base

MySQL is a generally utilized open-source social data set administration framework that can assist clients with conveying execution, versatile, and coordinated information base applications. Broadly utilized as a data set part of the product stack for web applications. MySQL orders are extremely amazing, and all engineers know and utilize these questions to portray MySQL orders that are valuable and significant for communicating with the framework and the MySQL data set. It depends on SQL (Structured Query Language) and is upheld and executed on Linux, UNIX, and Windows.

(e) Advantages

- Lower manufacturing cost
- Lower power consumption
- Reduces backend work
- Fully automatic

5. Simulation Output

Attendance Sign in Sheet

Date: 16-04-2021
Department: Electronics and Communication

Employee ID	Name	Time In	Time Out
00001	Reshma R S	8:23:15	4:21:23
00002	Christy D	8:24:56	4:22:34
00003	Karthika N	8:35:06	4:23:45
00004	Akshal Jasmine Y	8:35:45	4:24:56
00005	Deno Shalu D	8:39:24	4:25:01

Fig.3. Attendance sheet

6. Conclusion and Future Work

The ambition of this work is to develop an automatic attendance system for use in colleges. So, you can get more correct results than ordinary attendance sheet. This system is based on Raspberry Pi as hardware. So, the facial recognition attendance system is safe and verifiable. It gives a greater recognition rate at lower fake rates. Individual use of the Raspberry Pi increases the maneuverability of the task and works as standalone hardware. You can improve your recognition rate and further advance your work with the Raspberry Pi Infra-Red camera module. The system can be used for surveillance monitoring.

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