

Attendance system using Face recognition using Raspberry Pi

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ABSTRACT

Face recognition based smart attendance system using recognizing the students face while taking attendance by using face based on monitor camera image capturing. In our face recognition based smart attendance project, a raspberry pi system will be able to find and recognize human faces fast and precisely in images. The long-established method of calling name of each student is tedious and there is always a chance of proxy attendance. The proposed system is based on face recognition to maintain the attendance record of students. As the process of attendance taking starts the system takes pictures of the attendees and then applies face detection and recognition technique to the given image and the recognized students are marked as present and their attendance is updated with corresponding time, student name and register number. We have used deep learning techniques to develop this project.

Keywords: face recognition, attendance, raspberry Pi.

1. INTRODUCTION

Education institutes these days are concerned about the consistency of students' performance. One explanation for this decrease in student performance is the inadequate attendance. The long-established attendance was taken manually that is incredibly time overwhelming and infrequently results in human error. The old technique that uses paper sheets for taking students' attendance will now not be used. This project aims for computer-based student attendance taking system that supports the institutions to keep records of attendance. We have proposed to implement a "Face Recognition based Smart Attendance System Using IoT". The present implementation includes facial identification that is time saving and eradicates the probabilities of proxy attendance due to the facial detection. This system will currently be utilized in a section during which participation plays a vital role. Raspberry Pi, Python and OpenCV are the basic requirements for this system. The system implementation uses webcam as input device to identify the face of the person in real-time. This project on face recognition based smart attendance system using IoT aims to replace the manual attendance system with automated attendance system. As all the data is stored online in this proposed system, offline registers will become irrelevant, making the maintenance of records easier. Nowadays attendance is considered as a prime factor for both the students and the educational institution. Manual attendance is considered as a time-consuming process or sometimes it happens for the teacher to miss someone or students may answer multiple times on the absence of their friends (proxy attendance). Biometric attendance is automated method of verifying or recognizing the identity of a living person on the basis of some physiological characteristics, such as fingerprints or facial features, or some aspects of the person's behavior. Since biometric systems determine someone by biological attributes, they are tough to forge. Face recognition is one among the few biometric ways that has the veracity of a physiological approach while not being intrusive. Face Recognition is a type of biometric software that maps an individual's facial features mathematically and stores it as a face print. The system uses deep learning techniques to compare a live capture or digital image to the stored face print in order to verify an individual's identity. Once the recognized face matches a stored image, attendance is marked in corresponding excel sheet for that person. The other reason for

taking face recognition as biometric parameter is this technology reduces the physical touch of objects/records providing a contagious-by-touch free environment which the whole world is adopting these days. Automated attendance system using machine learning approach automatically detects and recognizes face and marks attendance which saves time and maintains a record of the collected data. According to the previous attendance management system, the accuracy of the data collected is the biggest issue. This is because the attendance might not be recorded personally by the original person, in another word, the attendance of a particular person can be taken by a third party without the realization of the institution which violates the accuracy of the data. For example, student A is lazy to attend a particular class, so student B helped him/her to sign for the attendance which in fact student A didn't attend the class, but the system overlooked this matter due to no enforcement practiced. Supposing the institution establish an enforcement, it might need to waste a lot of human resource and time which in turn will not be practical at all. Thus, all the recorded attendance in the previous system is not reliable for analysis usage. The second problem of the previous system is where it is too time consuming. Assuming the time taken for a student to sign his/her attendance on a 3-4 paged name list is approximately 1 minute. In 1 hour, only approximately 60 students can sign their attendance which is obviously inefficient and time consuming. The third issue is with the accessibility of those information by the legitimate concerned party. For an example, most of the parents are very concerned to track their child's actual whereabouts to ensure their kid really attend the classes in college/school. However, in the previous system, there are no ways for the parents to access such information. Therefore, evolution is needed to be done to the previous system to improve efficiency, data accuracy and provides accessibility to the information for those legitimate party. This is a project about Facial RecognitionBased Attendance Monitoring System for Educational Institution. In this chapter, the problem and motivation, research objectives, project scope, project contributions and the background information of the project will be discussed in detail. The technology aims in imparting a tremendous knowledge oriented technical innovation these days. Deep Learning is one among the interesting domain that enables the machine to train itself by providing some datasets as input and provides an appropriate output during testing by applying different learning algorithms. Nowadays Attendance is considered as an important factor for both the student as well as the teacher of an educational organization. With the advancement of the deep learning technology the machine automatically detects the attendance performance of the students and maintains a record of those collected data. In general, the attendance system of the student can be maintained in two different forms namely, Manual Student Attendance Management system is a process where a teacher concerned with the particular subject need to call the students name and mark the attendance manually. Manual attendance may be considered as a time-consuming process or sometimes it happens for the teacher to miss someone or students may answer multiple times on the absence of their friends. So, the problem arises when we think about the traditional process of taking attendance in the classroom. To solve all these issues, we go with Automatic Attendance System (AAS). Automated Attendance System (AAS) is a process to automatically estimate the presence or the absence of the student in the classroom by using face recognition technology. It is also possible to recognize whether the student is sleeping or awake during the lecture and it can also be implemented in the exam sessions to ensure the presence of the student. The presence of the students can be determined by capturing their faces on to a high-definition monitor video streaming service, so it becomes highly reliable for the machine to understand the presence of all the students in the classroom. The two common Human Face Recognition techniques are, Feature-based approach• Brightness-based approach.• The Feature-based approach also known as local face recognition system, used in pointing the key features of the face like eyes, ears, nose, mouth, edges, etc., whereas the

brightness-based approach also termed as the global face recognition system, used in recognizing all the parts of the image

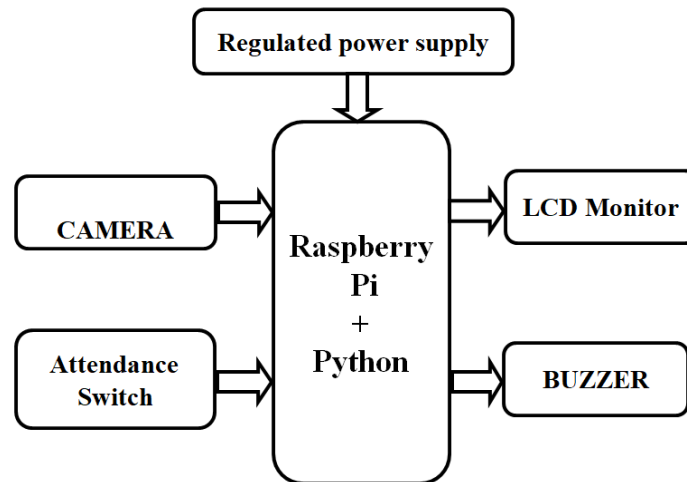
2. LITERATURE SURVEY

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]. 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 locator 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 $1 \times (128)^2$. 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]. 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 principal 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].

3. PROPOSED SYSTEM

The proposed system is designed to capture the face of each student and to store it in the database for their attendance. The face of the student needs to be captured in well-lit room so that student's face features can be detected, the seating and the posture of the student need to be recognized. With this system, there is no need for the teacher to manually take attendance in the class because the system records a video and through image processing/image training the face is recognized and the attendance database is updated in a spreadsheet. The proposed system uses Raspberry Pi as computer and a webcam for capturing the images.



Facial recognition Methodology is being widely used in many projects as it has many advantages. There is requirement of data for the system in order to trace and track the individual and mark his/her attendance. The data is loaded by assigning each individual's image with a corresponding id and name. Once the system starts, the option of taking image is available for which the pre-requirement is the input of id and name. More than 100 images will be taken in gray format using OpenCV. These images will be the input for Haar cascade. Haar Cascade codes the pictures into binary code after converting them into binary image. Once the system is given input, it is trained by clicking on train image option available on the screen using a file called Trainer.yml which is written in human readable data serialization language. The features of the face will be detected and stored for further actions. The dataset has to be created in the above said manner to further recognize the faces when needed. Track images option is used for detecting and recognizing the faces of individuals. After detecting the face of each individual, attendance will be marked in spreadsheet along with the corresponding date and time

The proposed system works in the above shown way. Once the system is activated it asks for the input which are the live image of student, Student name and Id. After storing and training the system will be ready to be used that is to track images and produce attendance report.

1. Capture the Student's Image
2. Apply Haar Cascade (Face Detection)
3. Extract the Rectangular Bounding Box
4. Convert to gray scale, apply histogram equalization and Resize to 100x100
5. if Updating Database then Store in Database else Apply LBPH (For feature Extraction) end if Post-processing

The system records a short video as input and using image processing/image training the face is recognized and the attendance database is updated in a spreadsheet in the way it is shown in the above pseudo code.

4. CONCLUSION

This paper on face recognition based smart attendance system using IoT features one of the best ways of attendance marking system which is time-saving, more efficient, realtime, precise, gives automatic report in spreadsheet, makes online updation easy. The system has been implemented using Raspberry Pi, Webcam, OpenCV, Haar cascade and python. Haar cascade, one among the finest face detection algorithmic program is used to confirm the standard of the system. Face Recognition based Smart Attendance System Using IoT is simple for usage and works efficiently. The system works automatically

once the registration of individual student is completed and dataset is created. The project is designed addresses many of the issues of existing manual systems and finger print based biometric system. Face recognition concept to mark the attendance of student and makes the system better and efficient. This project can substitute all other attendance systems and performs efficiently. The Automated Classroom Attendance System helps in increasing the accuracy and speed ultimately achieving precise attendance to meet the need for automatic classroom evaluation. The purpose of the paper to reduce errors and human effort in traditional attendance taking is achieved via face recognition based attendance system.

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