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Social Distancing Enhanced Automated Attendance Management System

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ABSTRACT-

In today's highly competitive world, everything has become smart and automated. As manpower has reduced, we require less human assisting systems for any task to be easily accomplished. Thus, we need each device to be smart and automatic. Especially in Educational Institutions automation is de facto. Attendance system in most of the educational systems in India is in paper format which is time consuming. IoT has been widely used across the globe in recent years for automation. In this paper, we propose a system that automates the attendance system. It automates the attendance system using face detection. It includes Raspberry Pi 3 model B+ hardware for executing the whole process. It uses an open CV and cascading algorithm for face recognition and matching of the faces.

Keywords- Raspberry pi, Open CV, Face Detection, Image Processing.

I. INTRODUCTION

The current attendance system in most of the Educational Institutions is paper based or manually updated to a database. Attendance system for large institutions is more complex and time consuming too.

Raspberry pi has been used widely for various purposes across the globe. It is a small sized computer, plugs into the monitor and uses a standard keyboard and mouse. This system automates the attendance system by using face recognition. This system is used to make attendance systems for large institutions more smart, interactive & reliable.

Pre-existing systems were developed in order to provide secure and safe web-based attendance monitoring system using Biometrics and Radio Frequency Identification (RFID) technology which is based on the multi-tier architecture, for both smartphones and computers.

The rest of the paper is organized as follows. Section [II] and section [III] describes the proposed system and methodology of classroom monitoring respectively. Finally, Section [IV] concludes the paper with the future scope.

In [1], they propose a novel face detector, which is very fast and detects faces with large scale variations (especially tiny faces) named Deep Pyramid Single Shot Face Detector (DPSSD). Additionally, a new loss function, called the Crystal Loss, is proposed for the tasks of face identification and verification. This Crystal Loss restricts the feature descriptors to lie on a hypersphere of a fixed radius, which minimizes the angular distance between the positive subject pairs and maximizes it between the negative subject pairs.

[2] presents the automatic attendance management system for convenience or data reliability. The system is developed to make a portable device for managing the students' attendance by the integration of ubiquitous components, using the Face Recognition technology.

In [3], the proposed system aims a safe and secure web-based attendance monitoring system using Radio Frequency Identification (RFID) Technology and Biometrics based on the multi-tier architecture, for both smartphones as well as computers. The system can maintain the attendance records of the staff members and of student's if necessary. The system can also be used to detect the current location of the students, faculties and any staff members anywhere within the domain of the institution.

[4] presents the design methodology of an alternate system using simple and high real time Zigbee - biometric system for easy and time saving management of attendance using the fingerprints of the employees at any organization along with the employee incoming and outgoing log maintenance.

In [5], an attempt is made to solve the problems of the recurrent attendance monitoring in developing countries using the RFID technology. The application of RFID for the attendance monitoring as deployed in this study is capable of eliminating time wasted during the manual collection of attendance and is also an opportunity for the educational administrators to capture the face-to-face classroom statistics for allocation of appropriate attendance scores and other managerial decisions.

[6] describes a face detection framework which is capable of processing images rapidly while achieving high detection rates. There are three key contributions. The first is the integral image which allows the included features to be computed very quickly. The second is a classifier which is used to

select a small number of critical visual features from a large number of potential features. The third is a method for combining classifiers in a cascade that allows the discarding of the images of background regions.

In [7], this method is extended to 3D face images. We investigate the influence of several parameters of this method and show improvements in the recognition rates, proving that this new method is a very promising approach for 3D face recognition.

II. PROPOSED SYSTEM

We have implemented a system that will automate the attendance system (which is currently in paper format or manual entry in computers in most of the Educational Institutions) into a smart and interactive one using fisher face algorithm for face detection. Thus, this system will also control the consumption of time.

III. METHODOLOGY

In this paper, we implement the automation of the attendance system which reduces time consumption.

For the attendance system, we use Raspberry Pi 3 instead of personal computer as the latter consumes more space for setup. Interfacing camera, integrating the hybrid technology and the total hardware setup is more simple, reliable and efficient than the existing system. For face recognition, a Python based Machine learning module is employed, which is faster in recognition and high in accuracy. For real-time process, we apply IoT to monitor attendance system and can be saved in cloud for any time access

The components used in this system are

A. Raspberry Pi 3 model B+
B. Web Camera

A. Raspberry Pi 3 model B+

The Raspberry Pi 3 Model B+ is an updated 64-bit quad core processor running at 1.4GHz dual-band 2.4GHz and 5GHz wireless LAN, faster Ethernet, and PoE capability via a separate PoE HAT.

Fig. 2. Raspberry Pi 3 B+ model

2. Web Camera

The proposed system uses a web camera for face detection, recognition and for real time image processing.

IV. ALGORITHM

Step 1: Retrieving data

The collection of data is done in the form of the images of face. This collection of data can be done using photographs that are already saved or from a webcam. The face to be stored must be fully visible and must face forward.

Step 2: Image Processing

The image processing is done in 2 steps:

a) Preprocessing stage: Getting images either using a camera or already saved images and converting from RGB to grayscale. The image data is divided into training and test data.

b) Processing stage: Fisher face method is applied in order to generate the feature vectors of facial image data which is used by the system and then to match the vector of traits of the training image with vector characteristics of the test image using Euclidean distance formula.

Step 3: Feature generation

Features of the faces stored are extracted.

Recognition Process

After the training is completed, the next stage will be the recognition of the image process. The goal is to successfully recognize the test image. If the training image is the same as the testing image, then the system can successfully identify the test image correctly up to 100%. In the other case that is when the training image is not the same as the testing image the test image and the training image must come from the image of the same person's face then the system can successfully identify the test image correctly up to 90%. The flow of the system is mentioned in Fig.7.

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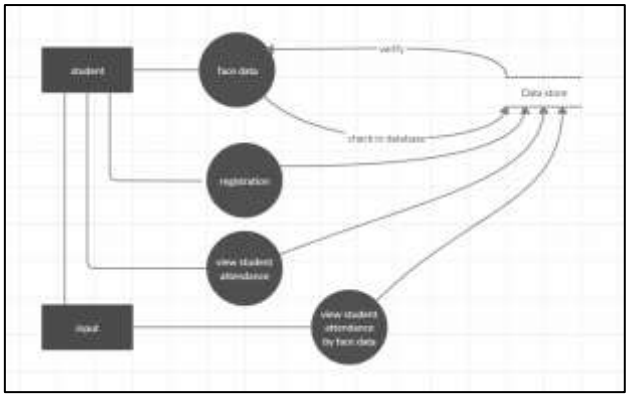

Fig.7.Data Flow Diagram

V.RESULT ANALYSIS

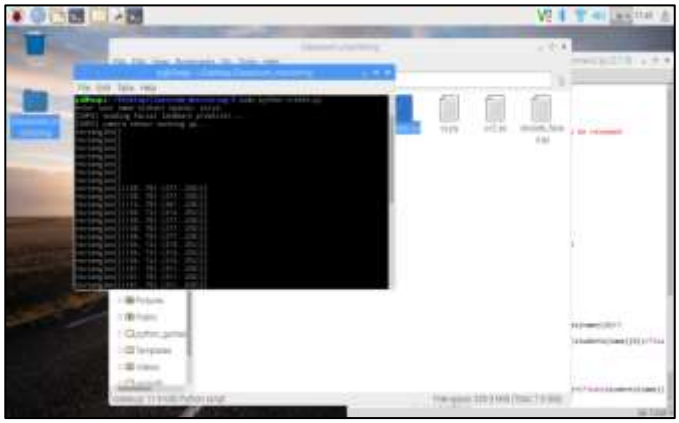

Fig.1. Create

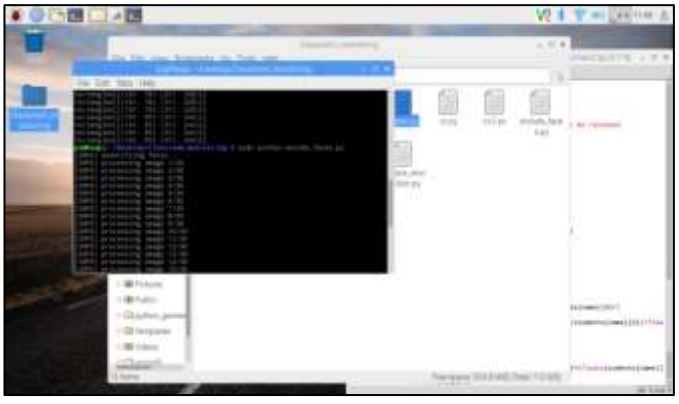

Fig.2.Encode

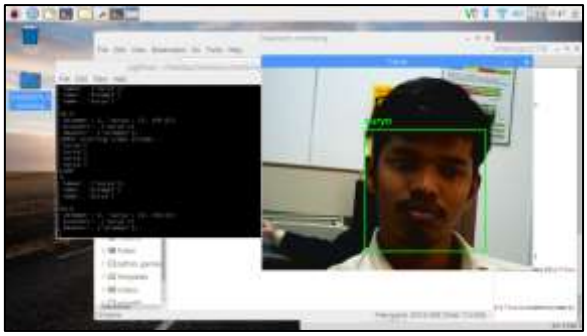

Fig.3. Running page

Fig.4.Result website

VI. CONCLUSION AND FUTURE SCOPE

We have implemented a smart model for class monitoring systems in this paper proposal. It automates Attendance System based on face recognition techniques thus it is proved to be time saving and also secured. Identifying of an unknown person can also be done. In the real time scenarios, it will outperform other algorithms with better recognition and low false positive rate. Cascade classifiers is proved to be better classifiers in comparison to distance classifiers.

The future work is to improve the recognition rate of these algorithms used, when there are unintentional changes in a person such as tonsuring head, usage of scarfs, and grown beard. The system which is developed recognizes the face only up to 30 degrees angle variations, which has to be improved in the future.

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