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FACE RECOGNITION ATTENDANCE SYSTEM

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A B S T R A C T

In today's world, student attendance recording plays an important role in improving the quality of the educational system. The traditional attendance method is tedious for the lecture as it costs quite a lot of time. Thus, there is a requirement for a robust computerized biometric-based Face detection attendance recording system using an ESP32 camera. In our proposed paper, the ESP32 Camera is used to capture images and Python is used to process the student's images and for recording their attendance. The ESP32 Camera Module is programmed using FTDI Module. The Arduino IDE is set up for the ESP32 Camera Module. To access the ESP32 camera, the Open CV which is an open-sourced image processing library is used and for downloading the python dlib module, Visual Studio (desktop development with C++) is a prerequisite, hence used. Object Detection uses Haar feature-based cascade classifiers which is an effective object detection method. It is an approach where a cascade function is trained from a lot of positive and negative images to detect objects in particular images. It is observed, that the proposed attendance recording system is more accurate and effective under a controlled environment. The performance of the proposed attendance system completely depends upon the student's images collected, the resolution of the camera used, and the capacity of students.

*Keywords: Face-Recognition,Open-CV,ESP32-Camera,Visual-Studio,HAAR-cascading*Introduction

1. INRODUCTION

The manual method of attendance marking is a tedious task in many schools and colleges. Manually calling the names of students might take about 5 minutes of the entire session which is an extra burden for the faculties and is time-consuming. Our project paper solves the chances of proxy attendance. The purpose of our proposed paper is to build an attendance system that is based on face recognition techniques. Facial recognition technology is used to identify and verify a person using the person's facial features and automatically mark attendance in the face recognition attendance system. The software can be used for detecting different groups of people such as employees, students, etc. The proposed attendance recording system detects the student and stores the information of that detected student, in a Microsoft Excel File.

For marking attendance the face of the individual student will be used. Nowadays, face recognition is gaining more popularity. A classifier that considers the human face to recognize it as the target object is used. Haar's Feature selection technique targets extracting human facial features. These features are different permutations of white and black rectangles. In each feature calculation, the sum of pixels under black and white rectangles is found.
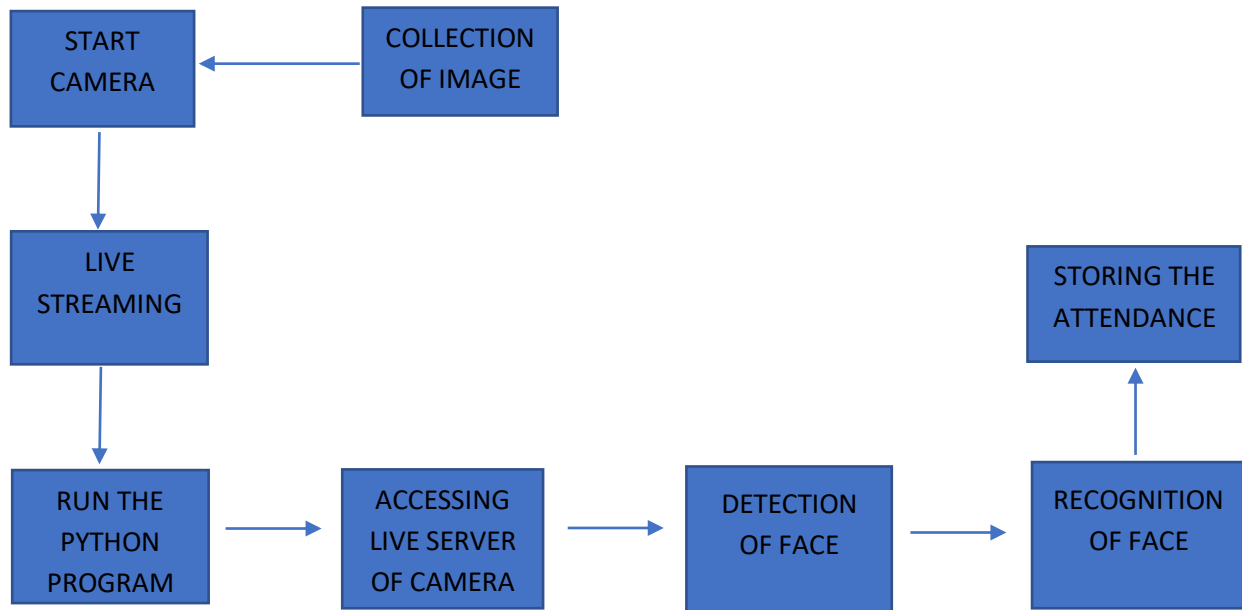
2.   ARCHITECTURE OF PROPOSED SYSTEM

Fig.1 Architecture of proposed system

3.   METHODOLOGY

Step 1:- Data Collection

All the students of the class have to register themselves by entering their names and then their images will be captured and stored in the dataset in one of the folders. The images of students are cropped so that the proposed system obtains the Region of Interest from the images of students which will be further used for the recognition process and also the images are saved as the names of respective students in a particular folder[2].

Step 2:-Face Detection

In [1] computer vision, the essential problem is to be figured out how to automatically detect objects in an image without taking human help. Face detection is introduced to get rid of this problem. Face detection can be used for human face detection from object images. There are slight differences in each face of human beings but overall, it is safe to say that there are some features that are associated with all human faces.

Face detection is basically the first step toward face-related technologies, such as face recognition or face verification. However, face detection can have very useful applications in various areas. The most successful application of face detection is probably to take photos automatically only by seeing human faces. When you take a photo of any person the face detection algorithm that's built into your digital camera detects where the faces are in images and adjust the focus accordingly to that. There are many algorithms for face detection but one of the oldest algorithms for face detection is Viola-Jones Algorithm that can be used. The system performed face detection using the Haar-Cascade Classifier with Open CV. [4] Haar Cascade algorithm needs to be trained to detect human faces before it is used for face detection. This is called feature extraction. The haar cascade training data used is an XML (extensible markup language) file- haar cascade frontal face default. The Haar features will be used for feature extraction.

Step 3:- Face Recognition

In [3] face recognition, data will be the images present in the folder. They will be assigned the name of the student it belongs to. These images are used for face recognition. Face recognition is a method of identifying and verifying the identity of an individual by using their face. There are many algorithms that can be used for face recognition but their accuracy might vary. This proposed paper describes how face recognition is done using deep learning.

Then the task performed is detecting faces in the image or video stream. Now that the system knows the exact location/coordinates of the face, this face is extracted for further processing ahead.

Feature Extraction: [5] Now that face is cropped out of the image, the system extracts features from the image by using face embedding. A neural network takes an image of the human face as input and outputs a vector that represents the most important features of a human face. In machine

learning, this vector is called embedding and thus this vector is called face embedding. During the recognition process, the face to be recognized is detected and then compared with the stored images. The matched name associated with the student it belongs to is returned on screen.

Step 4:- **Updating Attendance**

The system will identify and detect the person and store the information of the person detected in a Microsoft Excel File with their name and time when attendance was marked.

4.   RESULT

The following are the results of some faces of students detected by the ESP32 camera.
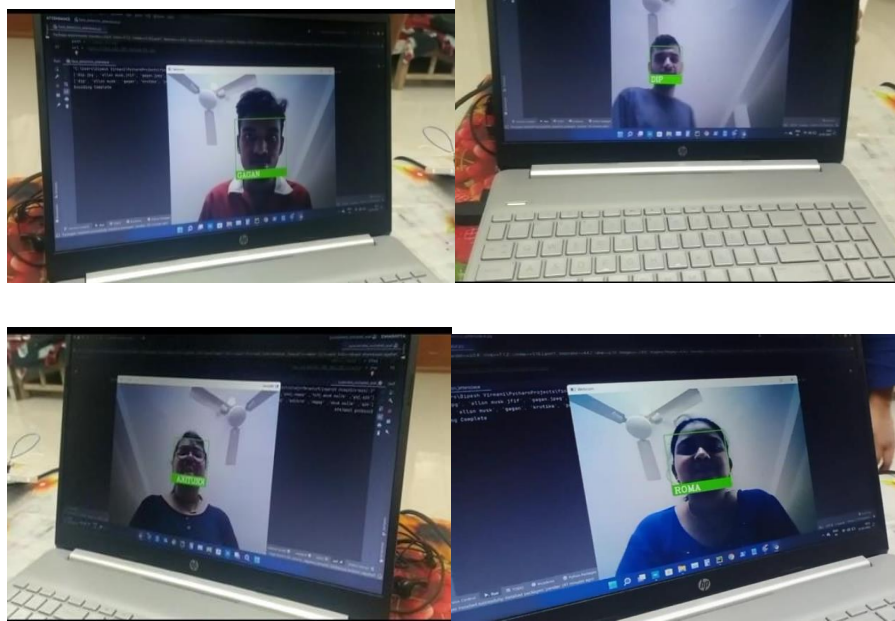

Fig. 2 Faces captured by ESP32 Camera.

Fig. 3 Attendance stored in excel sheet

The users can interact with the system. Here users will be mainly provided with three different options, they are student registration, faculty registration, and attendance recording. The students have to enter all the required details in the student registration form. After the registration of each student whenever the student will come in front of the camera, the camera will starts detecting the faces in the frame. After detecting, the system will automatically mark the attendance of the particular student with their name and time in the attendance list in the Excel sheet of a particular subject.The attendance of students is marked in an excel sheet with the time at which attendance has been marked.

5.   CONCLUSION

The proposed Attendance Recording system uses face detection and face recognition that helps to maintain the automated attendance of students. For face recognition, the inbuilt function of the face recognition python module is applied.

In the result, reporting timings and the name of the student are displayed as shown in fig.3 and stored in an excel sheet.

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