Real-time Image-based Attendance System using Viola Jones And Eigen Faces Algorithm

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Abstract

This work uses an image-processing technique to track real-time attendance. The goal of our work is to update the faculty database on student attendance in real-time. To achieve this we employ image processing on the MATLAB platform. Here, a camera that is precisely positioned on top of the classroom door is used to collect the image during image processing. This camera will take pictures of the immediate area and only recognize the faces in those pictures, sending the image data to our image processing algorithms. This work tracks attendance in real-time using an image processing technique. This work is objective is to instantly update the faculty database on student attendance. We use image processing MATLAB platform to accomplish this. Here, the image is captured and processed using a camera that is precisely positioned on top of the classroom door. This camera will capture images of the immediate area and deliver the image data to our image processing algorithms after only identifying the faces in those images.

Keywords: Attendance, Image processing, MATLAB

1.Introduction

Using an image processing method, this work keeps track of attendance in real time. Instantaneously updating the faculty database on student attendance is an aim of the project. To do this, we utilize image processing on the MATLAB platform.[1] Here, a camera that is precisely placed on top of the classroom door is used to take and process the image. This camera will take pictures of the immediate area, and after just recognizing the faces in those pictures, it will send the image data to our image processing algorithms.[2] This process takes a long time, and maintaining the data gathered is challenging. By digitizing the attendance process, we can make it quick and precise.[3] This work will use image processing to digitally capture the attendance-taking process, and IOT will automatically update faculty databases with current information.

2. Literature Review

Senthamil Selvi.K(2014) has found this new project regarding the “Facial recognition-based Attendance marking system," in this proposed work, attendance was determined by using position and face descriptions in classroom lectures. They projected the presence of students in the classroom lecture by using face detection. The results of this experiment show that continuous inspection improved the performance of attendance estimation.[1]
Mr.Patil.C.S(2014) studied about the “Student Attendance Recording System Using Face Recognition with GSM Based," a student footage system based on face validation, was considered and implemented. It works fine with a different panel. If appreciation is to be used as a viable biometric for validation, the detection score must be improved by an order of magnitude, which can be accomplished by controlling lighting and pose. Future advancements are more likely to be dependent on making better use of video knowledge and employing fully 3D face models.[2]

Implementation of an Automated Attendance System Using Face Recognition," the automated presence system has been effective in reducing errors in the manual attendance-taking system. The goal is to computerize and create a system that will benefit the institute. [3]

In an office setting, the most efficient and exact method of attendance can replace the old manual methods. This method is risk-free, dependable, and widely available. The system does not require any specialized hardware to be installed in the office. It is possible to construct it with a camera and a computer. [4]

3. Proposed Work

A face recognition system is essentially a piece of computer vision software that can perform two basic tasks: identifying a person and verifying that identification. Automatic face recognition has risen to the top of the research priority list with the advent of image processing technologies. Professors have long taken attendance at schools, institutes, and universities, and the results are recorded in on-site attendance registers. Due to the interdependence of hardware and software, a camera, as well as a computer with the extremely useful and multi-functional machine language "MATLAB" and Microsoft Excel installed, will be required.

Connect the camera to the PC before attempting to capture an image or video, and ensure that the camera driver has been properly installed and is compatible with MATLAB, as described in the previous section.

Our Smart Attendance System is extremely simple to use. Face recognition is provided in the MATLAB portion of the package. As a result, we create a feature set for each of the images in the database by submitting photographs taken by each user to MATLAB and constructing a collection of facial features for each of the images in the database using one of the feature extraction methods, such as PCA (Principal Component Analysis). Real-time images of human faces can be obtained from a USB camera via a USB interface.

To accomplish this, we used Matlab's Image Acquisition Toolbox to set up, access, and transport a single camera frame at a time into the MATLAB workspace, where it can be further processed using the Image Processing Toolbox. While the technique for using a facial recognition system is divided into several components, the following are the most important: A. Recognizing a person's physical appearance The second most popular method is face recognition. To begin, each student's face will be photographed in order to track their participation. This image can be obtained by either recording a video or taking a photograph with camera equipment. The camera will record a short video of the student for a few seconds, after which the system will scan the video and identify the students based on their facial features. Following frame capture, the system performs face recognition, which distinguishes between facial objects and non-facial objects in the images. Following that, the clipped face is analyzed using a situation-appropriate facial recognition algorithm. The image is recognized by comparing the input image to a previously created face database. When a legitimate match is discovered, attendance is recorded in an Excel spreadsheet.

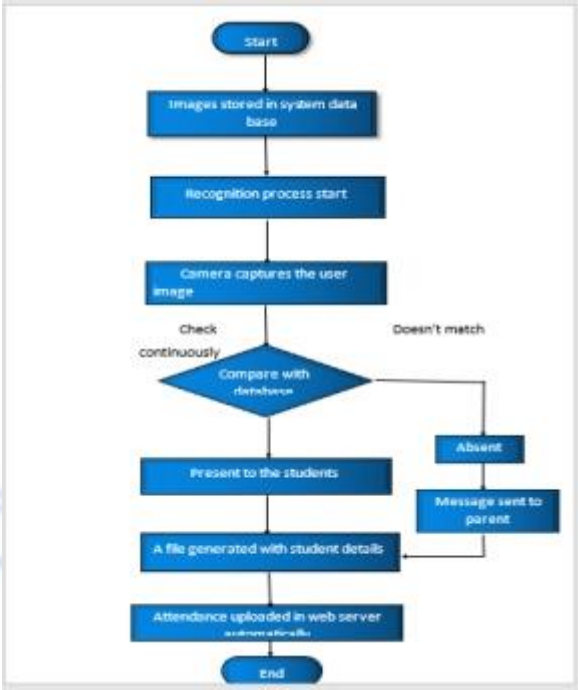

Figure 1:Flow Chart of Attendance System

A. Block Diagram

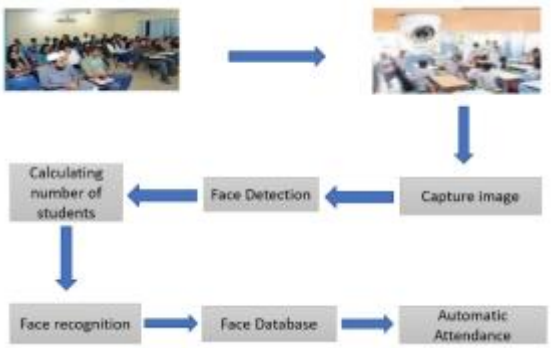

Figure 2:Block Diagram of Attendance System

B. Methodology

To implement this project ,here we are using two Algorithm's for "Face Detection, Recognition and Attendance making".

C.Viola Jones Algorithm

This paradigmatic approach to real-time face recognition. Although training takes time, detection happens quickly. A base window size of 24x24 is used by the Viola-Jones algorithm's face detection task to begin analyzing these attributes in every given image.

This algorithm operates in the following steps:

1. Generates a detector object with the Viola-Jones algorithm.
2. Extracts an image from a video
3. Identifies features
4. Annotates the features discovered.

Figure 3: Face Detection Output

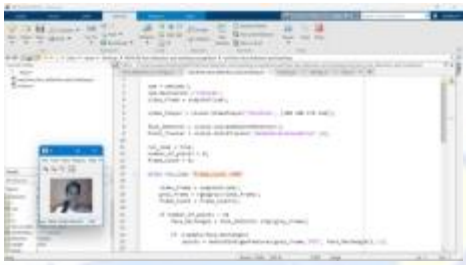

Figure 4:Face Recognition Output

D. Eigen Faces Algorithm

The distinguishing features on the face must first be retrieved using the Eigenface method before the face can be represented as a linear combination of the so-called "eigenfaces" produced during the feature extraction process. The key components of the training set's faces have been estimated. The phases of the recognition process include creating an eigenface for the given face image and calculating the Euclidean distances between this Eigenface and the previously recorded eigenface. The eigenvalue with the smallest Euclidean distance most closely resembles the individual. The simulation's results are displayed.

The steps for calculating the eigenface are as follows:

1) Assume s is a collection of all images in the training set.
2) Determine the mean.
3) Calculate the difference between each training image and the mean.
4) Create a covariance matrix (c)
5) Using the covariance matrix, calculate the eigenvalue and eigenvector.
6) Determine the weight values.

Figure 5: Comparison of Image with Database

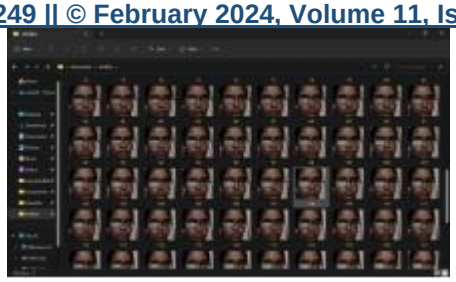

Figure 6: Recognized Images

4.Results and Discussions

As part of the recognition process, an eigenvalue is generated for the given face image, and the Euclidean distances between this Eigen face and the previously recorded Eigen face are calculated. The eigenvalue that most closely resembles the person is the one with the smallest Euclidean distance. The simulation's outcomes are displayed.

The optimal threshold, according to references, is 0.8 of the maximum Euclidean distance, but in our test, we discovered that the ideal value is 0.0022. In light of this, it can be said that the ideal threshold value for Eigen face-based recognition can change depending on the training image sets and must be revised if the training image sets are changed**.**

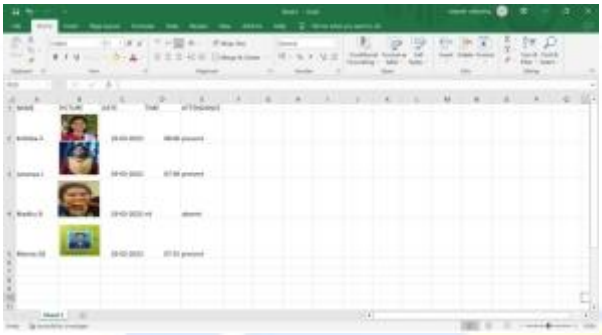

Figure 7: Final Matched Output

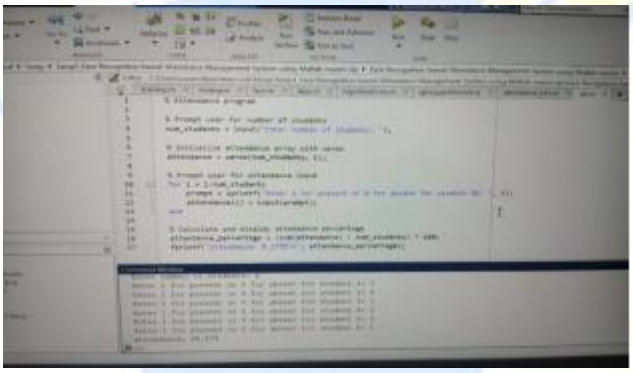

Figure 8:: Automatic Attendance Marking

5.Conclusion

A technology called facial recognition, also called face recognition, examines the features of a person's facial image captured by a camera. This technique is used to measure the dimensions of the entire face structure as well as the distances between the boundaries of the eyes, nose, mouth, and jaw. These measurements are made while a subject is in front of a camera and are stored in a database so that they can be compared later. One of the main advantages of employing facial recognition is that it is non-intrusive. Without having to wait for a long time or perform any other actions save looking at the camera, users can perform verification or identification from a distance of two feet or more. An Excel spreadsheet with the confirmed attendance was successfully updated. The working prototype had no flaws and was operational.

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