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Student Attendance System using Face Recognition

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ABSTRACT: Using facial recognition technology, a software program called the Smart Attendance System Using Face Recognition automates the taking of attendance. It does away with the necessity for labor- intensive, error-prone manual attendance taking. In order to record attendance, this system uses a camera to recognize a person's identification and compares it with a database. By eliminating manual interaction and decreasing the possibility of error, the face recognition technology-based student attendance system provides a simplified and automated method of tracking attendance. Improved accountability, more efficiency, and a more seamless learning environment for teachers and students are some of its possible advantages.

KEYWORDS: CCTV Camera detection, Face recognitions, Image Processing, Machine Learning

I. INTRODUCTION

Greetings from the attendance tracking of the future! Our method makes student attendance management easier by utilizing facial recognition technology. Bid adieu to conventional techniques, as this technology guarantees precision, safety, and effectiveness while monitoring attendance. You can be marked as present with just a face scan, which makes the process easy and hassle-free. Attendance is prime vital for both the teacher and student of an educational organization. Thus, maintaining a record of attendance is crucial. When we consider the conventional method of taking attendance in a classroom, the issue appears. Calling a student's name or roll number to check attendance is more than just a time issue. usage, but energy is also required. Thus, every issue listed above can be resolved with an automated attendance system. Many institutions currently employ automated systems for creating attendance records. Radio Frequency Identification(RFID) technology and biometrics are two examples of such systems. The time constraint is not met, despite the fact that it is automatic and advances over the traditional method. It takes time for the student to wait in line to give their attendance. This project introduces an involuntary attendance marking system, devoid of any type of interference with the normal teaching routine. The technique can also be used in classroom settings where attendance is crucial, such as during exam periods. This technology does away with traditional methods of identifying pupils, such calling their names or examining their identity cards, which can cause disruptions to the teaching process and anxiety among students during test times. Furthermore, in order for the pupils to be identified, they must register in the database. The user-friendly interface allows for immediate enrollment. These days, facial recognition systems are widely used because of their amazing performance and ease of use. For example, facial recognition is used by Federal Bureau of Investigation (FBI) and airport security systems to track suspects, missing children, and drug activity during criminal investigations (Robert Silk, 2017) In addition, prominent social networking site Facebook uses facial recognition technology to let users tag friends in pictures for amusement (Sidney Fussell, 2018). Additionally, the Intel Corporation permits customers to access their online accounts by facial recognition (Reichert, C., 2017).

II. LITERATURE REVIEW

The main goal of this paper review is to identify the solutions offered by other authors, take into account the shortcomings of the system they suggest, and present the best remedies. A novel technique known as continuous monitoring was used in Kawaguchi to develop a lecture attendance system. Students' attendance was automatically

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recorded by a camera that took their picture in class. The system's architecture is straightforward because it only has two cameras mounted on the classroom wall. The first camera is a capturing camera that is used to take pictures of students in the class, and the second camera is a sensor camera that is used to find a student's seat inside the class room and take pictures of the student. To ensure accurate attendance, the system analyzes photos taken using a camera that has spent a lot of time gathering faces and images in a database..

An automatic attendance management system using a real- time computer vision algorithm was presented in another study. The non-intrusive camera was deployed by the system to take pictures in the classroom. The extracted faces from the camera's photographs were compared to faces stored within the system. Machine learning algorithms, which are typically employed in computer vision, were also used by this system. Additionally, the camera's captured images were trained using HAAR CASECADE. The camera-captured face will be converted to gray scale and subjected to subtraction before being stored on the server for further processing . N. Kar unveiled an automated attendance management system in 2012 that employed Principal Component Analysis and face recognition technology. To put into Use two libraries to practice the system: FLTK (Light Tool Kit) and OpenCV, a computer vision library. FLTK was utilized to construct the interface, and both of these libraries contributed to the creation of the Open CV support algorithm. In the system, there are Request Matching and Adding New fact to Database. In Request Matching, the first step is open the camera and snap the photo after the extraction the frontal face. The next step is recognizing the face with the training data and project the extracted face onto the Principal Component Analysis. The final step displays the nearest face with the acquired images. Apart from that, adding a new face into the database is snap the photo after that extract the frontal face images and then perform the Haar cascade Method to find the perform the Principal Component Analysis Algorithm. The final step is storing the information inside the face XML file. The algorithm to enhance face detection from captured photographs or videos is the system's main focus.
A system that uses face recognition to implement automatic attendance was also proposed by the author. It uses MATLAB(matrix laboratory) and Principal Component Analysis (PCA) to extract facial features like the mouth and nose, and it was designed to address issues with the time- consuming nature of the attendance marking system. The results of the experiment demonstrated that the system could recognize faces in the classroom with dark backgrounds or with different views.

III. PROBLEM DEFINITION

The conventional method of recording student attendance is frequently fraught with difficulties. By doing away with traditional student attendance marking methods like calling students by name or examining their corresponding identity cards, the facial recognition student attendance system highlights its simplicity. Not only do they impede the teaching process, but they also divert students' attention during exam periods. During the lecture periods, attendance sheets are distributed throughout the classroom in addition to calling names. It could be challenging to circulate the attendance sheet around the lecture hall, particularly in classes with a lot of pupils. Consequently, facial recognition A suggested attendance system would take the place of the laborious and distracting manual presence sign-in process, which students must complete every day. Moreover, the automated student attendance system based on facial recognition can effectively tackle the issue of fraudulent approaches, hence eliminating the need for lecturers to repeatedly count the number of students to verify their presence. The work that Zhao, W. et al. (2003) proposed enumerated the challenges associated with facial recognition. Making the distinction between recognized and unidentified photos is one of the challenges in facial recognition. Furthermore, a paper by Pooja G.R. et al. (2010) discovered that the facial recognition student attendance system's training procedure is laborious and slow. Further more, the study put out by Priyanka Wagh et al. (2015) noted that variations in head positions and lighting are frequently issues that could impair the effectiveness of a facial recognition-based student attendance system. Therefore, in order to prevent omission, the identification procedure must be completed within predetermined time limitations. This calls for the development of a real-time functioning student attendance system. The traits that have been retrieved from the students' faces to indicate their identities must remain consistent as the background, lighting, stance, and expression vary. Reliability and speed of computation will account for six performance evaluation points.

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IV. METHODOLOGY

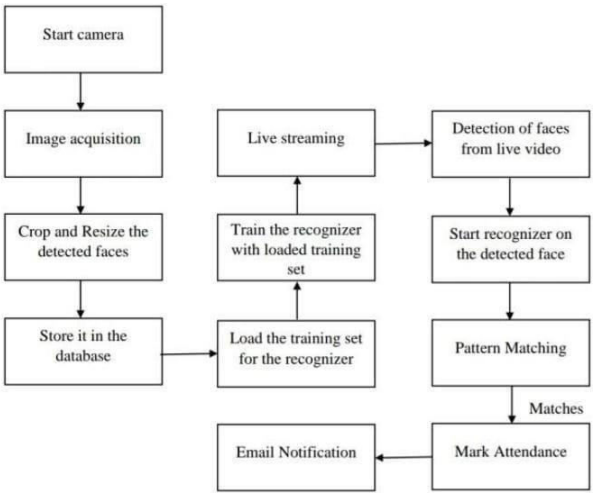

Fig.1. System Architecture

Typically this process can be divided into four stages,

1. Creation of the dataset:

Students' photos are taken with a web camera. A single student will be photographed several times from various angles and gestures. Pre-processed images are these. The images are cropped in order to establish the Region of Interest (ROI), which will then be used in the recognition process. Next, the clipped images need to be scaled to fit into a precise pixel spot. After then, grayscale copies of these RGB images will be created. Following that, these images will be saved in a folder with each student's name on it.

2. Face Detection:

Here, faces are detected using OpenCV and the Haar- Cascade Classifier. The Haar Cascade approach needs to be trained to detect human faces before it can be applied to face identification. This process is known as feature extraction. The training data for the haar cascade is contained in an xml file called haar cascade_frontal face_default. The haar features shown in Fig. 2 were used for feature extraction.

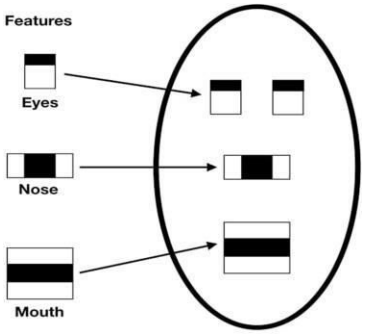

Fig.2.Haar Features

The detect Multi Scale module of OpenCV is being used here. Drawing a rectangle around the faces in an image is required. Minimum size, minimum neighbors, and scale factor are the three parameters that must be considered. Use the scale Factor to determine the required amount of picture shrinkage in each image scale. Min Neighbors specifies the

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minimum number of neighbors required for each candidate rectangle. Greater numbers usually correspond to better image quality but fewer faces identified. Min Size specifies the smallest possible size of the item. By default, it is set at (30,30). In this system, the parameters used are the scaling factor and min neighbors, which have values of 1.3 and 5, respectively.

3. Face Recognition

The three steps of the face recognition process are preparation of training data, training of the face recognizer, and prediction. The photographs in the dataset will serve as the training data in this case. An integer label designating which student it belongs to will be assigned to them. Then, face recognition is applied to these pictures. This system uses a Local Binary Pattern Histogram as a face recognizer. First, the complete face's list of local binary patterns (LBP) is acquired. Following the conversion of these LBPs into decimal numbers, histograms of each decimal value are created. Every image in the training set will ultimately have a single histogram created for it. The histogram of the face that needs to be identified is later computed during the recognition process and compared with the previously computed histograms. and gives back the label that most closely matches the student to whom it belongs [9].

4. Attendance Updation

Following the face recognition process, the faces that were identified will be noted as present in the excel sheet, while the remaining faces will be noted as absent. A list of the absentees will then be mailed to the relevant faculties. Monthly attendance sheets will be updated for faculties at the conclusion of each month.

V. RESULTS

Through a Graphical User Interface (GUI), users can communicate with the system. Here, users will primarily have access to three options: mark attendance, faculty registration, and student registration. The student registration form must have all the information that is needed filled out by the students. Following the registration button click, the webcam launches automatically, displaying the window depicted in Figure 3 and beginning to recognize faces inside the frame. After that, it will automatically begin taking pictures until 100 samples are gathered or CRTL+Q is hit. Following pre- processing, these photos will be kept in the training images folder.

Fig.3.Student Details

To label the training data in the face recognition attendance system, follow these steps: Collect a diverse set of images containing faces. Annotate each image with the corresponding identity or label. Ensure that the dataset includes variations in lighting conditions, facial expressions, and poses. Utilize software tools or libraries such as OpenCV or Dlib to preprocess the images and extract facial features.\Implement a face recognition algorithm such as Eigenfaces, Fisher faces, or Convolutional Neural Networks (CNNs) to train on the data set. Validate the trained model's performance using a separate validation set to ensure accuracy and reliability. Iterate on the training process by adjusting parameters, adding more data, or refining the model architecture until satisfactory results are achieved. Save the trained model for later use in the face recognition attendance system. Figure 4: Schematic representation of the training pipeline in the face recognition attendance system.

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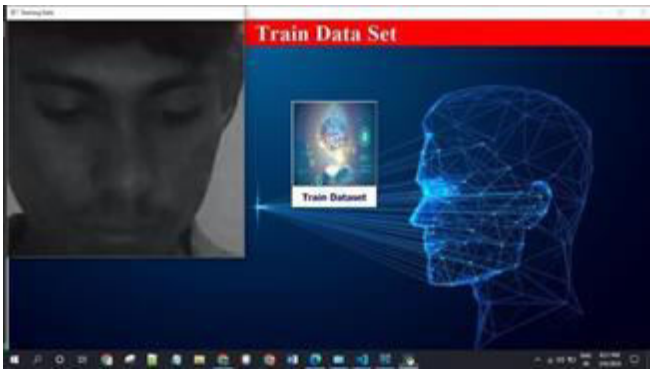

Fig.4.Train Data

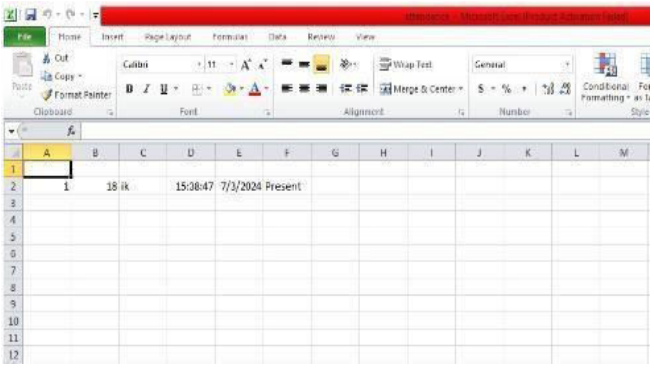

Fig.5.Attendance sheet

The attendance sheet updated following the recognition procedure is shown in Fig. 5. Students who are recognized are indicated with a '1', while those who are not are marked with a '0'. This technology uses facial recognition algorithms to create an efficient system for tracking student attendance. The suggested technology will be able to record attendance using facial recognition. It will use a webcam to identify faces before identifying them. Following acknowledgment, the attendance record will be updated and the recognized student's attendance will be noted.

VI. CONCLUSION

- We will develop the real-time processing capability of the face recognition system speeds up the attendance tracking process.
- students can quickly scan their faces, eliminating the need for manual check-ins and saving valuable time for both the management and the attendees.

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