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AUTOMATED ATTENDANCE SYSTEM USING FACE RECOGNITION TECHNOLOGY

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Abstract

Today, for Every Organization The most important aspect of recording a person's presence is their attendance. When someone is in an organization, it means they are carrying out their duty to attend the organization. Usually, attendance is recorded by hand. One by one, it might be called out or signed. Everyone in an organization can have their attendance tracked using facial recognition technology.Image processing has benefited greatly from face recognition. In the current Face Recognition system, we apply machine learning algorithms like Support Vector Machines (SVM) and Haar-Cascade Algorithms. In the proposed system, we employ a Deep Learning Technique called the YOLO framework. By using these strategies, the System is able to identify a person's face.

Index Terms: - Haar and Support Vector Machines (SVM)-Alpha Algorithms

1 Introduction

Tracking student attendance with outdated systems is no longer effective. The number of students enrolled in colleges and universities rises annually. Student attendance is a very significant factor. Therefore, it is essential to talk about a reliable system that logs students' attendance automatically. In order to evaluate student achievement in all schools and institutions, attendance must be maintained. Each college or school has its own method in this regard. While some students have adopted methods of automatic attendance using biometric techniques, others are manually tracking attendance using attendance registers, marking attendance sheets, or a file-based system. Nevertheless, these methods require students to stand in line for a considerable amount of time.Although there are many different biometric systems available, all modalities require the same key authentications. The unique identifier is entered during the enrolling procedure of every biometric system.A individual goes through a series of identification and verification processes after having their attributes stored in a database. These two techniques match a person's biometric characteristic to a template

that was previously stored and obtained at the time of the student's enrolment. Biometric templates come in several forms, including fingerprints, iris, voice, and more. Our system uses the facial recognition technique to automatically record student attendance in a classroom setting without the need for student intervention. The development objective of the new attendance management system is computerization. To keep track of students' attendance, we put in place an attendance management system. Since the adoption of this attendance system, students are not longer allowed to miss classes without the faculty's consent. Education has becoming more difficult. To enhance the quality of instruction, an attendance management system counts the number of pupils and motivates them to arrive at class on time. It takes a lot of time to find out whether a student is present in class by doing a roll call. Thanks to the advancement of deep learning and growing technology, face recognition has made significant strides in recent years. This opens up new possibilities for solving issues related to student registration.Thus, the concept of automatically counting the number of students in a class based on facial recognition is applied in order to save time. A facial recognition technique was utilized to construct this system, which can identify a person's face. Several substitute face recognition algorithms have been developed to increase the effectiveness of the system. Because a wide range of facial variables, including form, color, LBP, wavelet, auto-correlation, and more, are used, the method provides improved accuracy. Face identification, however, continues to be a challenging subject for us because of fundamental issues with many different characteristics, including changes in illumination, face rotation, facial expression, and so forth.

2. Literature survey

Face recognition, one of the most effective applications of picture analysis and interpretation, has recently gained a lot of attention, especially in the last few years. Furthermore, researchers from image processing, pattern recognition, neural networks, computer vision, computer graphics, and psychology continue to be drawn to the topic of machine recognition of human faces. It is evident that there is a tremendous need for user-friendly technologies that can secure our assets and protect our privacy without losing our identity in a sea of data.
Faces are used by humans to recognise and identify friends and relatives. Computers may now automatically identify persons by using recorded information such as a figure, iris, or face to identify a specific person. Many facial recognition techniques were previously utilized to obtain It was not totally automated, and annual inputs of the placement of the eyes, ears, nose, and mouth were required.The photos are then compared to the recorded data by calculating a distance to a common point.
The still image problem has several intrinsic benefits and drawbacks. The segmentation challenge is relatively simple for applications such as driver's license due to the regulated nature of the image acquisition process. However, if just a static image of an airport scene is available, automatic face detection and segmentation may provide significant problems to any segmentation system.However, if a video sequence is available, segmentation of a moving person can be achieved more readily by using motion as a signal However, the small size and bad image quality of faces acquired via video can greatly complicate recognition. Recognition of faces,
Face identifying, also known as face recognition, is simply labeling known faces in the same way as humans, as previously stated, learn the faces of our family and celebrities by merely glancing at their faces. Many strategies and algorithms for teaching a machine to recognise known faces have been developed since the 1970s. The majority of modern techniques

involve at least three steps:

- Face Detection
- Face Preprocessing
- Face Recognition

3 Implementation Study

The mobile instantiates the system.When it activates, the system begins processing the image of the kids for whom we wish to record attendance. We capture the pupils' images during the Image Capturing step. This is the fundamental phase in which we begin initializing our system. We take an image with our camera and examine it for limitations such as lighting, spacing, density, face expressions, and so on.

The obtained image is sharp enough for our needs. Once it has been resolved, we ensure that it is in.png or.jpeg format. We take many frontal postures of an individual to achieve the highest level of accuracy. This is the training database, where we classify each individual using labels.

Only frontal faces are detected in the acquired image from each object. Because we are only interested in the features of faces, this identifies only faces and excludes all other parts. These discovered faces are saved somewhere in the database for further investigation. During the extraction phase, features are extracted. The detected bounding boxes are then queried for feature extraction, and the extracted features are saved in a matrix. This feature extraction is performed for each observed phase. Shape, edge, color, wavelet, auto-correlation, and other characteristics are examined here.

Proposed Methodology

Proposed Model Face recognition model which proposes for the detection and recognition of the student faces for marking their attendance. The main modules used are:

1) Dataset Generation form training: This is the first stage in which a face dataset of the user is created, in which 10-20 images of each user are taken and the features used are user ID and username.

2) Face Detection: The face detection is based on the Haar cascade algorithm.It focuses on the different features like edge features,line features which are present inside the image based on these features.

3) Pre-processing: Steps involve in pre-processing are:

a) Resizing: Face is resized to a fixed pixel resolution after the face is detected

b) Cropping: Background is removed from the image.

c) Grayscale Conversion: The conversion of a color image into a grayscale image.

4) Feature Extraction and Recognition: Facial feature extraction is the process of extracting face component features like eyes, nose, mouth, etc from human face image. Facial feature extraction is very much important for the initialization of processing techniques like face tracking, facial expression recognition or face recognition. Facial recognition can identify human faces in images or videos, determine if the face in two images belongs to the same person, or search for a face among a large collection of existing images. Biometric security systems use facial recognition to uniquely identify individuals during user onboarding or logins as well as strengthen user authentication activity. The suggested system's goal is to capture each student's face and save it in a database for future reference.

1. Image capture: The students' images are recorded and forwarded to be detected using face detection.

2. Face Detection: Using a face detection technique, the face identification process is greatly improved.
3. Get the system up to speed: The image captured during enrollment is used to train the system, and the system is trained on these photographs.
The following are the steps for training the system:
● Face recognition
● Alignment of the face In order to improve the SVM classifier, you must first train it. In this stage, the image acquired in the previous stage is used as input. Face detection is performed first, followed by face alignment, cropping, and storage of the aligned faces. Second, Finally, the Dimension encoding is used to train the SVM classifier. 4. Make a test image: Our system is placed in the classroom after it has been trained on the database. The camera is set up in such a way that everything is visible.
5. Face recognition: Face detection algorithms have been proposed in a variety of ways. Detection is the process of finding a face in an image. Enabled by computer vision, facial recognition can detect and identify individual faces from an image containing one or many people's faces. It can detect facial data in both front and side face profiles. Machines use computer vision to identify people, places, and things in images with accuracy at or above human levels and with much greater speed and efficiency. Using complex artificial intelligence (AI) technology, computer vision automates extraction, analysis, classification, and understanding of useful information from image data. The image data takes many forms, such as the following:
● Single images
● Video sequences
● Views from multiple cameras
● Three-dimensional data

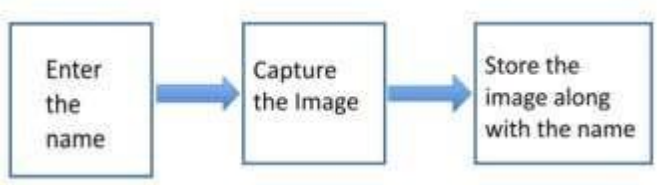

Figure 1: System Architecture

4. Methodology

We can now apply one of many techniques to train the system to learn the face after gathering enough photographs for the person (Training Set). Like most machine learning algorithms,
First, system training must be completed. There are various methods for recognising a face. As a result, we can employ the Haar cascade Algorithm in face recognition.

Haar-cascade classifier

Viola and Jones developed the Haar-cascade approach for training machine learning to recognise objects in images. It can be used to detect faces in this setting. The main principle behind the Haar-based face detector is that the region with the eyes should be darker than the forehead and cheeks, and the region with the lips should be darker than the cheeks, and so on. It normally runs roughly 20 steps of comparisons like this to determine whether or not it is a face, but it must do it at every possible position in the image and for every potential size of the face, so it frequently performs thousands of checks per image. A Haar-like feature consists of a rectangle divided into two, three, or four rectangles. Every rectangle is either black or white. the different conceivable features. A Haar- cascade must be trained using

Various images, both good and negative. The goal is to find the combination of these traits that represents a face. A positive picture contains the object that must be recognised, whereas a negative picture indicates a picture that does not contain the object.

In the context of face detection, a positive image has a face, but a negative image does not. Grayscale images are required for this machine learning. The grayscale intensity will be utilized to determine which feature is displayed. These characteristics can be discovered by adding the sum of the dark pixels in an image.

The Viola and Jones technique is founded on the following fundamental principles:

• Images employed in the integral representation that allow a machine to calculate the necessary Object characteristics (in this case, face characteristics)

• The required characteristic of the face can be found using Haar-like traits.

• Adaptive Boosting is used to pick the most appropriate properties for the targeted object to this area of the image.

• All of the features are fed into the classifier, which returns true or false.

The retrieved feature combination from the training section will be utilized to detect faces in images. The combination of attributes will be investigated in order to detect a face in an unknown image. Only in a single case are the features attempted to be matched.

Support Vector Machine(SVM)

SVM is a supervised machine learning technique that may be used for both classification and regression. Though we also phrase regression concerns, it is most suited for classification. The SVM algorithm's goal is to find a hyperplane in an N-dimensional space that clearly classifies the input points. The size of the hyperplane is determined by the number of features. When the number of input features is two, the hyperplane is simply a line. Svm is divided into two categories.

1.Linear SVM

2. Non-Linear SVM

Yolo Framework

You Only Look Once (YOLO) is a cutting-edge, real-time object identification technique that was first introduced in 2015 by Joseph Redmon, Santosh Divvala, Ross Girshick, and Ali Farhadi in their well-known academic paper "You Only Look Once: Unified, Real-Time Object Detection."

The YOLO framework (You Only Look Once) approaches object detection in a unique way.

It takes a single instance of the full image and predicts the bounding box coordinates and class probabilities for these boxes. YOLO is also aware of generalized object representation.This is one of the best algorithms for detecting and recognising objects.

5 Results and Evolution Metrices

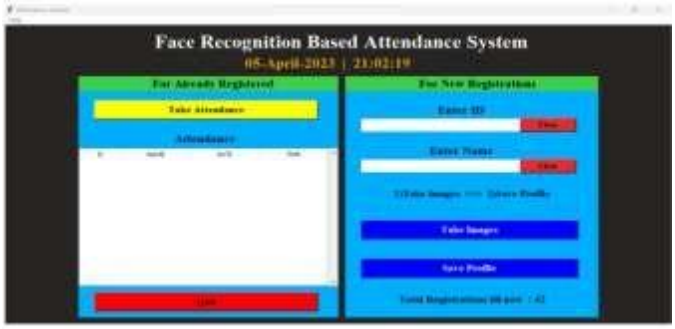

Fig1: In above screen the website was visible

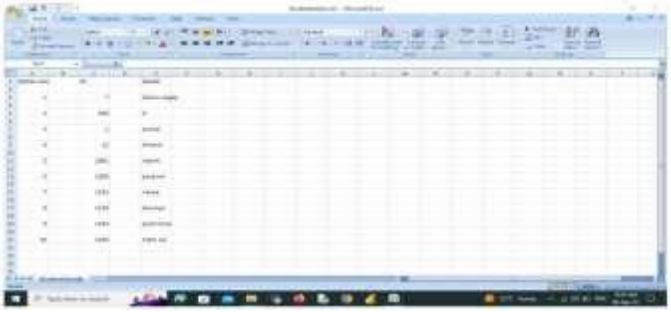

Fig2: Storing of Student Details

Fig3: Storing of Daily Attendence

6 Conclusion

An attendance management system is an essential tool in any situation where attendance is critical. Most of the current systems need human labor from users and are intrusive and time-consuming. In this work, we demonstrated the application of facial recognition in a student attendance management system, thereby addressing the previously described concerns. The attendance record is marked as present when a registered student's face is seen on the collected image collections; absenteeism is noted otherwise. The system is meant to be reasonably priced. We looked into a lot of different face recognition algorithm implementations.This system makes an attempt to create a useful method for tracking class attendance using face recognition techniques. Facial recognition technology will be used by the suggested technology to track attendance.

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