Attendance Management System Using Facial Recognition

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Abstract: Attendance is important for university students. However, the generic approach going to university may involve various challenges. Therefore, a face recognition system to capture attendees is one way to combat this problem. This paper will introduce you to the default system which saves student access to the database using face recognition method. The paper will explain more about the student attendance program, image processing, face detection and facial recognition. The facelift part will be done by using the viola-jones algorithm method while part of the face recognition will be further using the local binary method (LBP). The program will do make sure that the presence process is faster and more accurate.

INTRODUCTION

In today's world, participation is important. Attendance will be counted as part of student marks at most universities. Typically, the retrieval uses a pamphlet containing student details and serves as a student attendance register. Students will then put their signature as a sign that they are present that day. However, there is a problem with this standard procedure. One of the problems involves a student's deceptive signature of a close friend. The presence process takes a long time and many other problems. To address these issues, an automated presence system needs to be implemented. In this paper, the project will introduce an automated face recognition program to combat these issues. An automated system that will automatically keep the student going to the site.

In order to automatically take attendance of students, there is a technology that is easily built as such as Barcode Readers, Radio Frequency Identification System (RFID) and Bluetooth. Although these technology can help reduce the time it takes to be present, it requires a machine as well expensive and limited use devices as the device breaks easily. There is another alternative to biometrics. However, the biometrics proposal largely includes an application that the teacher will use during class. This will eventually cause disruption as the classroom will be disrupted every time the teacher allows students to enter the classroom late. With the use of biometrics, it will also take longer as students need a line to use the device.

Face recognition is the perfect way to solve these problems. Used to see faces, student faces will be taken in real time while the student is learning in the classroom without the awareness and process of learning will be smooth. Students can also listen without interruption for the attendance. As for the pastor, there is no need to keep all student attendance registers for later reports because attendance is automatic produced by the system. The data generated by the report will be accurate and no longer exist. Misleading data as opportunities for students to make proxies are gone.

Face recognition has long been used in many fields. In today's world, face recognition can be easily done as cameras are readily available and convenient in the market. Facial images can be easy taken from everyday life as there was a rapid development of electronic devices like the surveillance camera and cell phones.

One of the areas of recognition that plays an important role is safety. In today's world, many are buildings such as houses use face recognition to improve security in their homes.

LITERATURE SURVEY

There are different face detection techniques. Basic patterns for face detection are nose, eye, ears. Face detection is detecting face from an image or a video. There are different types of detection techniques, each have advantage and disadvantage discussed in paper. Sudhir Bussa *et al*. [3] they used the open CV-based facial recognition approach. This model integrates a camera that captures a [1] Viola Jones face detection algorithm, an Ada-Boost algorithm etc. input image, an algorithm to detect the face from an input image, encode and identify the face, marking the presence in a spreadsheet. The training database is created by training the system with the faces of authorized students. The cropped images are then archived as a database with their respective labels. The functionality is extracted using the LBPH algorithm. In this paper face recognition for human faces [4] are employed through Viola Jones algorithm for face identification LBPH in favor of feature extraction, Euclidean distance classifier is for face recognition. In general the steps employed to achieve this are the following: creating a dataset, face acquisition, feature extraction, and finally classification. The entire work is done in opencv using python. Abin Abraham *et al*. [5] proposed the various factors or methods to take attendance depending on the number of persons, departments etc. There are various methods for taking attendance like calling by roll number, swiping the card, etc depending on the no. of persons. In some place where no. of employees is in greater number they use biometrics like iris, handprint, finger print etc. Now as technology is growing day by day the methods are also developing for attendance, so here we are working on a system that automatically take attendance using face recognition.

Fig 1: Work flow

MEHODOLOGY

A. Face Detection

Face detection is a process of capturing a face from an image and a video. There are so many algorithms *et al*. [2] available for face detection like Viola-Jones Algorithm, Ada-Boost Algorithm etc. In this project we are using Viola-Jones Algorithm for face detection. Now we are going to discuss how Viola Jones algorithm:- Viola-Jones [6] made for front faces so it can detect best foresight instead of looking up or down before tracing, faces of the image is changed to gray-scale

because it is easier to work with it and less data is also available to process the faces of grayscale image. Viola-Jones ones has a search outline for a face within a box. it is essentially looking for features such as these haar like features. In this case it uses a bigger box size and takes bigger steps to show. In general you could change the box size and step size as per your requirements. There are several boxes designed to identify small steps. Features like the face and haar-like features. All cases have data that's been packed together, helping the algorithm to determine the position of face. This algorithm has four steps Haar-like feature, Creating an Integral Image , Adaboost Training , Cascading Classifiers

1. Haar-like feature

Now, the pictures below shows two sides black side and white side, these are the features shown by machine. Meanwhile at some instance one of the sides is shown lighter as edge of an eyebrow, while sometimes it is shinier in the middle which is depicted as nose. Viola-Jones identified three Haar-like features.in the research and these features are Line features, Edge features and four-side features.

Fig 2: Haar-like feature on image

2. Create an integral image

1	1	1
1	1	1
1	1	1

(a)

1	2	3
2	4	6
3	6	9

(b)

Fig 3: (a) input image (b) integrated image

In this step ,[7] an input image is converted to an integral image as shown in the figure. The integral image at location (x, y) contains the sum of the pixels to the left and above (x, y).

This performs the addition of the pixels confined to any specified rectangle using only four values. In the full image, these values are the pixels that look like the edges of the rectangle in the input image.

3. Adaboost training

This algorithm acquires an image of 24 by 24 pixels. The possible output characteristics of the image are one hundred eighty thousand. There will be a lot of data extracted from the image. It is practically impossible to do this real time. For adaptive reinforcement to be used for the realization, strong filing cabinet and reduces calculation time. The classifier will add up the characteristics and theirs weights of images. The classifier will take important facial features and stored in the filing cabinet that makes the stronger classifiers

Fig 4: Cascading classifier

4. Cascading Classifiers

Finally,[8] cascaded classifier classifies whether or not a sub-window is definitely not a face or it may be a face. If it is classified as may be a face, it will be passed to the next stage of the cascade, while if it is classified as not a face, it will be discarded.

Fig 5: Training Flowset

B. Image Training

The main objective of the proposed virtual AI mouse is to furnish an alternative to the conventional physical mouse that provides mouse functions with the help of computer vision enabled computer that houses a web camera which recognizes fingers and hand gestures and processes the captured frames and uses a machine learning algorithm to execute the defined mouse functions like moving the cursor, right click, left click and scrolling function. Also we are using multiple libraries to perform this project.

1. Training Algorithm

It is a vital step for face recognition. We've to use an pictures dataset to coach the rule. Whereas coaching keep in mind that we want to line Associate in Nursing ID for every image, and we have to require minimum forty image of every person[5]. Higher the number of pictures, higher we have a tendency to get the accuracy. Images of the person should have a similar ID. We have a tendency to may additionally set any text (like name, age etc) with image so once we the recognize the image it'll text this image

Fig 6: face dataset

2. Applying the LBP Operation

LBP is basically a texture based descriptor which it encoded local primitive into binary string [9]. The original LBP operator works on a 3×3 mask size. 3×3 mask size contains 9 pixels. The centre pixel will be used as a threshold to convert the neighbouring pixels (the other 8 pixels) into binary digit. If the neighbouring pixel value is larger than the centre pixel value, then it is assigned to 1, otherwise it is assigned to 0. After that, the neighbourhood pixel bits are concatenated to a binary code to form a byte value representing the centre pixel [7]. Figure 7 shows an example of LBP conversion.

Fig 7: Image Unit Point Converted into Pixel

FIG 8.Attendance System graph MediaPipe

3. Extarcting Features

In this we've got to use the image, that we have a tendency to got from training and divide that image into multiple grids victimization the parameters grid x and grid y.[11] victimization the image below, we should extract the bar chart of every region and every histogram contains solely 256 positions representing the occurrences of every constituent intensity and thus we have a tendency to should concatenate every bar chart to form a bigger bar chart. The original image comes from the ultimate bar chart.

Fig 9: Feature Extraction

4. Perform the facial recognition

After training the images it is easy [7] to recognise the face from an image and a video. Each histogram is created used to represent each image from the training set. Suppose we have to find an input image from given dataset, to do so we have to compare two histograms and then return the image with closet histogram and we have different methods to compare the histogram like Euclidean distance, chi, absolute value, etc but we use Euclidean distance. At last we got the output image with ID

$$D = \sqrt{\sum_{i=1}^n (hist1_i - hist2_i)^2}$$

C. Face Recognition

Face recognition is a process in which we have identified or verified the identity of an individual using their face. After face detection and image training we can easily recognize the face of a person. Regardless of where is technology is used it detects human face and prevents fraud. The correctness of the algorithm in recognizing the image is estimated automatically by the confidence and the threshold. [12] The correctness is indicated by a confidence value that is lower than the defined threshold.

fig 10: recognising face

D. Comparison of Feature

After the image has been through the face recognition stage, the features will be compared with the stored features. If there are similarities detected [8], it will be saved in the face database as well as the attendance database.

After the comparison has been completed, the attendance will be saved into the attendance database. If a student is present on a particular day, their student id will be saved together with the date and the course code of the class that the student participates in class

Fig 11: Portal

E. Attendance Database

After the comparison has been completed, the attendance will be saved into the attendance database. If a student is present on a particular day, their student id will be saved together with the date and the course code of the class that the student participates in school

Result

The main working of this project is to make face recognition based on attendance management system that is used in an organisation (school, collage, companies, etc) to capture the face images and mark the attendance of the students in the excel sheet with ID and Name. The algorithm gives the result when the given image is perfectly matched with the database faces. In this project we are taking 40 images each person for better accuracy to perform the experiment, the attendance is marked in the excel sheet automatically

	A	B	C	D	E	F	G	H	I
1	Id	Name	Date	Time					
2	1	sumit	15-05-2020	12:27:48					
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									

Fig 12: Excel Sheet for registering names

APPLICATIONS

The facial recognition based attendance system has a plethora of application use cases. It could be used where there is restricted space for a conventional attendance system and can be utilized in cases where the use of a traditional attendance system is being misused by taking advantage of the loopholes. This system rids of the need for a physical stress of a teacher or manger and it can be used in their absence.

Some Applications:

- i. It is observed that the proposed system produces a better accuracy result of 95% when compared to the existing methodologies. It can be utilized in the areas of automation for robots and other systems without the need of a physical support.
- ii. The same system can be used for recognizing complicated things in future and will play a vital in sophisticated devices.
- iii. Students, who try to help their friends, who didn't come to college, by providing proxy could find it impossible to cheat.

- iv. During this Covid-19 setting, it's advised to not touch high contact surfaces which can lead to the spread of the virus. Thus, the proposed model provides a viable solution that can be used to control automated attendance using a web camera attached to particular wall and can perform almost all the respective operations.

Conclusion

In this project face detection is meted out by using voila jones detection formula feature extraction by using Local Binary Patterns Histograms and classification by using euclidean distance classifier. The projected system is implemented using OpenCV and PyCharm. From the following implementation I can conclude that LBPH and euclidean distance has higher recognition rate. On the base of study carried out in the present examine, the subsequent suggestions area unit accessible for additional analysis and it's valuable to target the subsequent problems in future work. The projected system is changed to support in all the conditions like brightness, sporting specs, beard, in case of twins by minimum distance classifier. The proposed technique is ready-made within the evolution of genetic properties for facial expressions is studied for various security metrics is useful in securing government confidential databases and criminal detection.

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