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Face Attendance System

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Abstract: Automatic Face Recognition Technologies have seen dramatic improvements in performance over the past years and such systems are now widely used for security and commercial applications. An automated system for human face recognition in a real time background for a company to mark the attendance of the employees.

So smart Attendance using Real Time Face Recognition is a real world solution which comes with day to day activities of handling employees. The task is very difficult as the real time background subtraction in an image is still a challenge. To detect real time human face are used to recognize the face detected with a high accuracy rate. The matched face is used to mark attendance of the employee.

Our system maintains te attendance records of employees automatically. Manual Entering of in logbooks becomes a difficult task and it also wastes the time. So we designed an efficient module that comprises of face recognition to manage the attendance records of employees. Our module enrolls the staff 's face. This enrolling is a onetime process and their face will be stored in the database. During enrolling of face we require a system since it is a onetime process. You can have your own roll number as your employee id which will be unique for each employee.

The presence of each employee will be updated in a database. The results showed improved performance over manual after employee identification. This product gives much more solutions with accurate results in user interactive manner rather than existing attendance and leave management system.

Keywords: Face Attendance, Haar Cascade Algorithm, CNN, Python, Object Detection.

I. INTRODUCTION

Nowadays, Internet-of-Things (IoT) technologies have been used in many different fields (e.g., smart home and smart campus) for providing convenience and efficiency to users. Similarly, this paper proposes an automatic attendance system different from existing attendance systems. The existing attendance systems are usually operated by a manual methodor elec-trical system by identifying a student identification (ID) card or using an attendance application. There are some problems in these systems.

For example, there is lecture time loss because of checking attendance by a manual method.

Also, if students use an electrical attendance system, they always need to carry their student ID card or smartphone with an attendance application. A proxy at- tendance (i.e., attendance of somebody else for the sake of a person) can be done by an unconscionable person. This weak point of the existing attendance systems should be prevented

Maintaining the attendance is very important in all the institutes for checking the performance of employees. Every institute has its own method in this regard. Some are taking attendance manually using the old paper or file based approach and some have adopted methods of automatic attendance using some bio-metric techniques.
But in these methods employees have to wait for long time in making a queue at time they enter the office. Many bio-metric systems are available but the key au-thenti cations are same is all the techniques.

Our system uses the face recognition approach for the automatic attendance of employees in the office room environment without employees' intervention Face recognition consists of two steps, in first step faces are detected in the image and then these detected faces are compared with the database for verification. A num- ber of methods have been proposed for

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face detection i.e. Ada Boost algorithm, the Float Boost algorithm, the S-Ada Boost algorithm Support Vector Machines (SVM), and the Bayes classifier

II. COMPONENT DESCRIPTION

Landing Page :
This is basically the Home page of our Project. After opening the system this is the first page user will see. In this the user can able to Register, By adding First Name, Last Name, Address, Status and mobile number. Once user submitted his data, then we have to create our face data and train it. Then user can mark his attendance by clicking on the button called face attendance.

And once attendance has been marked successfully, user's care taker got notification on email.

Register:
This page provides the facility for the user to register and create a new account for only one time. This system provides options of status so that user can register as an instructor or as a student. For registering, any user requires to fill-up the following form box of First Name, Last Name, Address, Status and Mobile Number.
There are validations added for this form such as the Display, Soo user can Re-check he is registered successfully or not. Also he can take look on the personal information has been submitted

Create Face Data :
This page basically helps to capture or create the image data set. At a time, it takes 24 images of every user by different angels. Soo user don't need to wait or pass through front of camera everytime .
Also We can add User Id for every user at the time of creating face data.

Train Face Data :
This Page Train the face data, that we created already. Every Time when we added new user data, This programming page train, identify, manage all stored data. It can neglect the unwanted things from images , and crop, reduce the size of images and soo on

III. ALGORITHM

Haar Cascade Algorithm :

Haar Cascade is a feature-based object detection algorithm to detect objects from images. A cascade function is trained on lots of positive and negative images for detection. The algorithm does not require extensive computation and can run in real-time

In this article, we are going to see how to detect faces using a cascade classifier in OpenCV Python. Face detection has much significance in different fields of today's world. It is a significant step in several applications, face recognition (also used as biometrics), photography (for auto-focus on the face), face analysis (age, gender, emotion recognition), video surveillance, etc

One of the popular algorithms for facial detection is "haarcascade". It is computationally less expensive, a fast algorithm, and gives high accuracy.

Haar-feature selection:

A Haar-like feature consists of dark regions and light regions. It produces a single value by taking the difference of the sum of the intensities of the dark regions and the sum of the intensities of light regions. It is done to extract useful elements necessary for identifying an object. The features proposed by viola and jones are:

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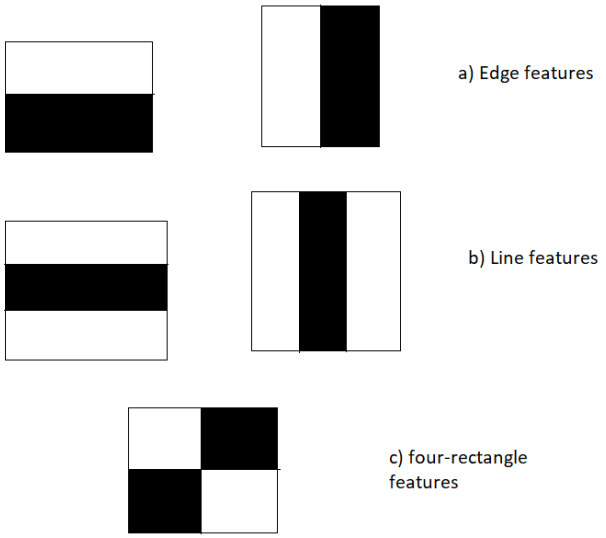

Creation of Integral Images:

A given pixel in the integral image is the sum of all the pixels on the left and all the pixels above it. Since the process of extracting Haar-like features involves calculating the difference of dark and light rectangular regions, the introduction of Integral Images reduces the time needed to complete this task significantly

AdaBoost Training:

This algorithm selects the best features from all features. It combines multiple "weak classifiers" (best features) into one "strong classifier". The generated "strong classifier" is basically the linear combination of all "weak classifiers".

Cascade Classifier:

It is a method for combining increasingly more complex classifiers like AdaBoost in a cascade which allows negative input (non-face) to be quickly discarded while spending more computation on promising or positive face-like regions. It significantly reduces the computation time and makes the process more efficient.
OpenCV comes with lots of pre-trained classifiers. Those XML files can be loaded by cascade Classifier method of the cv2 module. Here we are going to use haarcascade_frontalface_default. xml for detecting faces.

Stepwise Implementation:

Step 1: Loading the image
Code : img = cv2.imread('Photos/cric.jpg')

Step 2: Converting the image to grayscale
Initially, the image is a three-layer image (i.e., RGB), So It is converted to a one-layer image (i.e., grayscale).

Code : gray_img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

Step 3: Loading the required haar-cascade XML classifier file
CascadeClassifier method in cv2 module supports the loading of haar-cascade XML files. Here, we need "haarcascade_frontalface_default.xml" for face detection.

Code : haar_cascade = cv2.CascadeClassifier('haarcascade_frontalface_default.xml')

Step 4: Applying the face detection method on the grayscale image
This is done using the cv2::CascadeClassifier::detectMultiScale method, which returns boundary rectangles for the detected faces (i.e., x, y, w, h). It takes two parameters namely, scaleFactor and minNeighbors. ScaleFactor determines the factor of increase in window size which initially starts at size "minSize", and after testing all windows of that size,

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the window is scaled up by the "scaleFactor", and the window size goes up to "maxSize". If the "scaleFactor" is large, (e.g., 2.0), there will be fewer steps, so detection will be faster, but we may miss objects whose size is between two tested scales. (default scale factor is 1.3). Higher the values of the "minNeighbors", less will be the number of false positives, and less error will be in terms of false detection of faces. However, there is a chance of missing some unclear face traces as well.

Code : faces_rect = haar_cascade.detectMultiScale(gray,scaleFactor=1.1,minNeighbors=9)

Step 5: Iterating through rectangles of detected faces
Rectangles are drawn around the detected faces by the rectangle method of the cv2 module by iterating over all detected faces.

Code : for (x, y, w, h) in faces_rect:

cv2.rectangle(img, (x, y), (x+w, y+h), (0, 255, 0), thickness=2)

cv2.imshow('Detected faces', img)

cv2.waitKey(0)

Below is the implementation:

```
# Importing OpenCV package

import cv2

# Reading the image

img = cv2.imread('Photos/cric4.jpg')

# Converting image to grayscale

gray_img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

# Loading the required haar-cascade xml classifier file

haar_cascade = cv2.CascadeClassifier('Haarcascade_frontalface_default.xml')

# Applying the face detection method on the grayscale image

faces_rect = haar_cascade.detectMultiScale(gray_img, 1.1, 9)

# Iterating through rectangles of detected faces

for (x, y, w, h) in faces_rect:

        cv2.rectangle(img, (x, y), (x+w, y+h), (0, 255, 0), 2)

cv2.imshow('Detected faces', img)

cv2.waitKey(0)
```

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IV. CONCLUSION

The aim is to automate and make a system that is useful to the organization such as an institute. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This method is secure enough, reliable and available for use.

No need for specialized hardware for installing the system in the office. It can be constructed using a camera and computer. Human face detection can be used in different fields, such as in law enforcement, equity arrangements, identification recovery, and Biometrics. Facial identity and recognition technology integrate university campus tech solutions to ensure student protection. For chosen locations, such as university campuses, we establish facial recognition based on face detection.

Our primary point is to identify and throw unwanted persons out of the protected area. We are eager to develop a quick and efficient framework of facial recognition that identifies and does not reach people's faces.

By calculating the illegal movement of outsiders by using our suggested methodology, we will minimize internal campus crimes much as our point is to expand transparent mindfulness, human protection, and authorization of the law by adopting our proposal. In the future we will add artificial intelligence over the proposed system, to differentiate objects like humans, animals, and so on to ensure security surveillans

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