Implementing the Study of Attendance System Using OpenCV with the Help of Facial Recognition

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Abstract: **For the detection, Confirmation and documentation of humanoid faces. We symbolize a tactic to gross the facial detection of a person as a resources of compelling input which have difficult physical appearance of the faces to those the different peoples. It drives only work on the 2D Appreciation. It drives also an important branch of verification of biometric and has been used extensively in the numerous arenas (i.e. Video Monitoring System; Mainframe-Human communication and also the prospective of Door Control System): Attendance system monitoring will incorporate the recognition of face expertise. The framework will record the participation of the understudies in homeroom condition consequently and it will give the offices to the staff to get to the data of the understudies effectively by keeping up a log for check in and check out time.**

Keywords: **Face Acknowledgement system, Involuntary attendance, Verification, Bio-metric, OpenCV.**

1. Introduction

OpenCV (Open Source Computer Vision Library) is an open source PC vision and AI programming library. OpenCV was worked to give a typical framework to PC vision applications and to quicken the utilization of machine discernment in the business items. Being a BSD-authorized item, OpenCV makes it simple for organizations to use and alter the code. Computer vision is as old as the face recognition. The other ways of documentation (such as fingerprints, or iris scans) is more precise whereas face recognition is also a major focus of research and it is a primary technique of person or people's identification. But now a days Face recognition is steadily overtaking a universal biometric solution which takes zero efforts from the end of the user with compared to the other options of the biometric. It may be used in chiefly in five domains: attendance monitoring; management of employee; visitor management system; authorization system: last but not the least for the banking security system.

Customarily, understudy's attendances are taken physically by applying participation sheet given by the employees in class, which is a tedious occasion. Besides, it is hard to check individually understudy in a huge study hall condition with circulated branches whether the verified understudies are really reacting or not.

The current creators exhibit in this paper how face acknowledgment can be utilized for a powerful participation framework to naturally record the presence of a selected individual inside the separate scene. Proposed framework likewise keeps up a log document to track the section of each person concerning a general framework time.

A. Background and Related Work

The principal endeavors to utilize face acknowledgment started in the 1960's with a semi-mechanized framework. Imprints were made on photos to find the significant highlights; it utilized highlights, for example, eyes, ears, noses, and mouths. At that point separations and proportions were figured from these imprints to a typical reference point and contrasted with reference information. In the mid 1970's Goldstein, Harmon and Lesk made an arrangement of 21 emotional markers, for example, hair shading and lip thickness [2]. This demonstrated significantly harder to mechanize because of the emotional idea of a large number of the estimations actually made totally by hand.

Fisher and Elschlagerb ways to deal with measure various bits of the face and planned them all onto a worldwide format, which was discovered that these highlights don't contain enough special information to speak to a grown-up face [3].

Another methodology is the Connectionist approach, which looks to arrange the human face utilizing a blend of both scope of signals and a lot of recognizing markers [4]. This is normally actualized utilizing 2-dimensional example acknowledgment and neural net standards. More often than not this methodology requires an enormous number of preparing countenances to accomplish fair exactness; thus it still can't seem to be actualized for a huge scope. The principal completely mechanized framework to be created used extremely broad example acknowledgment [5]. It contrasted faces with a nonexclusive face model of anticipated highlights and made a progression of patters for a picture comparative with this model. This methodology is for the most part measurable and depends on histograms and the dim scale esteem.

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2. System Overview

The current creators utilized the open CV approach for face acknowledgment which was presented originally developed by Intel, it was later supported by Willow Garage then Its eez (which was later acquired by Intel). These calculations can be utilized to distinguish and perceive faces, distinguish objects, order human activities in recordings, track camera developments, track moving articles, separate 3D models of items, produce 3D point mists from sound system cameras, join pictures together to deliver a high goal picture of a whole scene, find comparable pictures from a picture information base, eliminate red eyes from pictures taken utilizing streak, follow eye developments, perceive view and build up markers to overlay it with enlarged reality, and so on [10]. The association of open CV is utilized to distinguish the presence of a face and its personality. There is a five stage measure engaged with the framework created by Turk and Pentland [1]. To start with, the framework should be instated by taking care of it a lot of preparing pictures of appearances. This is utilized to characterize the face space which is set of pictures that are face like. Next, when a face is experienced it ascertains an open CV for it. By contrasting it and known faces and utilizing some measurable examination it very well may be resolved whether the picture introduced is a face by any stretch of the imagination. At that point, if a picture is resolved to be a face the framework will decide if it knows its character or not. The discretionary last advance is that if an obscure face is seen consistently, the framework can figure out how to remember it.
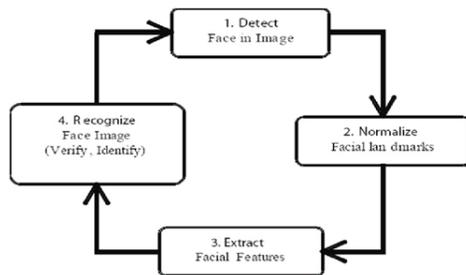

Fig. 1. Architecture of the system

The main component used in the implementation approach are open source computer vision library (Open CV). One of Open CV's goals is to provide a simple-to-use computer vision infrastructure that helps people build fairly sophisticated vision applications quickly. Open CV library contains over 500 algorithms and about 10 times as many functions that compose or support those algorithms [8]. The primary technology behind Face recognition is Open CV; the interface is designed using 'Open CV'.

The user stands in front of the camera keeping a minimum distance of 50cm and his image is taken as an input. The frontal face is extracted from the image then converted to gray scale and stored. The Open CV [7] is performed on the images and the timestamp values are stored in an xml file. When a user requests for recognition the frontal face is extracted from the

captured video frame through the camera. The Open CV value is re-calculated for the test face and it is matched with the stored data for the closest neighbor [9].

A. Open CV (Open Source Computer Vision)

Open CV (Open Source Computer Vision) is a library for PC vision that incorporates various profoundly advanced calculations that are utilized in Computer vision errands [13]. The library has in excess of 2500 calculations and is fit for handling pictures and recordings to distinguish faces, recognize objects, group human activities, track moving articles, shading discovery, design acknowledgment and some more. The following steps summarize the Open CV process.

1. Importing the Open CV.
   Import cv2.
2. Reading the images and assets from the local disk
   Img = cv2. imread("c:/pic.jpg").
3. Resizing image to small size for the clear appearance.
   Img = cv2. Resize (img, (400,200))
4. Displaying the original image.
   Cv2. Imshow ("Original image",img) and much more steps.
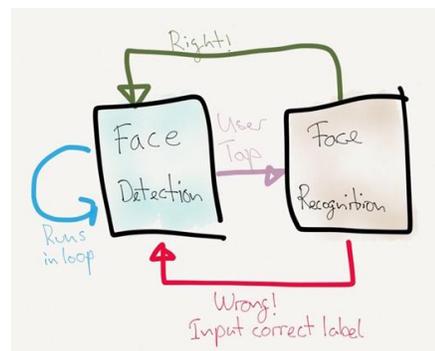
3. System Implementation

Fig. 2. How to take I/O data from assets

Fig. 3. How to add new data form the assets

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The proposed framework has been executed with the assistance of three essential advances:

- Learn and train the face pictures and resources for the info.
- Recognize and separate face picture and spare the face data in a xml record for future references Fig 2.
- Perceive and match face pictures with existing face pictures data put away in xml record [1].

A. Train and Learn Face images

Learning and Training the dataset is required to train the data for the better accuracy of O/P. The learn () function is executed in the following steps:

1. Load the training data Fig 3.
2. Do Open CV on it to find a subspace.
3. Project the training faces onto the Open CV subspace.
4. Save all the training information.
- Gray images
- Original images
- The average training face image
- Projected face image
- Person ID numbers
- Timestamp for excel sheet

In the above we have to train the data or assets for the better accuracy of the output. Here we can train and learn the data for the input of the Open CV. In this we have to take the original images and we can get train it with the help of the software's. Then all the learned data and the trained data face representation are saved as an .XML file using the Open CV's built in tenacity function.

B. Face Detection and Extract

From the start, open CAM_CB () is called to open the camera for picture catch. Next the frontal face is removed from the video outline by calling the capacity Extract Face () [2]. The Extract Face () work utilizes the Open Cv Haar Cascade strategy to stack the haar cascade_ frontalface_alt_tree.xml as the classifier. The classifier yields a "1" if the locale is probably going to show the item (i.e., face), and "0" in any case. To look for the article in the entire picture one can move the pursuit window over the picture and check each area utilizing the classifier [6]. The classifier is planned such a way that it tends to be effortlessly "resized" so as to have the option to discover the objects of enthusiasm at various sizes, which is more productive than resizing the picture itself. Along these lines, to discover an object of an obscure size in the picture the output system is completed a few times at various scales. After the face is recognized it is cut into a dim scale picture of 50x50 pixels.

C. Spot and Documentation

Perceive () work, which actualizes the acknowledgment period of the Open CVface program [5]. It has only three stages. Two of them - stacking the face pictures and anticipating them onto the subspace - are as of now natural. The call to load Face Img Array() loads the face pictures, recorded in the train.txt,

into the face Img Arr and stores the ground truth for individual ID number in person Num Truth Mat. Here, the quantity of face pictures is put away in the neighborhood variable, n Test Faces.

We likewise need to stack the worldwide variable n Train Faces just as the vast majority of the other preparing information – n Open Cv, Open CV VectArr, pAvg TrainImg, etc. The function load Training Data () does that for us. Open CV finds and loads every information esteem in the XML document by name.

After all the information are stacked, the last advance in the acknowledgment stage is to extend each test picture onto the Open CV subspace and find the nearest extended preparing picture. The call to cv Open CV Decomposite (), ventures the test picture, is like the face-projection code in the learn () work [12].

As before, we pass it the number of eighteeen esteems (n Open Cv), and the variety of vectors (Open Cv Vect Arr). This time, in any case, we breeze through an assessment picture, rather than a preparation picture, as the principal boundary. The yield from cv OpenCV Decomposite () is put away in a nearby factor – projected Test Face [14]. Since there's no compelling reason to store the extended test picture, we utilized a C exhibit for projected Test Face, as opposed to an Open CV framework.

The find Nearest Neighbor () work registers good ways from the extended test picture to each extended preparing model. The separation premise here is "Squared Euclidean Distance" [11]. To compute Euclidean separation between two focuses, we have to include the squared separation in each measurement, and afterward take the square foundation of that entirety. Here, we take the entirety, yet skirt the square root step. The conclusive outcome is the equivalent, on the grounds that the neighbor with the littlest separation likewise has the littlest squared separation, so we can spare some calculation time by contrasting squared qualities.

4. Experiment and Result

The progression of the trials cycle is given beneath:

1) Face Detection

Start capturing images through web camera of the client side:
Begin:
//Pre-process the captured image and extract face image
//Take the captured face image and compared with trained values of existing faces in the database.
//If Open Cv value does not matched with existing ones, save the new face image information to the face database (xml file).
//If original value matched with existing one then recognition step will have done.
End;

2) Face Recognition

Using Open CV the following steps would be followed in for face recognition:
Begin:
// Find the face information of matched face image in from the database.

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// update the log table with corresponding face image and System time that makes completion of attendance for an individual student.

End;

This section presents the results of the experiments conducted to capture the face into a grey scale image of 50x50 pixels.

Table 1
Describes the open CV function used in the proposed system and its execution results

Test data	Expected Result	Observed Result	Pass/Fail
Open CAM_CB()	Connects with the installed camera and starts playing.	Camera started.	pass
Load Haar Classifier()	Loads the HaarClassifier Cascade files for frontal face	Gets ready for Extraction.	Pass
ExtractFace()	Initiates the Paul-Viola Face extracting Frame work.	Face extracted	Pass
Learn()	Start the PCA Algorithm	Updates the facedata. xml	Pass
Recognize()	It compares the input face with the saved faces.	Nearest face	Pass

Fig. 4. Training and learned images of data.

Table 2
Face detection and recognition rate

Face Orientations	Detection Rate	Recognition Rate
O0 (Frontal face)	98.7 %	95%
18°	80.0 %	78%
54°	59.2 %	58%
72°	0.00 %	0.00%
90°(Profile face)	0.00 %	0.00%

We played out a lot of investigations to show the proficiency of the proposed technique. 50 unique pictures of 15 people are utilized in preparing set. Figure 4 shows an example paired picture recognized by the Extract Face () work utilizing the Open CV Library for Face extricating Frame work discovery strategy. From table 2 it is being seen that with the expanding of face point regarding camera face identification and acknowledgment rate is become diminishes.

5. Conclusion and Future Work

So as to acquire the participation of people and to record their season of section and leave, the creators proposed the participation the executive's framework dependent on face acknowledgment innovation in the establishments/associations. The framework gauges' participation of every understudy by constant perception at the passage and leave focuses. The consequence of our starter test shows improved execution in the assessment of the participation contrasted with the customary highly contrasting participation frameworks. Current work is centered around the face location calculations from pictures or video outlines.

In further work, creators mean to improve face acknowledgment adequacy by utilizing the communication among our framework, the clients and the chairmen. Then again, our framework can be utilized in a totally new element of face acknowledgment application, versatile based face acknowledgment, which can be a guide for everyday citizens to think about any individual being captured by phone camera including appropriate approval for getting to a brought together information base.

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