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Employee Attendance and Acknowledgement System using Facial Analysis

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ABSTRACT
These days, biometric recognition methods begin growing rapidly as one of promising authentication methods, besides the conventional identification method. Biometric recognition techniques proposed till date (to be implemented further) need some physical contact with the user like placing finger on the device etc, in case of retinal detection user needs to stand still only in one fixed position till the system recognizes the iris and scan retina. But, this proposed system doesn't. It just uses the smart device's (externally connected) webcam access to identify the people without any physical contact which is a great benefit actually. Notification system is where the real IoT takes place, machine-to-machine(M2M) communication is established in this phase of the project. Here, HOG's (Histogram of Gradients) algorithm is used to train the machine for detection of human faces (how many faces does the picture contains at a movement). Face-Landmark estimation Algorithm is used to place Eyes, Nose and lips in sample place of image (done by locating 68 specific points on sample image) The noticeable point is that this framework works in live (detection happens live, movement to movement).

I. INTRODUCTION

The technology which is being used around the world is making the process more simpler and faster for humans. As it doesn't require any physical contact or any particular posture for detection thus framework saves more time than a normal detection framework does. Generally, a system saves 10-15 minutes on manual human verification. This framework works more precisely and accurately as it is live tracing (even a frame can't escape while the machine is at its work).

Advantage over other system is that this framework can trace efficiently even if there are some cosmetic changes, facial hair growth unlike other face-detection systems. Involves 5 steps:

(1) Finding all the faces.

(2) Postures and projecting faces. (Tracing i.e., sketching the outline of the face)

(3) Encoding faces (IoT domain where it needs to gather the data and compare)

(4) Finding the person's name from the encodings.

(5) Sending the list to the registered device via email and acknowledgement to mobile using IFTTT.

II. PROPOSED WORK

To avoid physical contact with the systems, Tracing (sketching) systems can be used for the identification purpose and smart IoT communication between the systems for receiving Notification. This system can trace the face the of the person within no time (Live) so that particular posing is not required and also time efficient. Using visual studio and python software face detection can be done and then, Attendance list will be mailed to the registered accounts and, Alert can be sent to the registered devices using IFTTT.

III. RELATED WORK

[1] Proposed a face recognition system that is using a Eigen and Fisher face to different algorithms other that e regular Haar Cascade [2] Proposed a conventional Face recognition attendance marking system using the general haar cascade system

[3] They have addressed an approach smart attendance monitoring system designed on the basis of deep learning algorithm. Attendance will be marked while entering and exiting, their faces will be recognized in another deep learning model embedded surveillance camera and the exit time will be stored

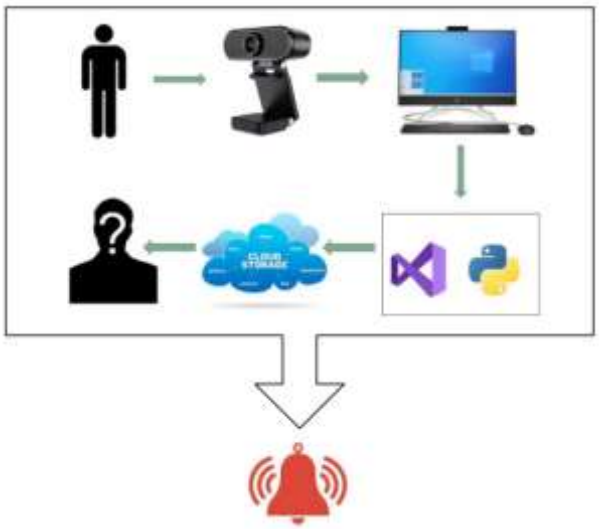
[4] This paper proposes a model for implementing an automated attendance management system by making use of face recognition technique, by using Eigenface values, Principle 7 Component Analysis (PCA) and Convolutional

Neural Network (CNN). student's faces.[5] Gives brief idea about the working of landmark estimation.

IV. DRAWBACKS OF EXISTING SYSTEMS

Though there are many recognition systems existing, there are some limitations like that systems definitely require physical contact with the person to identify him/her. There are some other systems which can identify the person by scanning the retina, it requires much time to pose against the system and particular poses are to be taken. This retinal scanning system may be contact-less but time-taking system.

V. BLOCK DIAGRAM



IMPLEMENTATION

A. Finding the faces in the image

HOG's (Histogram of Oriented Gradients) algorithm is used. First of all, we make the images black and white. Look at every single pixel in our image at a time, also surrounding pixels of a particular one in case. Replace the pixel with an arrow in a direction lighter to darker background [The arrows are called Gradients]. Following these arrows the outlines of the face are sketched from lighter to darker. Therefore, we can identify he image specifically with light background and the surrounding in black.

B. Posing and Projecting Faces

Done using Face-Landmark Estimation Algorithm. Will locate 68 specific land marks after centring the image. Here, image is centred by considering Eyes, Lips as reference rotation of image is internally processed by dlib in python.

C. Encoding Faces

Convolutional Neural network (CNN) is used here. It is best preferred for Image classification and differentiate between images. Here, it is used to measure distance between eyes, size of ears, size of lips, etc. Using CNN 128 Encodings of a face are generated. 128 is the maximum number of possible angles a human can pose. In all the 128 encodings it measures the corresponding distances.

D. Finding the name of the Person from the Encodings

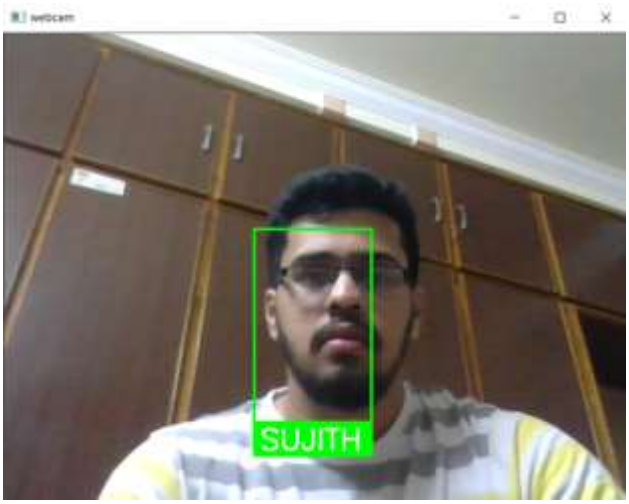
We use Support Vector Machine Classifier (SVM classifier) for the classification and identification. Because, It is faster than compared to other classifications (we require identification to be done in milliseconds). As the measurements generated by the CNN model are numerical, SVM can classify them easily and efficiently using a Hypervisor. It calculates the distance from each face's encodings and gives the face distance. Thereby, the face which is having minimum distance is similar to the testing image.

E. Sending the attendance list to the Registered device via email & acknowledgement to mobile using IFTTT

We register the email id of the accounts to which the attendance list generated has to be sent. Then, after the identification from the encodings the mail will be sent to the registered mail id.

Thereafter, an acknowledgement will be sent to the mobile stating that "Today's Attendance has been recorded".

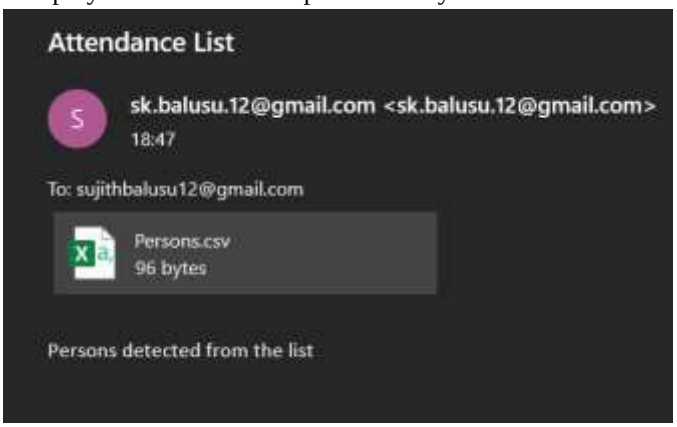
VI. RESULTS



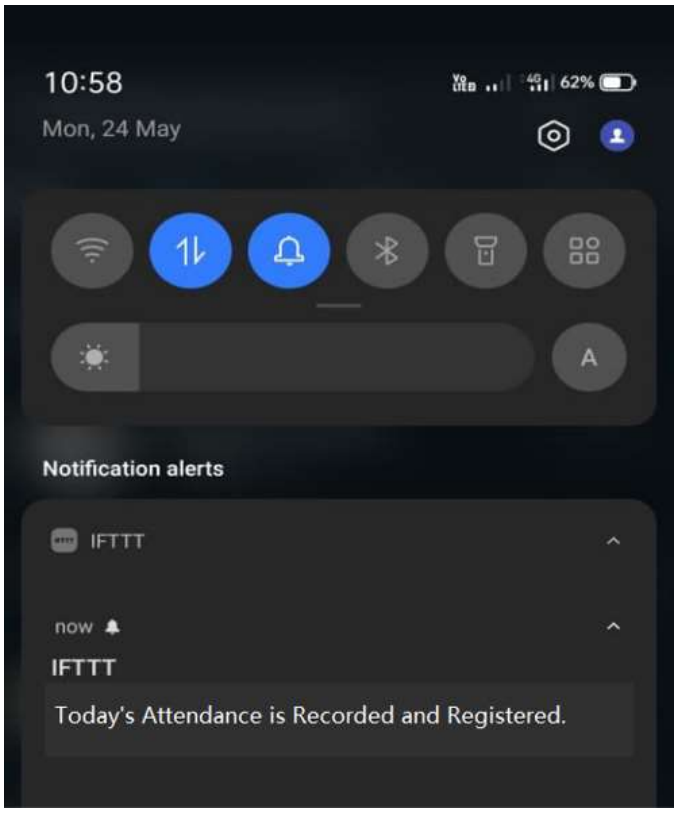
Whenever, the person comes in front of the camera while the system is running, it automatically starts detecting the persons and compare the face with those in the cloud.

After identifying the person successfully, the system generates a list having attributes of Names, Date, Time of Identification.

That particular list generated is an Attendance list of the employee/workers on that particular day.



The registered mail account will be notified with the list having the names of the persons detected as a proof of attendance.



After successfully sending the mail to registered account, an acknowledgement will be sent to the mobile of the corresponding representative, acknowledging attendance of that particular day has been recorded.

VII. CONCLUSION

Employee and Acknowledgement system has been implemented successfully which can detect the persons without any physical contact and with much faster than any other bio-metric systems existing in work today. It can reduce the man power required in sensitive cases for identification and backing up the required persons.

VIII. REFERENCE

[1] Xiaoguang Lu,"Image Analysis for Facial Recognition", Dept of Computer Science & Engineering, Michigan State University, 2016.

[2] Olegs Nikisins, Rihards Fuksis, Arturs Kadikis and Modris Greitans, "Face Recognition System on Raspberry Pi", International Conference on Image Processing and Control Engineering, 2015.

[3] Rainer Lienhart and Jochen Maydt. An extended set of haar-like features for rapid object detection. In Image Processing. 2002. Proceedings. 2002 International Conference on, volume 1, pages 12 I–I. IEEE, 2002.

[4] Dong chen He and Li Wang. Texture unit, texture spectrum, and texture analysis. IEEE Transactions

[5] X. Wang, T. X. Han, and S. Yan. An hog-lbp human detector with partial occlusion handling

[6] P. N. Belhumeur, J. P. Hespanha, and D. J. Kriegman. Eigenfaces vs. fisherfaces: recognition using class specific linear projection. IEEE Transactions on Pattern Analysis and Machine Intelligence, 19(7):711–720, Jul 1997.

[7] M. Turk and A. Pentland. Eigenfaces for recognition. Journal of Cognitive Neuroscience, 3(1):71– 86, Jan 1991 [8] Lawrence Sirovich and Michael Kirby. Low-dimensional procedure for the characterization of human faces. Josa a, 4(3):519–524, 1987.

[9] John G Daugman. Uncertainty relation for resolution in space, spatial frequency, and orientation optimized by two-dimensional visual cortical filters. JOSA A, 2(7):1160–1169, 1985

[10] S Marˆcelja. Mathematical description of the responses of simple cortical cells. JOSA, 70(11):1297–1300, 1980.

[11] Takeo Kanade. Computer recognition of human faces, volume 47. Birkh¨auser Basel, 1977.