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Video Based Dynamic Human Authentication System

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Abstract - *Advances within the sector of knowledge where Technology also make Information Security an inseparable, a neighborhood of it. In order to refine security, Authentication plays a crucial role. This paper presents a review on the human authentication techniques and some future possibilities in this field. In human authentication, a person must be identified supporting by some characteristic physiological parameters .A wide kind of systems require reliable personal recognition schemes to either confirm or determine the identity of an individual requesting their services. The purpose of such schemes is to make sure that the rendered services are accessed only by a legitimate user, and not anyone else. By using authentication, it is possible to confirm or establish an individual's identity. The position of human authentication within the current field of Security has been depicted during this work. We've also outlined opinions about the usability of human authentication systems, comparison between different techniques and their advantages and drawbacks during this paper.*

Key Words: **Face detection, Face recognition, Feature extraction, Security, Identification system**

1. INTRODUCTION

Recently with the rapid advances in technology altogether with the aspects of our lives, the necessity for a system that performs personal identification and recognition has become vital. This need was nurtured by the continual desire of the person to guarantee security. This desired security assures individual's own safety, the safety of his/her belongings as well as the safety of the society and its assets. There is a wide variety of approaches to identification systems, such basic identification systems have endless flaws and thus result in violators being able to breach the security of that system. This triggered the necessity for systems that provide more protection to the user's privacy, and consequently, scientists have diverted their thinking also as their research to the usage of biometrics. By biometrics, we mean methods that might uniquely identify an individual supported one or more of the person's fundamental properties or traits. Some of those traits include but aren't limited to fingerprint, DNA, hand and palm geometry buts also iris recognition and face recognition. Face recognition systems in particular have gained the attention of many researchers in diverse fields including computer scientists, neuroscientists and psychologists. This is often thanks to the very fact that the method of face recognition doesn't require the knowledge of that person in subject, nor does it require his participation within the identification process.

The face recognition process are often abstractly divided into four steps:

1. Face detection; an image is captured from which a human face is detected from the cluttered surroundings.
2. Image normalization; in which the image need be standardized consistent with its scale, orientation, pose, size, illumination etc. relative to the images stored within database. This is a pivotal step in the process of recognition since the recognition of the face will not be a successful process unless the attributes of the probe image are more or less identical to the attributes of the faces stored in the database.
3. Feature extraction; in which distinctive attributes of the face are extracted for recognition.
4. Face recognition or authentication; where in recognition, the input face to the system is unknown and the system is responsible to find a match to that face (i.e. to identify who that person is) from database of already known stored faces in the system. While in authentication, the input face is claimed to be that of a specific person and the system is responsible to either verify or reject the claimed identity of that input face.

1.1 Face Recognition

Over the past few decades face detection and recognition have transcended from esoteric to popular areas of research in computer vision and one among the higher and successful applications of image analysis and algorithm based understanding. Because of the intrinsic nature of the matter , computer vision isn't only a computing area of research, but also the thing of neuroscientific and psychological studies also, mainly due to the overall opinion that advances in computer image processing and understanding research will provide insights into how our brain work and the other way around . A general statement of the face recognition problem are often speculated as follow: given video or still images of the object and then verify or identify single or multiple individuals within the grasp of that environment employing a database stored with faces.

Fig a: input image

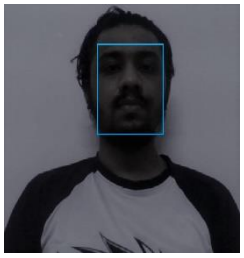


Fig b: gray scale of input

1.2 Face Detection

In faced recognition, the face is detected and then that face is compared to a database of stored faces which will decide who that individual is. Face detection can be performed reliably and much more easily with an open source framework provided by Intel which is OpenCV.

Detecting a person's face when that person is viewed from an angle that is typically harder, sometimes requiring 3D Head Pose Estimation. Also, lack of proper brightness in a picture can greatly increase the problem of detecting a face, or increased contrast in shadows on the face, or even the image is unclear, or the person is wearing accessories such as mask, glasses etc. Face recognition however is far less reliable than face detection, with an accuracy of 30-70% generally.

Since 1990s, Face recognition has been a robust field to study or research, but is still embryonic from a reliable authentication method. More and more techniques are being developed annually. The Eigenface technique is taken into account the only method of accurate face recognition, but many other (much more complicated) methods or combinations of multiple methods are slightly more accurate.

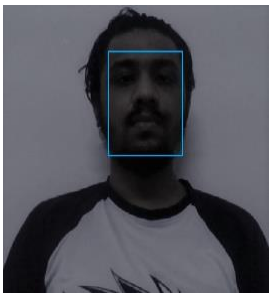


Fig b: gray scale of input

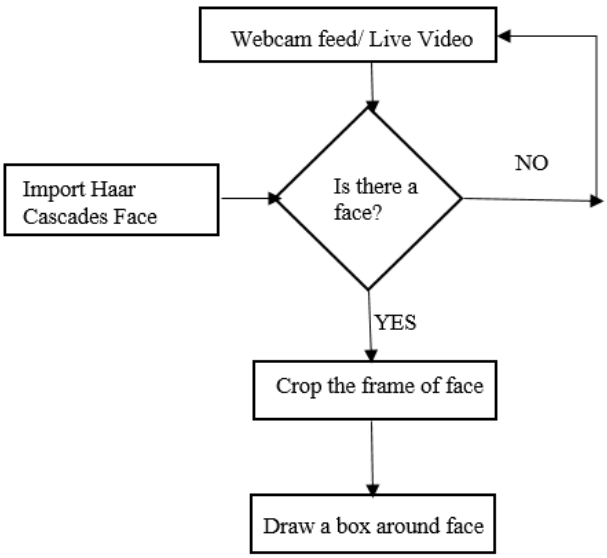
Fig c: Face detected

2. METHODOLOGY

Face detection process:

First stage is to create a face detecting system with Haar-cascade. But, training still is required in order to create new Haar-cascades. OpenCV features a very robust set of Haar-cascade that is used on this project. Still many random objects can be identified alone using face-cascade. Thus to make system more efficient, eye cascades can be incorporated to obtain a stable face detection. Following is the flow chart for face detection process. Detecting a person's face when that person is viewed from an angle that is typically harder, sometimes requiring 3D Head Pose Estimation. Also, lack of proper brightness in a picture can greatly increase the problem of detecting a face, or increased contrast in shadows on the face, or even the image is unclear, or the person is wearing accessories such as mask, glasses etc.

Face Detection means an image is captured from which a human face is detected from the cluttered surrounding. After Face Detection, Training the classifiers and Face Recognition is done. It can be achieved by various algorithms which are available on python.



Flowchart-1: Face Detection

Face recognition process:

There are technically 3 algorithms we can use, but we have used the LBPH (Linear Binary Pattern Histogram) which gives very efficient result. The other two are Eigenface and Fisherface algorithms. LBPH is implemented using OpenCV libraries.

There are 3 stages for face recognition and are follow as:

1. Collecting images ids
2. Extracting unique attributes, classify them and then store them in XML files.
3. Match attributes of that input image with the attributes in the saved XML files and predict identity.

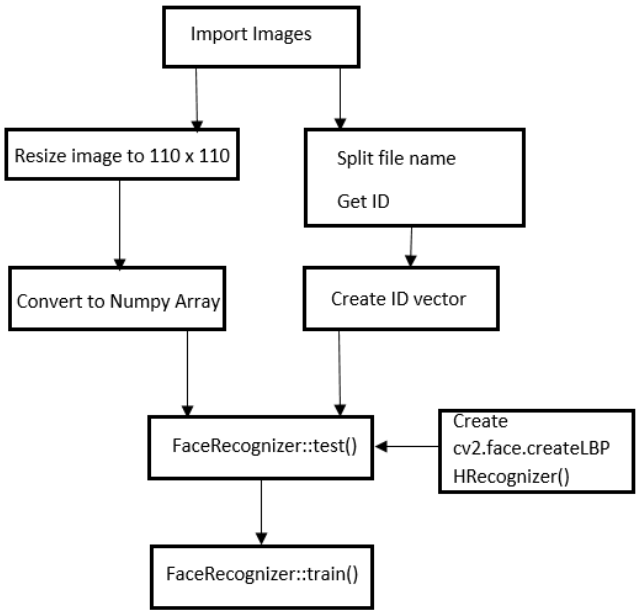
1) Collecting the image data:

Collecting classification images is typically done manually employing a photo editing software to crop and resize photos. Furthermore, PCA and LDA requires an equivalent number of pixels altogether the pictures for the correct operation. This point consuming and a laborious task is automated through an application to collect 50 images with different expressions. The appliance detects suitable expressions between 300ms, straightens any existing tilt and save them.

2) Training the classifiers:

Using FaceRecognizer class OpenCV enables the creation of XML file which store features extracted from datasets.

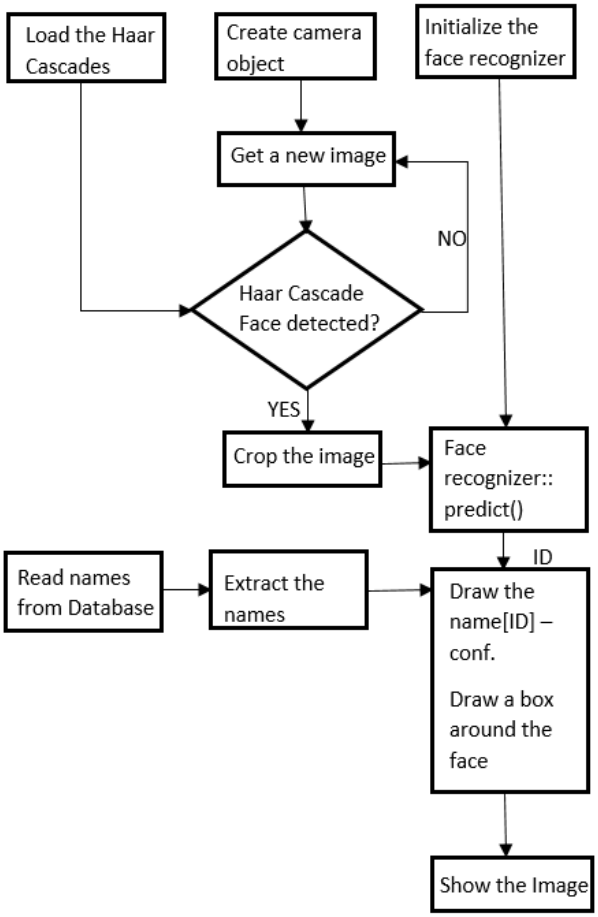
The images which are stored are firstly imported, then converted to grayscale then saved with IDs. FaceRecognizer objects are created employing a class called face recogniser.



Flowchart-2: Training classifiers

Face Detection Process:

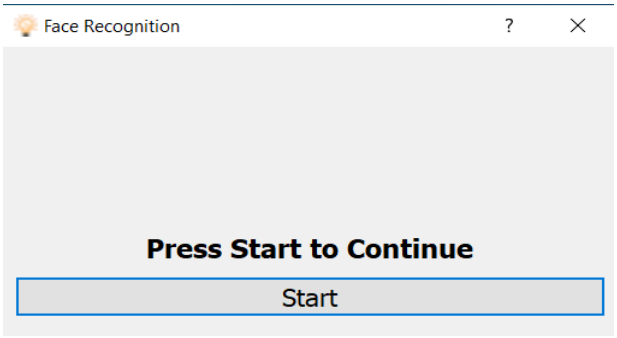
Face recogniser object is created using the desired specifications. Using face detector faces are cropped and transferred to be recognised. For every face which is detected, a projection or prediction is made using FaceRecognizer.predict() which returns the ID of the class and confidence. Threshold is decided by varying confidence. Finally the names are displayed.



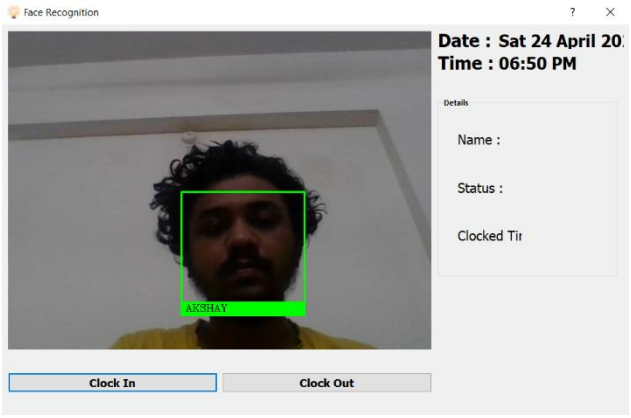
Flowchart-3: Face Recognition

2.2 RESULTS:

1. We will get a start button once we run the program. To continue we will have to press start.



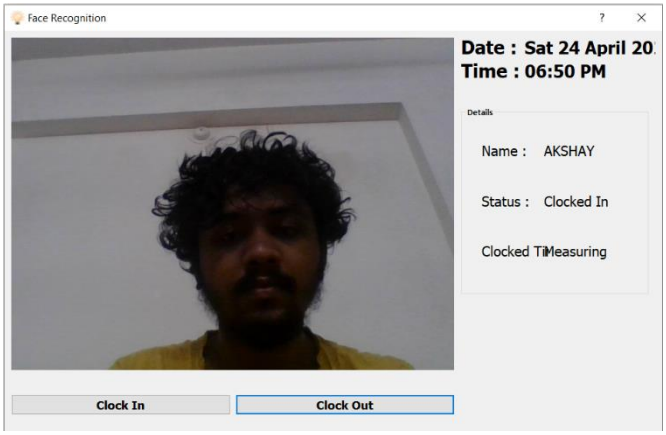
2. After that the main screen will open, it will detect the face which is by comparing it with the faces which are in database.



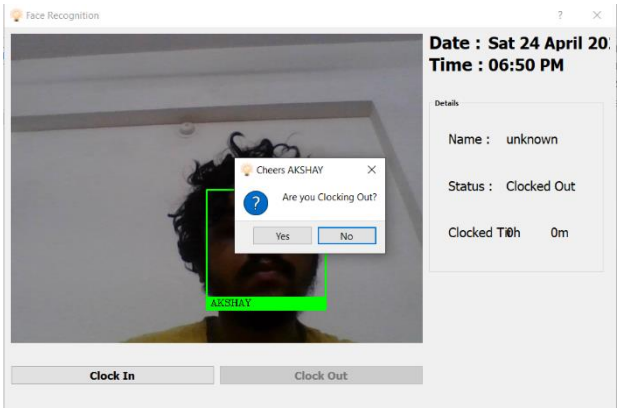
3. The program will ask us whether we are clocking in or not then we will simply press on clocking in, it will start recording the time we enter into the institution.

4. After clocking in, respected name will be shown in the UI align with the status whether an individual is clocked in or out.

Along with status, the date and time of that specific day will be mentioned along with time measuring, which will show for how much time an individual was in organization.



5. After clocking in, the individual also have an option to clock out. It will finally display the time for which that individual was in organization.



6. And final all the clocking data will be stored in an excel file.

AKSHAY	21/04/24 18:53:17	Clock In
AKSHAY	21/04/24 18:56:40	Clock Out

3. CONCLUSIONS

Face recognition technology has come an extended way within the last twenty years. Today, machines can automatically verify or identify information for secure transactions, for surveillance and security measures, etc. Next generation face recognition systems are getting to have widespread application in smart environments -- where computers and machines are more like helpful assistants.

This paper narrates the mini-project for autonomy module and visual perception. Next, it explains the technologies utilized in the project and therefore the methodology used. Finally, it shows the results. Haar-cascade proved to be a very efficient way to automate things .Considering all factors, LBPH with Haar-cascades is a cost effective face recognition platform.

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