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### **RESEARCH ARTICLE**

# Face Authentication Application for Social Networking Site

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**Abstract**— *In this project an access control system is integrated with a face authentication system. From the given image, face detection system locate size and scale of human faces. First step for Face localization, Face Tracking, Facial Expression Recognition, and Face Recognition is Face detection. Detection of faces within an image can be done accurately and rapidly using a method introduced by Viola and Jones [1]. This technique accurately detects facial features.*

**Keywords**— *Face Recognition, Haar Cascade, OpenCV Library, PCA, EigenFace Method*

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## I. INTRODUCTION

Now a days, social networking has become a very popular media for many people to interact with each other [1]. Obtaining a lot of personal information from this social network is very easy. Using the search engine sites or existing social networking website, search for detailed-identity can be easily conducted through searching. However, it seems to be less effective. Therefore, our designed system can connect a person to a variety of services through his/her own identity. Person's face is the primary identity in our proposed system. Using our system, it is possible to know various social network and other internet activities followed by that person. System identification can be done by a person using face recognition system and utilizing the camera system on a computer or a laptop. This system uses the Haar cascade algorithm for face identification and face recognition. Because of the wide variations of shape and pigmentation within a human face, analysing the pixels for face detection is time consuming and difficult to accomplish. Haar Classifiers which is devised by Viola and Jones rapidly detects any object, including human faces. This algorithm uses AdaBoost classifier cascades which are based on Haar-like features and not pixels [2].

## II. LITERATURE SURVEY

We studied the working behavior of already existing face authentication systems. Each of these applications offers different features and limitations.

*Face Recognition:*

In a Face recognition system, engineering method is performed in an image to search for the identity or the information contained in an image. There are two stages in a Facial recognition system. Face detection module is the first stage, which is followed by the facial recognition stage.

Various methods that can be used for face detection of an image are [2]:

- a. Knowledge-based method
- b. Feature invariant approaches
- c. Template matching methods
- d. Appearance based methods

One of the most commonly used methods in the face recognition system is to extract the features of a face from image and compare that facial feature with a database of faces that have been taken earlier.

#### *HAAR cascade classifiers:*

Haar-like feature is the core basis for Haar classifier object detection. These features uses the change in contrast values between adjacent rectangular groups of pixels rather than using the intensity values of a pixel. Relative light and dark areas can be determined by using the contrast variances between the pixel groups. Haar-like feature is formed from such two or three adjacent groups with a relative contrast variance. These Haar-like features are used for detection of an image [3]. By increasing or decreasing the size of the pixel group being examined, Haar features can be easily scaled. Thus, detection of objects of various sizes can be done by using Haar-like features.

#### *Integral Image:*

Integral image is nothing but the simple rectangular features of an image which is calculated using an intermediate representation of an image [3]. An array containing the sums of the pixels' intensity values located directly to the left of a pixel and directly above the pixel at location (x, y) inclusive is an Integral image.

### **III. PROPOSED SYSTEM**

Face detection and recognition is the process of determining the identity of any particular person. Here only face will be detected and other objects will be ignored by the camera such as tree, hand, building etc. By detecting face of any person one can get access to the system which is secured by the password. Face detection is the psychological process that helps to locate and attend faces in a visual scene. Research shows that our ability to detect faces is affected by a range of visual properties such as colour and orientation.

We are using facial recognition and detection instead of passwords where face of the user is captured and detected then matched with faces/photos in the database to verify user and to authenticate user for access of the system. During enrolment phase, image of the face of the user is captured and saved in the database.

When user wants to login into the system, the photo of user's face is captured and then compared with the one in the database and if it matches then user is authenticated and authorized to access system. [4]

#### *Features:*

1. Fast & accurate face recognition
2. Reliable matching
3. Extraction of similar facial area
4. Secure access control for sensitive areas.

### **IV. IMPLEMENTATION**

Facial recognition and detection has two types of comparisons:-

**VERIFICATION-** The detected image of an individual is compared with who they say they are and yes or no decision is given by comparing it with database images.

**IDENTIFICATION-** The given individual is compared to all the other individuals in the database and ranked list of matches is presented.

The face recognition and detection technology implementation has the following four stages:

- **Image Acquisition** - Face recognition and detection technology acquires faces from almost any static camera or video system that generates images of sufficient quality and resolution. High-quality enrolment images are essential to eventual verification and identification to define the facial characteristics to be used in all future authentication events.
- **Image Processing-** Images are cropped so that the ovoid facial image remains, and colour images are then converted to black and white to facilitate initial comparisons based on grey scale characteristic and then they are normalized to bring the images to the template.
- **Distinctive characteristic location-** All face recognition and detection systems attempt to match visible facial features with the images in database.
- **Template Creation-** Enrolment templates are normally created from processed facial images and stored in the database.

- Template matching- Match templates is compared against enrolment templates and it acquires series of images and it scores against the enrolment, so that a user attempting 1:1 verification within a facial recognition system may have 10 to 20 match attempts to take place within 1 to 2 seconds.

In face recognition and detection technology, faces are recognized and detected using PCA algorithm which uses Eigen face and eigenvector approach. Firstly, training set consisting of say  $M$  face images with  $N \times N$  which are captured using web cam is created and each face image is converted into face vector having  $N^2 \times 1$  size. Then face vectors are normalized by calculating average face vector, say  $\Psi$  i.e. by calculating unique features in the face vectors and then subtracting the average face vector from each vector. Hence, we get the normalized face vectors as  $\phi_i$ . After this, covariance matrix  $C$  is calculated in order to calculate eigenvector. Here,  $C = A A^T$  where  $A = \{\phi_1, \phi_2, \phi_3 \dots \phi_M\}$  [5].

Now,  $K$  best eigenvector are selected such that  $k < M$  and  $K$  can represent the entire training set. The selected  $K$  eigenvectors should be in the original dimensionality of face vector. Each face image is represented as a linear combination of all  $K$  eigenvectors. Each face from training set is represented as a weighted sum of  $K$  eigenvector and average face vector. A weight vector  $\Omega_i$  which is the Eigen face representation of 'i'th face image is calculated for each face image. This is the weight vector of the input image captured using camera. Then distance between input weight vector and the face vector of each face image in the training set are calculated. If the distance is less than threshold, then person is identified otherwise there will be false matching.

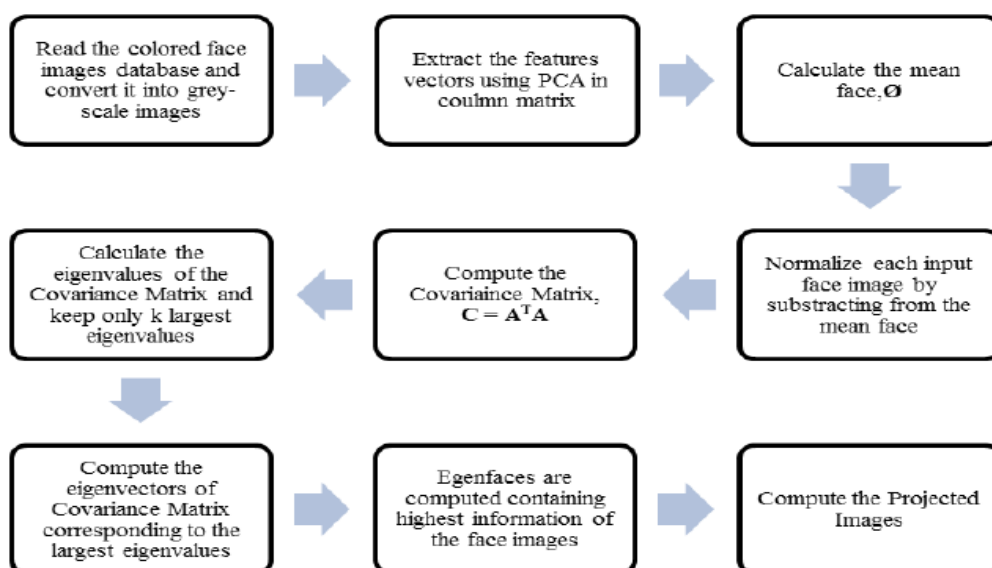


Fig.1 Face detection using PCA

## V. CONCLUSION

The rapidly increasing growth in electronic transactions results in great demand for fast and accurate user authentication. Social networking is becoming important part of life, there are a variety of services on the internet which are integrate their services with social network services. So to provide security for confidential areas, we have different authentication methods but among all of them biometric is very effective method.

To overcome this problem we can use face detection and recognition method. Face is the primary identity of the user and by identifying that we can provide access to the user. It requires high computation to identify any particular user. Once the site has the database of its user then it becomes easy to identify the authentic user. So providing security by using face authentication we can be surer about the privacy.

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