Implementation of Face Recognition based security system using PCA

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Abstract:- *This paper presents face detection and recognition system using PCA (Principal Component Analysis) based technique. First we create a face database in which images as well as extracted features are stored. Then a known picture is given input and the Euclidian distance is observed with respect to the distance of the saved picture. This distance discloses us how close the information picture is from the images that are stored in the database. Based on the maximum and minimum distances we can make a decision of whether the face is a known face or not. Based on that result we display the output as the face is matched or face is unknown that is no match found. If a person is an existing user the system will generate one time password (OTP) and send it to the mobile number of the registered person. If the person enters valid OTP person gets authorization. Once the verification of user credentials is done, the detailed information will be displayed on the screen. Thus two level authorizations are done in proposed face recognition system.*

***Key Words*: Face Recognition, Eigenfaces, Image processing, Face Detection, PCA.**

1. INTRODUCTION

Internet is one of the most important parts of our daily life today. People use internet to get information, share information worldwide. User can share or access any data or information at any time because user can use internet any time. It is very important to keep personal information or confidential information secure from hackers. So authentication is most important at this stage. Traditional password and other authentication methods are used to protect their confidential information. But these techniques provide low security mechanism. This is because face recognition deals with people as its centre of attention, thereby increasing the user-friendliness in human-computer interaction. It could also maintain our privacy and protect our assets without dropping our identity. Automatic personal identification is become popular by using biometrics data instead of using security cards, passwords and pattern recognition.

2. Methodology

The overall system is divided into two modules. One is the training modules and other is the testing modules. The training process consists of the following steps:

i. Real time capturing of face using webcam.
ii. Detection of face
iii. Extract the features
iv. Stored the detected faces into face database

The testing process consists of following steps.

i. Real time capturing of face using webcam
ii. Detection of face
iii. Extract the features
iv. Compare extracted features with features extracted from face database
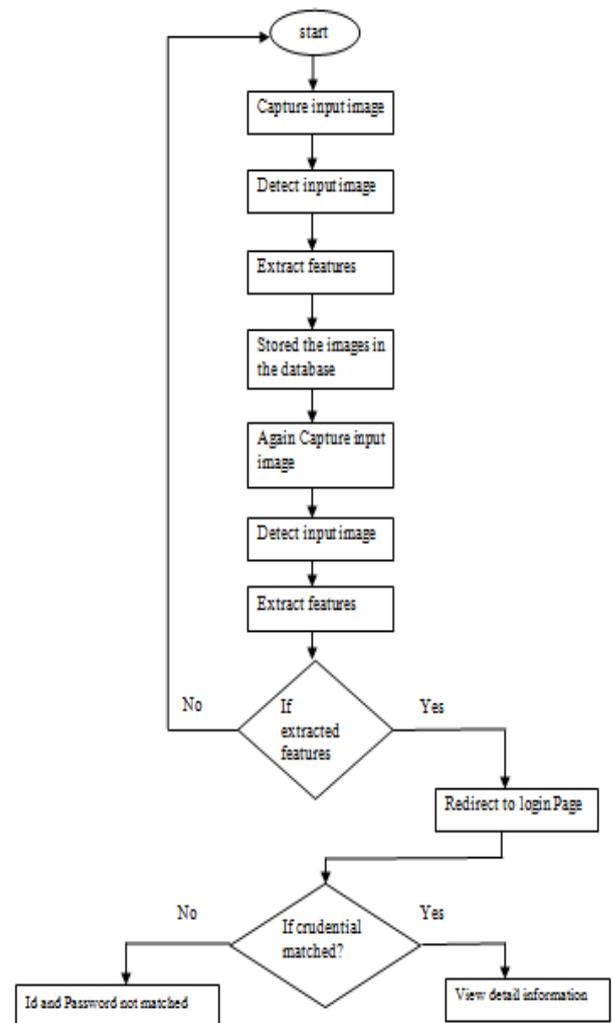
3. Proposed System

Fig -1: Proposed system flow chart

4. Implementation and Results

We have developed a real time face recognition system where we capture images from the web camera in which the user have to stand in front of camera. Captured images are sent to Matlab for detecting and tracking image. Here, the overall system is divided into two modules. One is training module and another is testing module. The steps for training and testing modules are discussed in methodology are described as followings-

a) For the real time based system, first we have designed a home page in Matlab. Here, in this system, for the training purpose images are captured by using webcam where the users have to stand in front of camera. Captured images are detected and cropped along with their bounding boxes and stored it in the database. In our work we store 10 different faces of a single person in the database. After that PCA algorithm is used to calculate the different features from the images for the recognition purpose.

b) Secondly, we have designed a registration page using php where the detected person has to provide their detailed information regarding name, email address, phone number etc. Once the user is authorized he/she can have the privilege to enter into the home page and can view the details. Screenshot of registration page is shown in Fig -2.

c) Thirdly, for the testing purpose, images are again captured by using webcam where the users have to stand in front of camera. After that the captured images are detected, and features are extracted. If the extracted features are matched with the database entities then it will redirect to the login page which has been designed on php as shown in Fig -3.
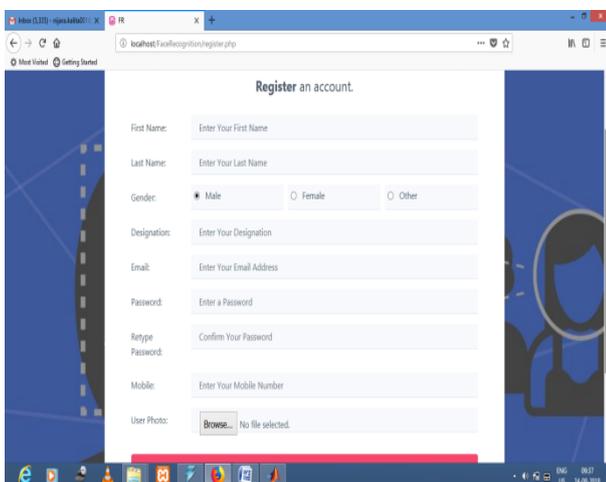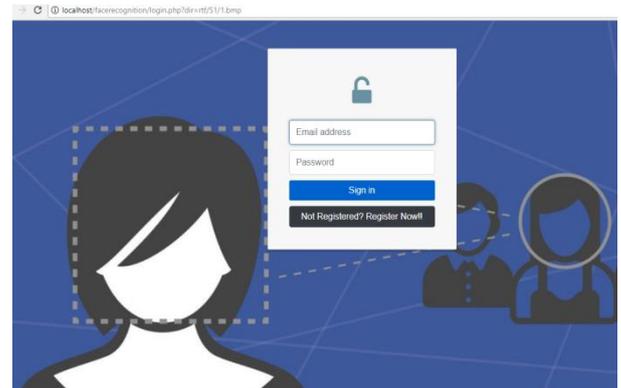

Fig -2: Registration Page

Fig -3: Login Page

Now, the detected person will be able to register into the system with the detailed information. Screenshot of the Registration page is shown earlier. After the completion of the whole registration process, the registered person can directly go to the testing phase. Since his/her face is already registered therefore he/she need not go to the testing phase again. If a person is an existing user the system will generate one time password and send it to the mobile number of the registered person. If the person enters valid OTP person gets authorization. Once the verification of user credentials is done, the detailed information will be displayed as shown in fig below. Thus two level authorizations are done in proposed face recognition system. Screenshot of the registered user is shown in Fig -4.
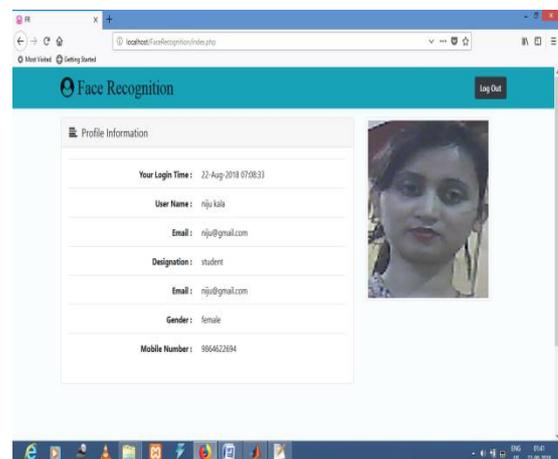
Fig -4: Details of the registered user

3. CONCLUSIONS

This work highlights the main outcome of Face Recognition using PCA and its advantages. This study aims to design, develop and test the Face Recognition system for real time images. All system functionalities are running well and therefore, this study successfully achieved the objectives. There are many other similar algorithm out

there that provide the same functionality as PCA, however, PCA also has its own benefits that can contribute to society. Face recognition systems are going to be used more and more in the future for security reasons because they provide better performance over other security systems. The system successfully recognized the human faces and worked better in different conditions of face orientation.

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