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Comparison of Performance Parameter of Palm Vein using Different Algorithm

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Abstract:
This paper focuses on an algorithm which is best for human recognition system by using palm vein technology. Palm vein technology is a biometric technique in which vein pattern of human palm is used to verify the person. A CCD camera will be used to capture the image of palm. Then process like authentication, verification and recognition will be done. The proposed algorithms are Gabor filter, wavelet transform and PCA. In this paper, we perform the PCA algorithm and calculate it's FAR & FRR and compared it with the standard value of other algorithms.

Key words: Biometric, palm vein pattern, ROI extraction, feature extraction, principal component analysis (PCA), matching.

I. INTRODUCTION

Biometrics is defined as an automated measurement of Physiological and Behavioral characteristics to determine or authenticate identity. Increasing cessity of e-mail, Inrnet resources etc., offers serious security concerns. Biometrics can be defined as recognizing and identifying a person based on physiological or behavioral characteristics. The behavioral characteristics measure the movement of a user, when users walk, speak, type on a keyboard or sign their name, The physiological characteristiucs would be the physical human traits like fingerprints, hand shape, eyes and face, veins, etc. Palm vein technology is one of the upcoming technology. It is the world's first contactless personal identification system that uses the vein patterns in human palms to confirm a person's identity. It is highly secure and accurate. The contactless feature gives it a hygienic advantage over other biometric authentication technologies. Biometric authentication technology which identifies people by their unique biological information. It uses the vascular patterns of an individual's palm as personal identification data. After capturing palm vein images its ROI is extracted and palm vein recognition algorithm is run on ROI extracted images. Many techniques have been used for identification of images and it consists of steps like pre-processing, palm vein pattern extraction and feature extraction. In this paper we are proposing a low cost technique for effective ROI extraction and different methods like PCA matching for verification purpose. PCA (Principal Component Analysis) is a simple non-parametric method of extracting relevant information from confusing data sets. It reduce a complex data set to a lower dimension. Steps involve in PCA are-Read image, Create database into 1D vector, compute mean image vector, compute difference image vector, compute covariance matrix, Eigenvectors of covariance matrix.

II.LITERATURE SYRVEY

Biometrics can be defined as recognizing and identifying a person based on physiological or behavioral characteristics. The behavioral characteristics measure the movement of a user, when users walk, speak, type on a keyboard or sign their name, The physiological characteristics would be the physical human traits like fingerprints, hand shape, eyes and face, veins, etc. It becomes obsolete to beware passwords safely or to remember to all of them. Abuse of stolen id cards and passports will be reduced enormously and stolen credit cards will be prevented. Due to this biometric feature unnecessary costs will be drastically reduced and level of common convenience and safety will grow. Behavioral and physiological biometrics has some disadvantages such as-

1. Voice Recognition:
When processing a person's voice over multiple channels such a microphone and then over a telephone reduces the recognition rate. Physical conditions of the voice, such as those due to sickness, affect the voice verification process. Environment nose reduces the overall accuracy and effectiveness of the recognition.

2. Fingerprint Recognition:
Some people have damaged or eliminated fingerprints. Vulnerable to noise and distortion brought on by dirt and twists. Since users have to touch the sensing device, so it gets damaged on scratches on it.

3. Face Recognition:
2D recognition is affected by changes in lightin, the person's hair, the age and if the person wear glasses. It also depends on orientation/angle of user's face with camera.

4. Iris Scan:
Iris scan is very expensive and intrusive. It requires a lot of memory for the data to be stored. It requires more time for matching with database stored and diddicult to use because of postioning eye.

5. Signature Identification:
Signature of a person may change after a long time, like if an user gone through an accient and he cannot use his hand and then he sign after a long time. his sign and pressure points may change. It has high false rejection rate. On the basis of testing technology on more than 70,000 individuals, Fujitsu declared that the palm vein system had a false rejection rate of 0.01%(i.e., only one out of 10,000 scans were incorrect

denials for access) and a false acceptance rate of less than 0.00008%(i.e., incorrect approval for access in one in over a million scans).If you registered your profile as achild, it'll still be recognized as you grow, as an individual's pattern of veins are established in utero. No two people in the world share a palm vein pattern even those twins will differ.

III.PROPOSED SYSTEM

Palm vein authentication technology consists of a small palm vein scanner that's easy and natural to use, fast and highly accurate. Simply hold your palm a few centimeters over the scanner and within a second it reads your unique vein pattern. A vein picture is taken and palm pattern is registered. The registered palm pattern is stored into the database along with the personal details of the client. No one should place his/her palm near the scanner. The scanner makes use of a special characteristic of the reduced hemoglobin coursing through the palm veins. It absorbs near infrared light. This makes it possible to take a snapshot of what's beneath the outer skin, something very hard to read or steal. The integrated optical system in the palm vein sensor uses this phenomenon to generatye an image of the palm vein pattern and the generated image is digitized, encrypted and finally stored as a registered template in the database.

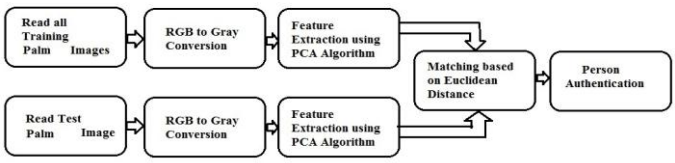

Fig.1. Palm vein authentication using Principal Component Analysis

Following are the stages of the palm vein verification system. Each stage in
Figure.1.is described in detail

1. Image Acquisition Stage (Read the Images in Training and Testing Phase):

The process of selecting the image and giving to the system as input is called image acquisition. Palm image can be captured by a camera or it can be scanned by a scanner. Camera uses Megapixels (MP) format and scanner uses Dots per inches (DPI) format and so scanning the palm image by using a scanner will give more accurate results. The scanner helps to digitize, analyze and process an image. The output of a scanner is an uncompressed image. The scanner has to be placed in a proper environment with computer connectivity.
Webcam is used for capturing the image of the bank cheque. The captured image is then stored in the personal computer.
For further analysis purpose the image is need to be enhanced and the region of interest is to be cropped. This can be done in the preprocessing stage.

2. Image Pre-Processing:

Preprocessing is done to enhance the quality of the scanned palm image. The acquired image is converted to binary image, where the image is represented just in two pixel values, black and white pixels of 0's and 1's.

2.1. RGB to Gray conversion:

The image of a palm, captured by camera is a colored image. This means that the image is in RGB format. For palm image verification purpose we first need to convert the image into gray-scale. Thus we convert the image into grey image. This means that the whole image is now represented in 256 pixel values. Here 0 represents a black pixel while 255 represent a white pixel value. This conversion can be done using MATLAB software. In MATLAB, a command "rgb2gray" is used for this conversion. After we get the gray-scale image we need to crop the region of our interest.

2.2. Region of Interest:

Instead of keeping the whole data for verification purpose, we can only keep the palm image as well as the name of the person for the verification purpose. This way we can reduce the overhead of storing the whole image in the database. For cropping again MATLAB can be used. Here a command "imcrop" can be used for manual cropping. We also need to specify the pixel values from where we need to start cropping and also give the height and width of the image. Using command "imtool" in MATLAB we get the pixel information of the whole image.

2.3 Binarisation:

Binarisation means to convert the gray-scale image into only two pixel format. The whole image thus gets converted into 2 bin value. This is very essential for further processing of verification. MATLAB uses direct commands for conversion of an image to binary image.

3. Feature Extraction using PCA:

Feature extraction is used to extract the features of the image of palm image. These features are stored in the database in the beginning. Later on they are also used for verification purpose. The verification is done simply by matching the stored features in the database with the ones extracted while processing. For feature extraction PCA is used. PCA is a principal component analysis method generally used to extract features and also minimize the size of features. PCA is one of the simplest ways of feature extraction. Using PCA reduces the complexity of the overall system retaining the accuracy of the system.

4. Palm image Recognition and Person Authentication:

In the database, the entire customers' palm images along with their particulars are stored. Whenever a new image comes in for verification, the test image is first preprocessed. Then the image is sent for feature extraction. After the features are extracted, these features are matched with the ones stored in database. If a match occurs, the following customers' particulars are displayed on the GUI. These are the main steps used in the palm image recognition systems. Using all these steps we can successfully implement a palm image verification system.

IV.RESULT

Following are the results that are obtained from the system.

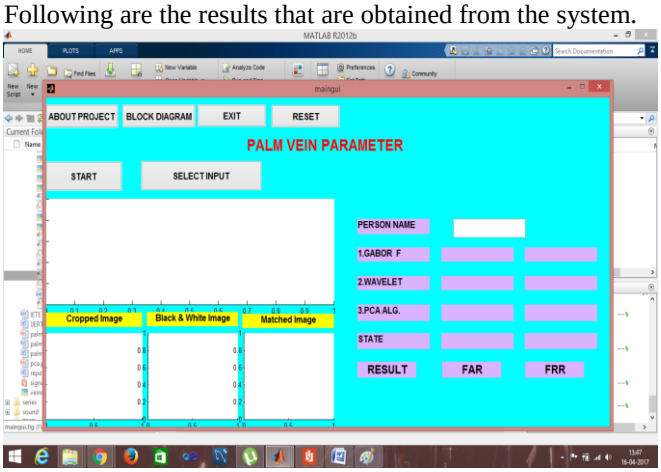

Figure 2. GUI of the System

Graphical user interface is prepared for the system. GUI is prepared using the MATLAB software. This GUI can be used to efficiently display the customer data on the screen. The GUI is shown in Fig.2. Also, the GUI also consists of the button to display the information about the project. This snapshot is shown in Fig. 3.

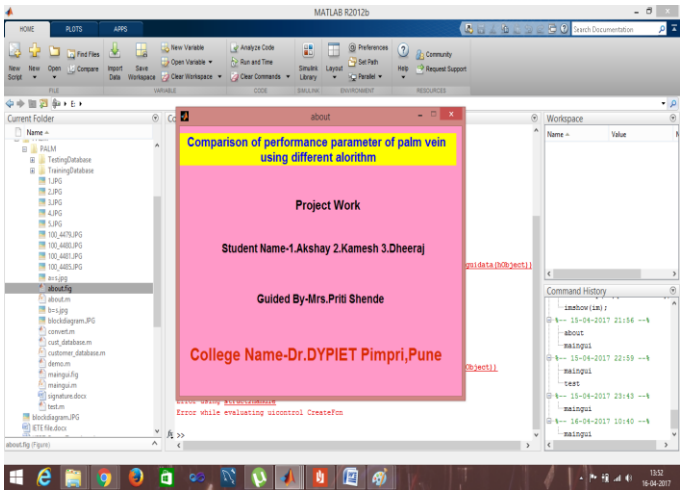

Figure.3. GUI Displaying Information about Project

GUI also comprises of two buttons to reset the chosen cheque image and reset all the chosen images and to start new. There is also an Exit button to exit the GUI.

These pushbuttons on the GUI have callback functions which are called upon a mouse click. Whenever we click on exit pushbutton, an event is generated to exit the GUI. This way using the GUI, it brings the user closer to the programming environment and also keeps him away from the programming overheads. GUI has start button to start the DC motor and draw the cheque inside the box for capturing the image of the cheque. After selecting cheque scan copy we can take the snapshot of cheque using the webcam. After the test image is captured, its feature vectors are calculated and the matched with the feature vectors of the training set. If the match occurs, the corresponding particulars of the customer are displayed on the GUI. The matched signature is shown in Fig.4. and Fig.5.

Figure.4. GUI displaying a perfect match

V.CONCLUSION

Verification system is very essential in every field. It can be used to avoid frauds in the system and thus can be used to curb heavy monetary losses. PCA is used for the purpose of feature extraction. This reduces the complexity of the overall system is reduced. PCA is a very simple method and is very much useful in feature analysis. Thus using this method, effectively features are calculated and the corresponding match can be obtained. The matched palm is displayed on the GUI along with the test palm. Also the customer with whom the palm has matched his data is also displayed on the GUI. This way analysis of the obtained results can be easily done from the GUI.

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