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FINGERPRINT RECOGNITION FOR DIFFERENT ORIENTATION

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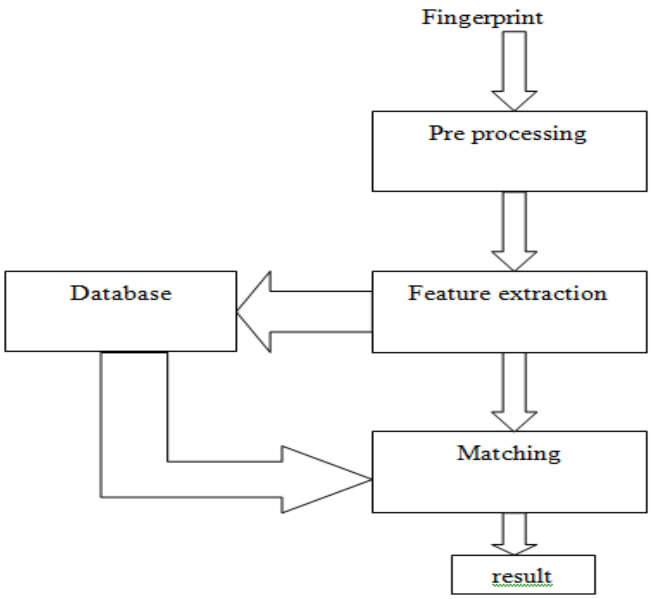
ABSTRACT

Fingerprint recognition is one of the techniques used for identification purpose. Most of systems uses this technique for security or to identify authorized person which uses feature extraction as the important step. Simply for different orientation of fingerprint DWT is used here. Original image is cropped and resized first and then DWT is applied to extract feature for different orientation of same data such as for 0°,45°,90°,etc.

Keywords: Fingerprint, DWT ,Euclidean distance.

I. INTRODUCTION

Biometric system uses different characteristics for recognition purpose such as fingerprint , palm ,retina etc. There are number of traditional methods for identification such as password ,tokens ,smart cards but they have some disadvantages like it is difficult to remember password, the token or smart card maybe misplaced or can be used by unauthorized persons .Instead of that we can use biometric system. Again there are various characteristics out of that fingerprint is the simplest one to detect core point and cost of system will be low as compared to other. Fingerprint is unique for every one even in twins. Fingerprint contains ridges and valleys. Fingerprint contain different features such as global or local that mean minutiae (ridge ending ,ridge bifurcations etc.)



Fingerprint contains ridges and valleys. Fingerprint contain The system will extract the feature and match with database of different orientation fingerprints. different features such as global or local that mean minutiae (ridge ending,ridge bifurcations etc.)The system will extract the feature and match with database.

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In this paper we work on orientation, that means we have to extract features for different rotation and find out Euclidean distance to get final result.

II. RELATED WORK

A lot of work has been done to identify fingerprint for orientation as well as for low quality images also. Input image may be original or it may be rotated in different angle so we have to recognize this image with the help of basic steps such as pre processing ,feature extraction, matching with database. We can use FFT or Gabor filter or combination of them for verification of fingerprint image. Where the DWT is proposed to identify dark images or inked images.

III. PROPOSED APPROACH

A. Pre processing

Input image contain noise. So image enhancement is necessary to reduce noise & to get original image .Sometimes fingerprint may contains cuts ,dry, wet, dirt so image enhancement is the first step to get clear image. To obtain Region of Interest(ROI) by applying segmentation on grey scale image.

B. Feature extraction

To determine features from the raw signal by the use of digital processing techniques .If image size is large and reduced feature extraction is required then this approach is used .This feature extraction is used for image matching, object detection, texture classification for quick response.

Algorithm for texture analysis and feature extraction with DWT:

1. Obtain grey level image from the scanner. Or inked image scan and convert into grey scale.
2. Apply a 2 level discrete wavelet transform decomposition on grey scale image
3. For each level wavelet transform decompose the given image into three directional components, i.e., horizontal, diagonal and vertical detail sub bands in the direction of 0, 45 and 135 respectively apart from the smooth sub band. For the second level LL sub-image.

   Now compute the following three features

i. Standard deviation: This is the deviation of the image which gives a measure of the amount of detail in that sub band.

ii. Kurtosis: It measures the peaked ness or flatness of the distribution and is given by

$$k = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{x_i - \mu}{\sigma}\right)^4$$

where μ is the sample mean of the *N* pixels within the image and σ is standard deviation

iii. Skewness: Skewness is a measure of the asymmetry of the data around the sample mean

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$$g_1 = \frac{m_3}{m_2^{3/2}} = \frac{\frac{1}{n}\sum_{i=1}^{n}(x_i - \overline{x})^3}{\left(\frac{1}{n}\sum_{i=1}^{n}(x_i - \overline{x})^2\right)^{3/2}},$$

where, **X**i is the ith value, is the sample mean, m3 is the sample third central moment, and m2 is the sample variance. Given samples from a population, the equation for the sample skew ness g1 above is a biased estimator of the population skewness. A distribution that is skewed to the left(the tail of the distribution is heavier on the right)will have a negative skewness. A distribution that is skewed to the right(the tail of the distribution is heavier on the left), will have a positive skewness.

4. Now these three features for original image are computed.. so length of the feature vector is (3*10) + original image = 93

C) Matching:

This is the last step of proposed system that is matching .In this process calculated features are compared with database .If it crosses the threshold level it mean that the person is authorized and for that purpose here we uses Euclidean distance. It will verify the test image with the database images using following equation.

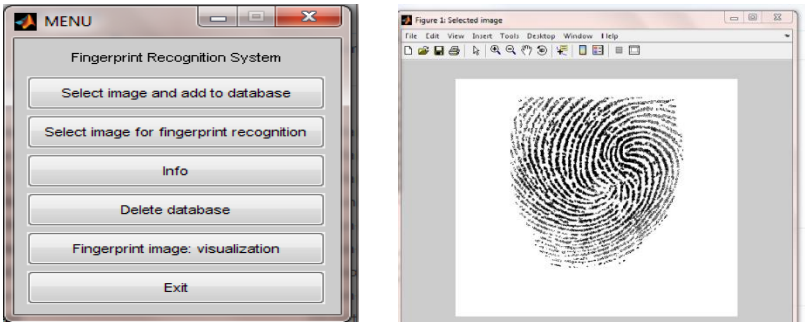
If N is the number of features in feature set *f*, *fj* (*x*) is the *j*th texture feature of the test sample X and *fj* (*k*) is the *j*th texture feature of *k*th texture class in the database, then the Euclidean is described as below:

Euclidean

$$d_E(k) = \sqrt{\sum_{j=1}^{N}\left[f_j(x) - f_j(k)\right]^2}$$

IV.EXPERIMENTAL RESULTS

This approach is very simple and it contains input images of different persons with orientations. With the help of DWT algorithms features are extracted and minutia are find for various images. Then extracted features are compared with database by using Euclidean distance. It will recognize the authorized person. The results are shown below:



a)Select image and add to database

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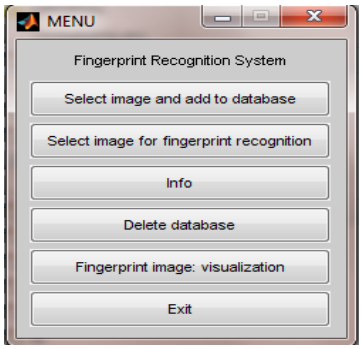

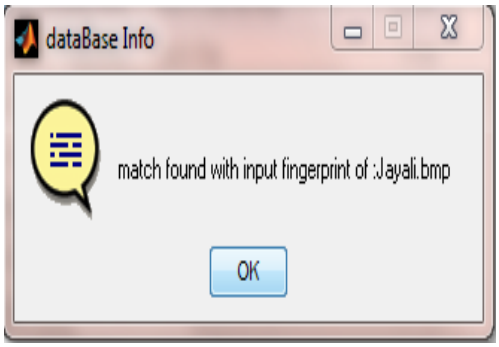

b)Match found with input fingerprint

V.CONCLUSION

It is found that performance of system increased and it is more effective when we increases the number of images. For each feature average value is calculated and compared with database to find authorized person. matching process is done with Euclidean distance. If extracted feature matched with database then person is authorized otherwise invalid.

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