Palm Print Matching Based on Directional and Texture Features

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***Abstract*—In this paper, the author propose palm print recognition algorithm of human being based on radon transform. We propose a general framework for Directional and Texture Features. Firstly we use canny edge detection on taken image. Normally palm prints are recognized by changes in ridges, singular points, minutiae and bifurcation etc. For palm print recognition we use radon transform which is little bit different than other techniques. The proposed algorithm gives us good feature vector of palm print images.**

***Keywords*—Radon Transform, Palm print images, Feature vector**

I. INTRODUCTION

- **What is Biometric?**

  Biometric verification means a person can be uniquely identified by evaluating one or more distinguishing biological character. Fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA, and signatures include unique identifiers. Fingerprinting is the oldest form of biometric verification. In some bank automatic machines are used for Iris- pattern and retina pattern authentication. Facial-recognition technology has been used by law enforcement to pick out individuals in large crowds with considerable reliability. Hand geometry is being used in industry to provide physical access to buildings. Signature comparison is not as safe, all by itself, as the other biometric verification methods but offers an extra layer of verification when used in conjunction with one or more other methods.

  Palm Print recognition is a biometric authentication method based on the unique patterns of various characteristics in the palms of people's hand. Palm Prints and fingerprints are often used together to enhance the accuracy of identification. A handprint, by virtue of covering more skin area, includes more identifying details. In criminal investigations, a full or partial Palm Print may sometimes be obtained when fingerprints are absent.

- **What is Palm Print recognition?**

  Palm Print recognition techniques divided into two parts, low-resolution and high resolution. In low-resolution images, only principal lines, wrinkles, and texture are extracted and in high resolution images, where in addition to principal lines and wrinkles, more discriminant features like ridges, singular points, and minutiae can be extracted. Palm Print can be used for criminal, forensic, or commercial applications.

- **Why Palm Print recognition?**

  The palm print consist principal lines and wrinkles. When we are comparing two palm prints at that time it also contains other information such as texture, indents and marks. Palm print recognition is used in personal identification as it works well in most cases. Also it can be used for criminal, forensic, or commercial applications. If thief's hand gloves slipping during the crime at that time investigator find palm print for solving their case. Many physiological characteristics of humans, i.e. biometrics, are typically time invariant, easy to acquire, and unique for every individual. Biometric features such as face, iris, fingerprint, hand geometry, palm print, signature, etc.

  Palm print recognition methods have been proposed, which can be roughly divided into categories such as texture-based, line-based, subspace learning-based, correlation filter-based, local descriptor-based, and orientation coding-based.

II. SYSTEM DESCRIPTION AND METHODOLOGY

a. Basic of palm print

Scanning device or a camera-based application these two systems are used for palm print recognition. In these systems already image data is stored and then by camera we take a photograph of an individual palm and compares with the stored record for that person. Palm

prints are counterparts to fingerprints, including similar details.

Advantage of palm print-

Compared with the fingerprints, the palm print is much larger and by using these palm prints we can capture more distinctive features as compared to fingerprints. So that, this palm print recognition is more suitable in identification systems than fingerprints.

Disadvantage of palm print-

The palm print scanners are usually large and expensive since they need to capture a large area than the fingerprint scanners.

b. Proposed Methodology

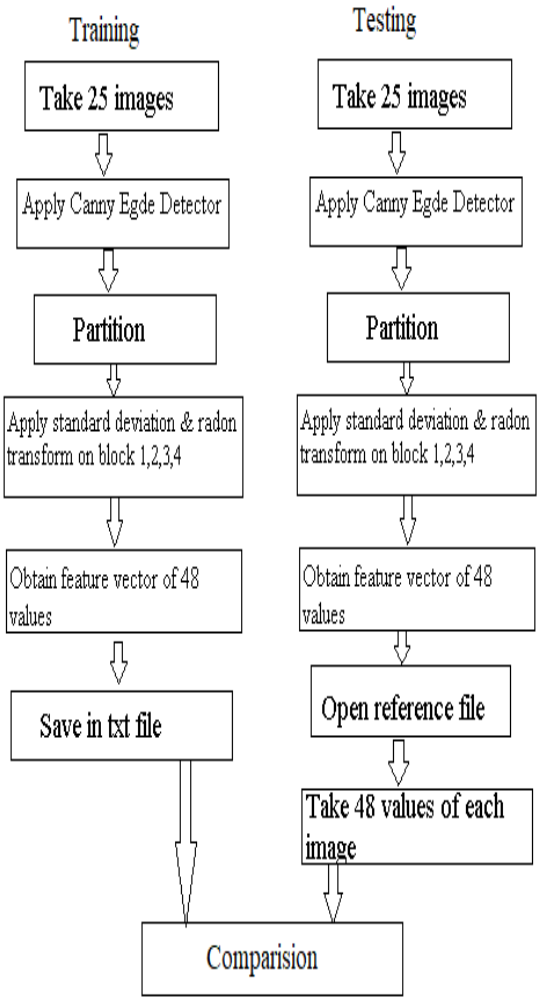

Fig.1 Proposed Methodology

c. Process of palm print recognition.

1. Select randomly 25 training palm print images.
2. Select other 25 palm print images for testing.
3. Compare train images feature vectors and test images feature vectors.

1. Select randomly 25 palm print images.

In first part for palm print recognition system is to select randomly 25 training palm print images. Then we use the canny edge detection on these 25 training images to getting clear image for matching. After that these images are dividing into four parts as shown below and apply radon transform on each block. Then calculate standard deviation.

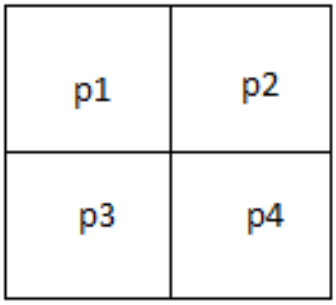

Fig.2 Parts of image

After partition we apply radon transform. Radon transform is applying with 30-30 degree on each block and then calculate standard deviation of each block. We obtain feature vector of 48 values of each image. This feature vector saves in txt file.

2. Select 25 reference images for better feature vector.

In second part for palm print recognition select 25 test images. Then we use the canny edge detection on these 25 test images for getting clear image for matching. After that these images are dividing into four parts and apply radon transform and then calculate standard deviation of each block. We obtain feature vector of 48 values of each image.

3. Compare training images feature vectors and test images feature vectors.

From testing image feature vector of first image is compare with feature vector of all training images.
When feature vector of first testing image is compare with feature vector of first training image and if both feature vectors are not match then the feature vector of first testing image is goes to feature vector of second training image and this matching procedure goes up to 25 training images.

At one stage feature vector of first test image is exactly match with feature vector of any training image and that point this matching process will stop, then it will take second testing image for matching with training images.

II. RESULTS AND DISCUSSION

The proposed method is implemented on MATLAB (R2013a) with different test images from standard database. The training image shown in fig.2 is considered as an input to proposed method.

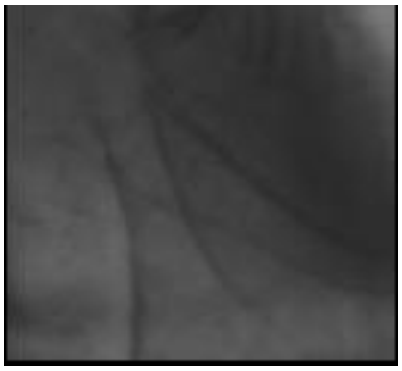

Fig.3 Train image

On this image we use canny edge detection. By using canny edge detection we are getting one image in which, lines of palm prints are highlighted and this is as shown in fig.4. Means simply we get binary image.

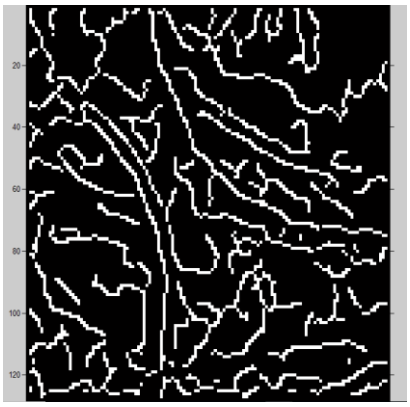

Fig.4 Apply Canny Edge Detection on image

This image is equally divided into four parts each is shown in fig.5 Radon transform is applied to each block of their division.

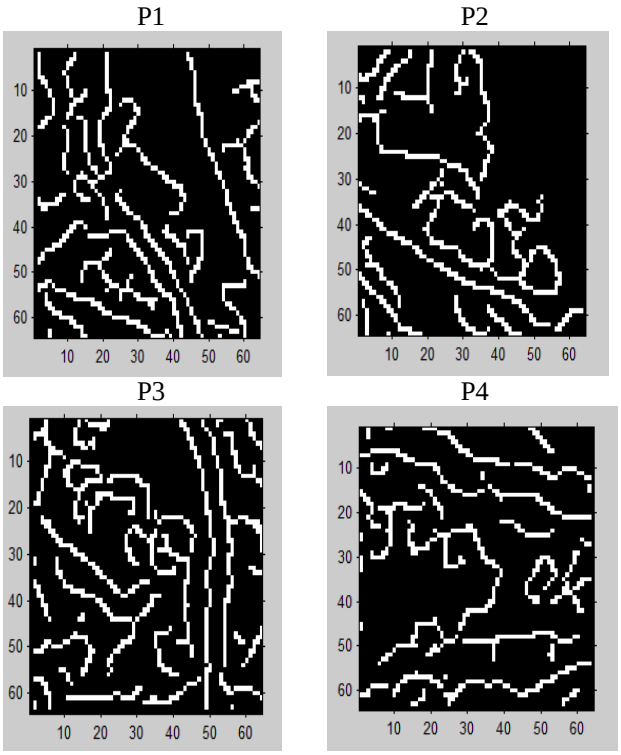

Fig.5 Division of Train image

After division of binary image we apply radon transform on each block of image and then we calculate the standard deviation of each block and save in .txt file. Values of standard deviation of each part are our feature vector.

Fig.6 Test image

Now, secondly we select test image, apply similar process for feature detection. Now here first image features are compared with train image feature vector. For getting train image feature vector we open saved text file where we save feature vector of training image.

In comparison process we calculate Euclidean distance and find out minimum error between train image and test image.

While comparing 25 train images with 25 test images we get aggregate of 96 percent and 24 images are matched.

Table.1 Comparison table

Test images	Train images
p-1-3	p-1-1
P-2-2	p-2-1
p-3-3	P-3-1
p-4-2	p-4-1
p-5-2	p-5-1
p-6-3	p-6-1
p-7-3	p-7-1
p-8-3	p-8-1
p-9-3	p-9-1
p-10-2	p-10-1
p-11-2	p-11-1
p-12-2	p-12-1
p-13-3	p-13-1
p-14-3	p-14-1
p-15-3	p-15-1
p-16-2	p-16-1
p-17-3	p-17-1
p-18-2	p-18-1
p-19-2	p-19-1
p-20-3	p-20-1
p-21-2	p-21-1
p-22-3	p-22-1
p-23-3	p-23-1
p-24-2	p-24-1
p-25-2	p-25-1

III. CONCLUSION

Here we explore palm print recognition system for that we use canny edge detection and radon transforms. The canny edge detection is used for getting binary image of the palm print. Radon transform detect the space between two lines of palm print. For calculating deviation of line we use standard deviation. So that we are getting good feature vector of palm print and this feature vector is useful for matching.

IV. REFERENCES

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