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TECHNIQUE FOR PERSON IDENTIFICATION BY USING PALM PRINT METHOD

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Abstract:
Palm print is a special and solid biometric trademark with high convenience. With the expanding interest of highly exact and strong palm print confirmation framework, multispectral imaging has been utilized to acquire more discriminative data and increment the anti-spoofing ability of palm print. The proposed work has utilize PolyU palm print Database. Palm print images were gathered from 250 volunteers, including 195 males and 55 females. Work extracting palm print includes by utilizing stockwel technique.
Keywords- Biometric, Palm-print, Stockwell transform.

I. INTRODUCTION

Biometric is the automated use of physiological or behavioral characteristics to determine or verify and identify a person. A palm print refers to an image acquired of the palm region of the hand. It can be either an online image or offline image where the image is taken with ink and paper . The palm itself comprises of principal lines, wrinkles and epidermal edges. It contains information, for example, texture, indents and marks which can be utilized to recognize the individual person.

This paper is organized as follows: Section II presents Related Work. Section III summarizes architecture of Proposed Work. Section IV Experimental Results V. as Evaluation of results. VI.Acknowledgment finally, we summarize in Section VII. Conlcusion.

II. RELATED WORKS

Papers from renowned journals are referred to understand the related work in this domain. Summary of related work is discussed below**.**

In previous work, Chin [3]. Displayed palm-print based ID framework including image thresholding, border, tracing, wavelet-based division and ROI location steps are performed to get square locale in palm table which is called Roi. Features are separated from ROI area. The WT [7] is good at extracting information from both time and frequency domains. However, the WT is sensitive to noise.

Han. [4], propose two hand-based features:-1.Hand Geometry.2.Palmprint.This two features are combine together to reduce False Acceptance Rate (FAR).Proposed system was build using Wavelet-based hand segmentation.

Gupta. [1], proposes technique to extract palm-print features based on instantaneous-phase difference obtained using Stockwell transform of overlapping circular-strips. The S transform [2] is a frequency dependent resolution of time-frequency domain and it is entirely referred to local phase information.

III. PROPOSED SYSTEM

3.1. IMAGE ACQUISITION

The Proposed System use PolyU database of Palm Print images [8].

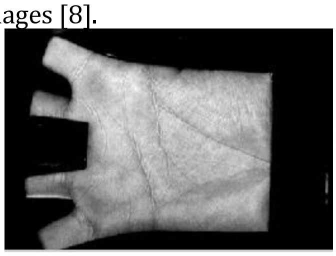

Fig3. Image of Palm-Print [8]

3.2. PREPROCESSING OF HAND IMAGE

The palm print image from the database is first preprocessing to make it ready to read and extract any features from the palm image. First remove the noise from the image by using morphological operations [9].It remove any isolated small blobs or holes on image.

3.2.1 EROSION

Let E be a Euclidean space or an integer grid, and A binary image in E. The erosion of the binary image A by the structuring element B is defined by [9]:

$$A \,\theta\, B = \{Z \,\varepsilon\, E \mid (B)_z \subseteq A\}$$

When the structuring element B has a center (e.g., a disk or a square), and this center is located on the origin of E, then the erosion of A by B can be understood as the focus of points reached by the center of B when B moves inside A.

3.2.2DILATION

Dilation of image A and structuring element B [10].

$$A \oplus B = \{z \mid (B)_z \cap A \neq \phi\}$$

The set of all points z such that the intersection of (B) z with A is nonempty.
The equation is based on reflecting B about its origin and shifting this reflection by z [9].

3.2.3 OPENING

Erosion followed by dilation (U: union of all the sets inside the braces). It smoothes the contour, breaks narrow isthmuses, and eliminates thin Protrusions. The opening of image f by structuring element b, denoted by [9],

$$f \circ b = (f \ominus b) \oplus b$$

Opening is simple the erosion of f by b, followed by a dilation of the result b [5].

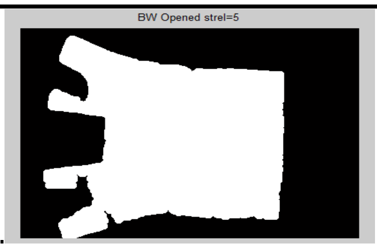

Fig.5 Palm Print Image

3.2.4. CLOSING

Dilation followed by erosion. Smoothes the contour, fuses narrow breaks and long thin gulfs, and eliminates small holes. The closing of f by b, denoted by [9],

$$F \cdot b = (f \oplus b) \ominus b$$

Closing is dilation of f by b, followed by erosion of the result b.

Figure.6: Palm Print Image

3.2.5 EXTRACT PALM PRINT IMAGE

After completing initial preprocessing on palm-print, now we extract the palm print from the whole image. For extracting the palm from image, we draw a rectangle of the palm print size. For that we calculate height and width of palm print. Then draw rectangle on palm and extract the area of palm print from image.

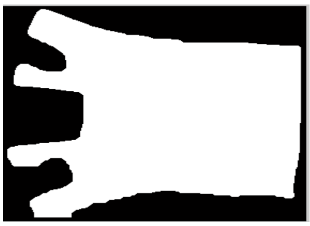

Figure: 8 Palm Print Image

3.2.6 EDGE DETECTION

From extracted palm print image find edge of image. Apply 'Canny' edge detection to find edge of palm print. An edge in an image may point in a variety of directions, so the canny algorithm uses four filters to detect horizontal, vertical and diagonal edges in the blurred image. The edge detection operator returns a value for the first derivative in the horizontal direction (G_x) and the vertical direction (G_y). From this the edge gradient and direction can be determined [11]:

$$G = \sqrt{Gx^2 + Gy^2}$$

It is obvious from above Figure, that an image of the gradient magnitudes often indicate the edges quite clearly. However, the edges are typically broad and thus do not indicate exactly where the edges are. To make it possible to determine this, the direction of the edges must be determined and stored as-

$$\theta = \arctan(|Gy| / |G|)$$

3.2.7 EXTRACT PALM

After finding edge of the palm-print,draw the maximum possible circle in this edge of palm print. Find the x,y co-ordinate that is center of the circle.

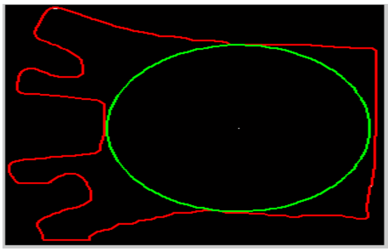

Figure: 10 Max Circle in Palm Print

Using center of circle draw the rectangle from palm print. Finally we extracted palm from plam print image.

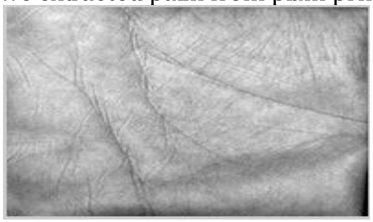

Figure: 11. Extracted Palm

3.3 FEATURES EXTRACTION

To filter the image apply median filter to extracted palm.

Figure: 18 Extracted Palm with Median Filter Applied

The maximum circle is averaged across its radial direction to obtain 1D-intensity signal Avg as [1]:

$Avg(\theta) = \square\, I(X_p, yp), 0^0 \,\square\, \theta \le 360^0$

$X_p = x_c + r \times \cos(\theta)$

$Yp = y_c + r \times \sin(\theta)$

Where x_c and y_c are co-ordinates of the centers of circle. I is palm-print image. θ is angle of radial direction. It is fluctuated consistently from 0^0 to 360^o at intervals of $360^o/p$. is the amount of radial direction. Thus we get 1D-intensity signal Avg = (Avg1, Avg2... Avgp) is of length P. The obtained 1D-intensity signal Avg(P) is subjected to Stockwell Transform.

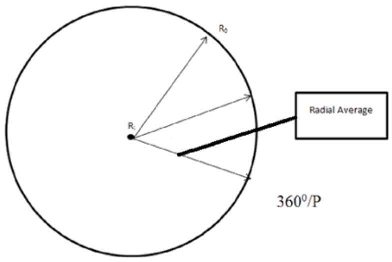

Figure: 19 Maximum Circle.

The generalized ST $S(\tau, f)$ Of time varying 1D-signal x (t) is defined as [1]:-

$$S(\tau,f)=\int_{-\infty}^{\infty} x(t)\frac{|f|}{\sqrt{2\pi}}e^{-((\tau-t)^2f^2)/2}e^{-i2\pi ft}\,dt$$

τ

Where both t represent time and f is the frequency.

The ST $S(\tau,f)$ of the signal x (t) can be represented in amplitude and phase form as [1]:

$$S(\tau,f)=A_x(\tau,f)e^{i\phi_x(\tau,f)}$$

Where $A_x(\tau,f)$ is the amplitude at time step □ for frequency f defined as [1]:

A_x(□ , f) = abs(S (□ , f))

X=real(S (□ , f))

The real features(x) of Stockwell transform forms a feature vector of palm-print. Save the feature vector of images in database.

3.4. MATCHING

Support Vector Machine (SVM)

As with any supervised learning model, first train a support vector machine, then use the trained machine to classify (predict) new data. In addition, to obtain satisfactory predictive accuracy, use various SVM kernel functions, and tune the parameters of the kernel functions.

IV.Experimental Results

4.1 Datasets

PolyU:-

Multispectral Palmprint images were collected from volunteers, at the age distribution id from 20 to 60 years old. The samples are collected in two separate sessons.In each session, the subject was asked to provide 5 images for each palm. Therefore, 20 images of each illumination from 2 palms were collected from each subject. The average time interval between the first and the second session was about 9 days [8].

4.2 Performance Evaluation

To evaluate the performance, we calculate Accuracy, Sensitivity, Specification, and Precision.

The system is evaluated on number of images database varies between different database set. On this different database set, we vary different radial angle to extract the features from palm. This variation of different dataset and different radial angle is evaluating the performance of Accuracy, Sensitivity, Specificity, and Precision. Results are presented in different Tables.

1. The system is evaluated on different dataset of 50,100,300 images. The features are extracted by using radial angle 10.

10-deg	50	100	300
Accuracy	97.8	98.5238	99.3725
Sensitivity	88	77	76.5
Specificity	98.8889	99.6	99.86
Precision	89.7959	90.5882	91.6167

Table.2 Variation in accuracy, sensitivity, specification and precision for different dataset with constant radial angle.

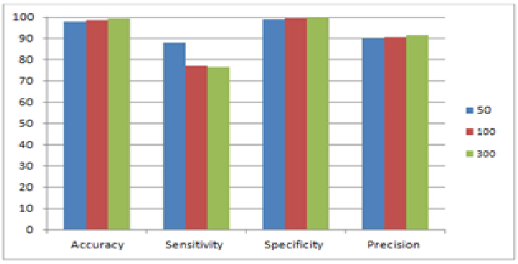

Fig.31 Variation in accuracy, sensitivity, specification and precision for different dataset with constant radial angle.

2. The system is evaluated on dataset of 50 images. The features are extracted by using different radial angle of 10, 50, and 70.

50db	10	50	70
Accuracy	97.8	93.5543	92.18
Sensitivity	88	60.4651	54
Specificity	98.8889	96.4	96
Precision	89.7959	59.0909	57.44

Table 3 Variation in accuracy, sensitivity, specification and precision for different radial angle of 50 image dataset.

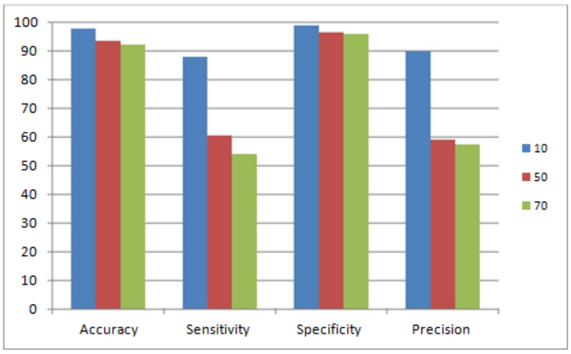

Fig 32 Variation in accuracy, sensitivity, specification and precision for different radial angle of 50 image dataset.

3. The system is evaluated on dataset of 100 images. The features are extracted by using different radial angle of 10, 50, and 70.

100db	10	50	70
Accuracy	98.5238	94.0952	93.3334
Sensitivity	77	39	29
Specificity	99.6	96.85	96.55
Precision	90.5882	38.2352	29.5918

Table 4 Variation in accuracy, sensitivity, specification and precision for different radial angle of 100 image dataset.

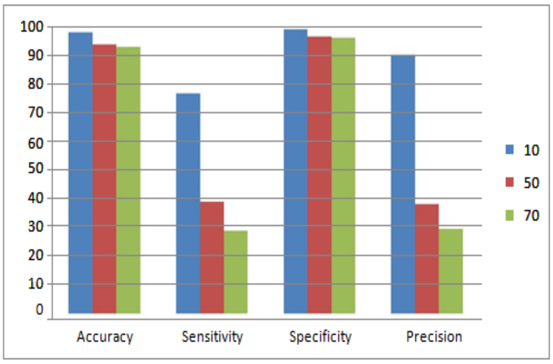

Fig 33 Variation in accuracy, sensitivity, specification and precision for different radial angle of 100 image dataset.

4. The system is evaluated on dataset of 300 images. The features are extracted by using different radial angle of 10, 50, and 70.

300db	10	50	70
Accuracy	99.3725	97.7637	96.4982
Sensitivity	76.5	16	9.7435
Specificity	99.86	98.3795	98.19
Precision	91.6167	16.4948	9.5

Table 5 Variation in accuracy, sensitivity, specification and precision for different radial angle of 300 image dataset.

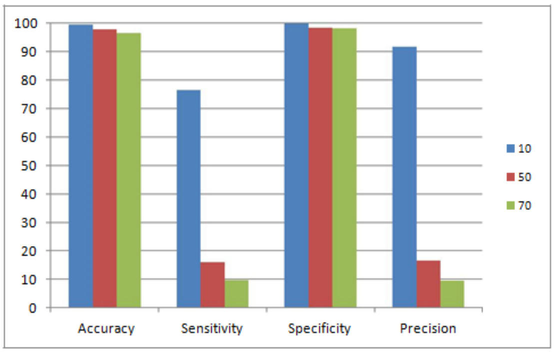

Fig. 34 Variation in accuracy, sensitivity, specification and precision for different radial angle of 300 image dataset.

5. The system is evaluated for processing time on different dataset of 50,100,300 images. The features are extracted by using radial angle 10.

10deg	50	100	300
Get Features Vector	9.4718	20.3574	60.9573
Train SVM	0.1476	0.5756	13.754
Train IMG	10.0871	20.1096	64.1342
Test IMG	10.1103	21.5565	44.3426

Table 6 Timing evaluation on different dataset with constant radial angle.

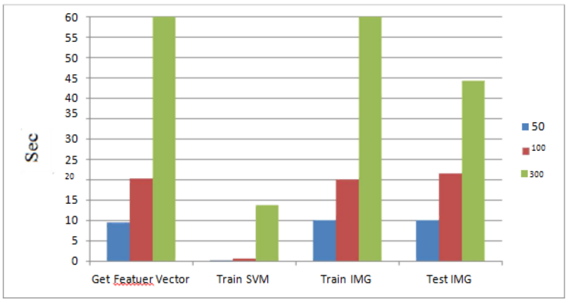

Fig 35Timing evaluation on different dataset with constant radial angle.

V.Result Analysis

The experimental results on different number of images in dataset and different radial angle on this dataset are evaluated. The system is evaluated on PolyU dataset. From which minimum we use 50 images in a dataset. Large dataset contain 300 images in dataset. The experimental result is shown in above table 2, 3, 4, 5, 6, 7.The table2 shows the system evaluated on different dataset of 50,100,300 images with 10 degree angle constant. We find high accuracy of image identification for 300 image dataset.

Different three dataset (50,100,300) is evaluated for different radial angle as 10, 50, 70.We find high accuracy for less radial angle than higher.

The system is also evaluated timing on different datasets of 50,100,300 images with radial angle 10, 50, 70.As we can see in table6,the time require for processing 300 image dataset is much more than dataset of 100,50 images. Same we evaluated for different angle. As we can see in tanle7 time require for less angle is higher than grater angle.

By using support vector machine, time requires to train and test the dataset is less. Also to identify palm print with high accuracy is possible.

VI. ACKNOWLEDGMENT

We are sincerely thankful to PolyU, for providing database of Palm-print for our research work

VII. CONLCUSION.

In this paper, the system has been proposed for user identification based on unique biological feature. The system provides high level of security to the users. The system achieves the authentication with minimal Time. The system has high accuracy of 99 % and precision 91% to recognize the palm print. The system has high sensitivity 76 % and specificity 99 % to recognize the palm print.

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