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A Novel Approach for Palmprint Recognition Using Neighboring Direction Indicator

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ABSTRACT

Multibiometrics can provide higher identification accuracy than single biometrics, so it is more suitable for some real-world personal identification applications that need high-standard security. Among various biometrics technologies, palm print identification has received much attention because of its good performance. Combining the left and right palmprint images to perform multibiometrics is easy to implement and can obtain better results. However, previous studies did not explore this issue in depth. In this Process, we proposed a novel framework to perform multibiometrics by comprehensively combining the left and right palmprint images. This framework integrated three kinds of scores generated from the left and right palmprintimages to perform matching score-level fusion.The experiment is carried out by using MATLAB software image processing toolbox.

Keywords:—*Palm print recognition, matlab, biometric, PolyU-Palmprint-Database, Palm print recognition*

I. INTRODUCTION

Biometric systems are widely used in access control and security-based applications. The goal of the biometric system is to utilize physical and/or behavior characteristics to identify/verify the subject of interest. There exist various kinds of biometric systems that are based on physical and/or behavioral cues such as the face, iris, speech, key-stroke, palmprint, retina, and so on. Among these, the palmprint-based biometric system that has been investigated for over 15 years has demonstrated its applicability as a successful biometric modality. Palm prints exhibit a unique characteristic that can be characterized using texture features that are contributed due to the presence of palm creases, wrinkles, and ridges. Furthermore, the palm prints can be captured using low-cost sensors with a very low-resolution imaging of 75 dots-per-inch (dpi). Authentication by biometric verification is becoming increasingly common in corporate and public security systems, consumer electronics and point of sale (POS) applications. In addition to security, the driving force behind biometric verification has been convenience.

The biometric use of palm prints uses ridge Patterns to identify an individual. Palms of hands epidermal ridges, thought to provide a friction surface to assist with gripping an object on surface[2].Palm print identification systems measure and compare ridges, lines and Minutiae found on the palm. Palm print recording and identification for law enforcement purposes has been in existence almost as long as palm prints systems are reported to comprise 30% of all crime scene

marks [2]. As much as another 20% are made up of the edge of the hand, fingers between the palm and fingertips and other parts of the hand. A key driver for law enforcement agencies to adopt full-hand scan technologies is the high incidence of hand related crime scene marks. Joao de Barros, an early explorer and writer, wrote that the Chinese merchants distinguished young children from each other by recording palm prints on paper with ink. One of the earliest AFIS systems built to support palm prints is believed to have been developed in Hungary in the early 1990's. In 1997, the technology was bought by a US company. In recent years, most AFIS vendors have added palm print records capabilities to their systems [4]. Palm print authentication is one of the relatively new physiological biometric technologies which exploit the unique features on the human palm print, namely principle lines, wrinkles, ridges, datum points, etc[3]

The palm prints are matched by using multi biometrics for this the recognition rate will be better than the existing system and computation cost for that system will be reduced. The system improves the performance of palm print biometric technology. In this process, we propose a novel framework of combining the left with right palmprint at the matching score level. The flow of the procedure of the proposed framework. In the framework, three types of matching scores, which are respectively obtained by the left palmprint matching, right palmprint matching and crossing matching between the left query and right training palmprint, are fused to make the final decision. The framework not only combines the left and right palmprint images for identification, but also properly exploits the similarity between the left and right palmprint of the same subject. Extensive experiments show that the proposed framework can integrate most conventional palmprint identification methods for performing identification and can achieve higher accuracy than conventional methods. This work has the following notable contributions. First, it for the first time shows that the left and right palmprint of the same subject are somewhat correlated, and it demonstrates the feasibility of exploiting the crossing matching score of the left and right palmprint for improving the accuracy of identity identification. Second, it proposes an elaborated framework to integrate the left palmprint, right palmprint, and crossing matching of the left and right palmprint for identity identification. Third, it conducts extensive experiments on both touch-based and contactless palmprint databases to verify the proposed framework. Pre-processing is to setup a coordinate system to align palmprint images and to segment a part of palmprint image for feature extraction.

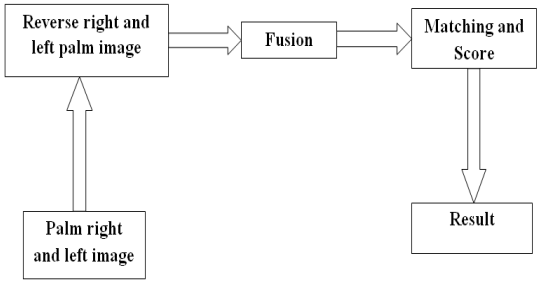

Figure 1: Palmprint Recongnization

II. METHODS FOR RECOGNITION

It can be used in the area of image processing which involves using algorithms to detect and isolate various desired portions or shapes (features) of a digitized image. Transforming the input data into the set of features is called *feature extraction.* There are three groups of marks which are used in palm print identification:

Geometric features, such as the width, length and area of the palm. Geometric features are a coarse measurement and are relatively easily duplicated. In themselves they are not sufficiently distinct [3];

Line features*, principal lines and wrinkles*. Line features identify the length, position,

depth and size of the various lines and wrinkles on a palm. While wrinkles are highly distinctive and are not easily duplicated, principal lines may not be sufficiently distinctive to be a reliable identifier in themselves; and *Point features or minutiae*. Point features or minutiae are similar to fingerprint Minutiae and identify, amongst other features, ridges, ridge endings, bifurcation and dots [3].

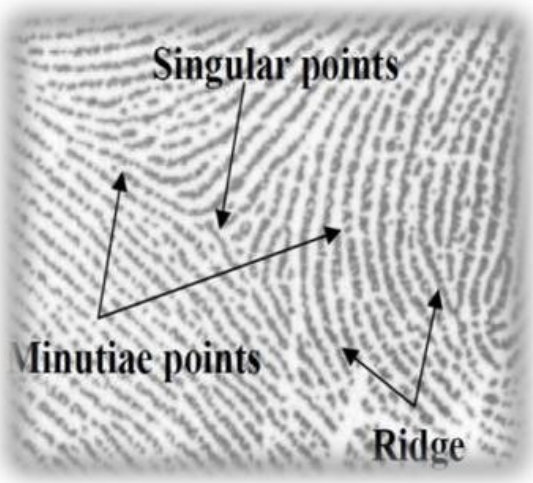

Figure 2: Palm print features

Palm creases and ridges are often superimposed which makes feature extraction difficult. An important issue in palm print recognition is to extract palm print features that can discriminate an individual from the other. There are two popular approaches to palm print recognition. One of the approaches is to transform palm print images into specific transformation domains [2].

III. Performance Analysis

The accuracy, sensitivity and specificity of the classifier is measured. The accuracy represents the efficiency of the process. The sensitivity shows how the algorithm gives correct classification. The specificity shows how the algorithm rejects the wrongly classification results. The performance of the process is measured based on the calculation of Accuracy, Area under curve of the process.

$$ACC = \frac{(TP + TN)}{(FP + TN) + (TP + FN)}$$

The performance of the process is measured in terms of performance metrics like Precision, Recall, F-measure and false positives. The

$$recall = \frac{TP}{TP + FN}$$

$$precision = \frac{TP}{TP + FP}$$

$$F = 2\frac{recall \cdot precision}{recall + precision}$$

1. TP is the total number of correctly classified foreground (true positives).
2. FN is the total number of false negatives, which accounts for the incorrect number of disease type pixels classified as dataset (false negatives).
3. FP is the total number of false positives, which means the pixels are incorrectly classified as images (false positives).
4. True negative = correctly rejected

IV. Region of Interest Extraction

The main idea of the region of interest (RoI) is to extract the significant region from the palmprint that constitutes for the rich set of features such as principal lines, ridges, and wrinkles by compensating for rotation and translation. The accurate extraction of RoI plays a crucial role in improving the performance of the overall palmprint recognition. In this work, we have employed the algorithm proposed in which is based on aligning the palmprint by computing the center of mass and also by locating the valley regions. We carried out this RoI extraction scheme only on the PolyU palmprint database as the other two databases (PolyU and IITD) have already provided the RoI images.

If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input.

Feature selection or feature extraction: selecting variables from the measured set that are appropriate for the task. These new variables may be obtained by a linear or nonlinear transformation of the original set (feature extraction). To some extent, the division of feature extraction and classification is artificial

In our work the feature selection is based on the statistical measurements of a palm for Palm print Recognition System. The proposed work discusses about to measure properties of image regions. There are various statistical measurements out of which part of our study and experiment are basic statistical properties of a palm image and are Area, Bounding box and centric.

The description is for the measurement of a set of properties for each connected component (object) in the binary image, BW. The image BW is a logical array; it can have any dimension

a. Area —

The Scalar can say an actual number of pixels in the region.

b. Bounding Box —

The smallest rectangle containing the region,

a 1-by-Q *2 vector, where Q is the number of image dimensions: ndims(L), ndims(BW)

c. Centric:-

It is 1-by-Q vector that specifies the center of mass of the region. Note that the first element of Centric is the horizontal coordinate (or *x*-coordinate) of the center of mass, and the second element is the vertical coordinate (or *y*-coordinate). All other elements of Centric are in order of dimension.

These basic statistical properties can be used to measure the statistical property of image region. The calculated values of palm lines extracted image can be useful for palm matching technique. The matching can be done by using basic statistical properties of palm and mostly useful on extracted palm lines image. Thus it can be very useful for palm matching technique with minimum time estimation.

V. PALM PRINT IMAGE DATABASE

In order to carry image processing experiment; we require a digital image. The digital image can be inputted and related experiment can be carried and related results can be formed. So such image database is provided to the researcher to explore the related scientific research.

The Hong Kong Polytechnic University (PolyU) 2D_Palmprint Database [6] is an existing palm print image database made available world-wide to advance research in the area of biometrics palm print recognition system. The Biometric Research Centre (UGC/ CRC) at The Hong Kong Polytechnic University [6] has developed palm print database. To advance research and to provide researchers working in the area palm print recognition a platform to compare the effectiveness of palm print recognition algorithms. They intend to publish our palm print database, making it freely available for academic, noncommercial uses. Palm print has proved to be one of the most unique and stable biometric characteristics. The palm prints refer to the image acquired of the palm region of the hand. The palm print image databases are made available world-wide to advance research and to provide researchers working in the area of palm print recognition system.

Almost all the current palm print recognition techniques capture the two dimensional (2D) image of the palm surface and use it for feature extraction and matching. Although 2D palm print recognition can achieve high accuracy [6].

The PolyU 2D Palm print Database contains 7680 samples collected from 384 different palms. Twenty samples from each of these palms were collected in two separated sessions, where 10 samples were captured in each session, respectively.

The average time interval between the two sessions is one month. The all palm print images are of same size and same dimension palm print image such as 384 X 284

And each 2D palm print image was recorded in BMP format image file. The palm print images have a name sequence and can be interpreted as follows-

e.g. - A palm print image name "PolyU_001_F.bmp" can be interpreted as the initiated word "PolyU" is the copyright for the Polytechnic University of Hong Kong. Then followed "001" indicate the subject enrollment number as it varies with person to person palm print image. The followed "F" indicate the session enrollment that whether it is the First or Second. And finally the format "BMP" of the image file

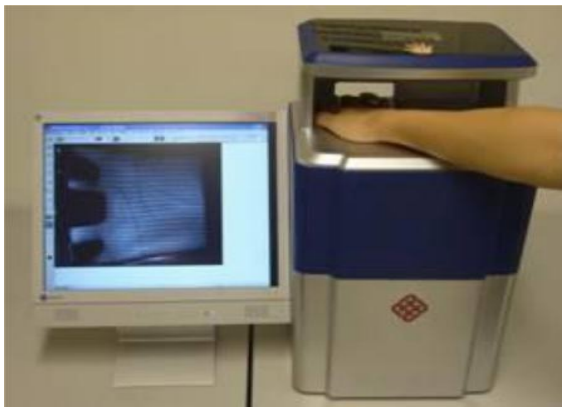

Figure 3(a) The outlook of image acquisition device (b) The device is being used to collect palm print image;

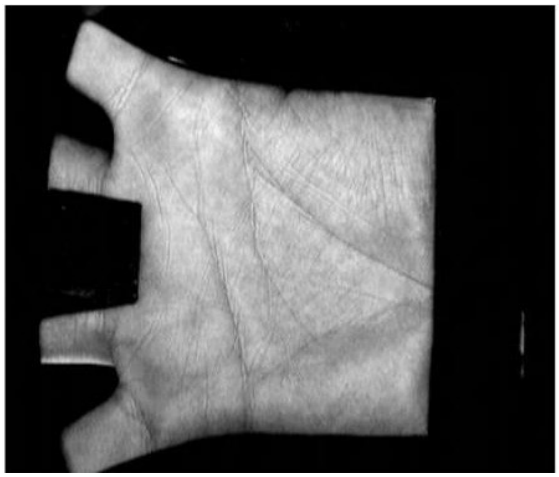

Figure 3 (c) The "PolyU_001_F_01.bmp" palm print image. [6]

VI. Experiment and Result

Pattern recognition is the assignment of a label to a given input value. An example of pattern recognition is classification, which attempts to assign each input value to one of a given set of *classes*. Palm print as a new member of pattern recognition and biometrics family, has attracted much of the research attention in the past decades. Palm print recognition is one of the relatively new physiological biometric technologies which exploit the unique features on the human palm print, namely principle lines, wrinkles, ridges etc.

The methodology for the research to be carried out is based on statistical pattern recognition. As statistical pattern recognition is a term used to cover all stages of an investigation from problem formulation and data collection through to discrimination and classification, assessment of results and interpretation. The Experiment was performed over the palm Image taken from the database developed by the Hong Kong Polytechnic University (PolyU) palm print database.

The palm print image after applying various morphological operations will successfully yield the principal lines of the palm print image. These are extracted features useful for Person identification.

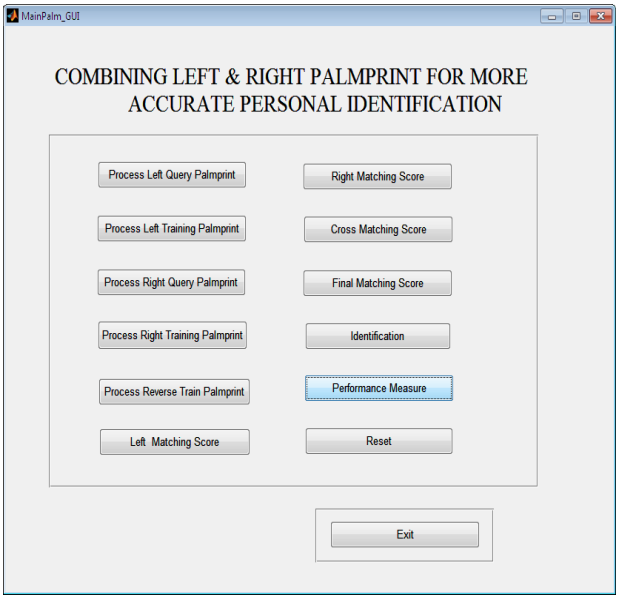

Figure 4. Combining left and right palmprint

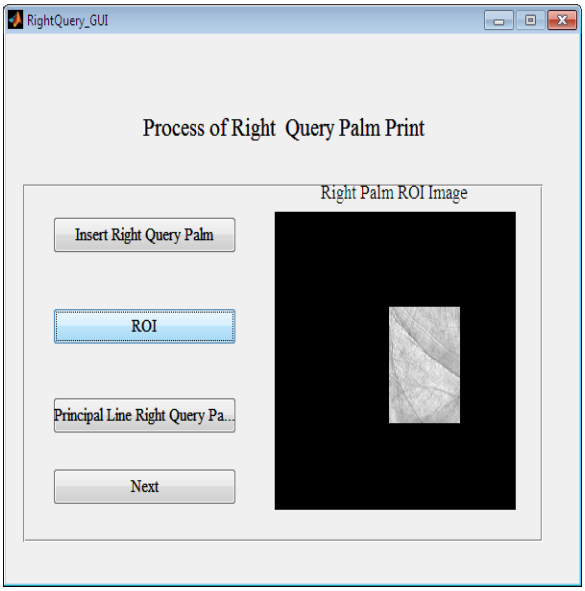

Figure 7: process of right query palm print

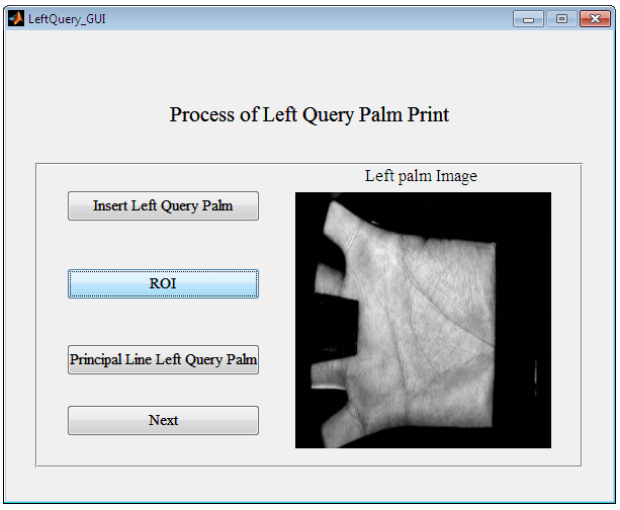

Figure 5. Left query ROI palm print

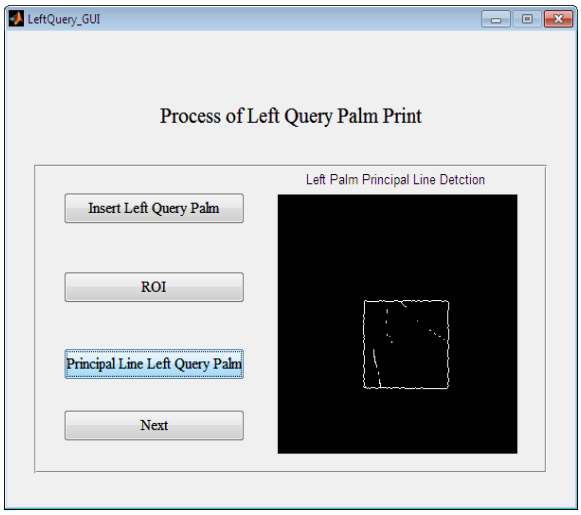

Figure 8: principal line left query palm

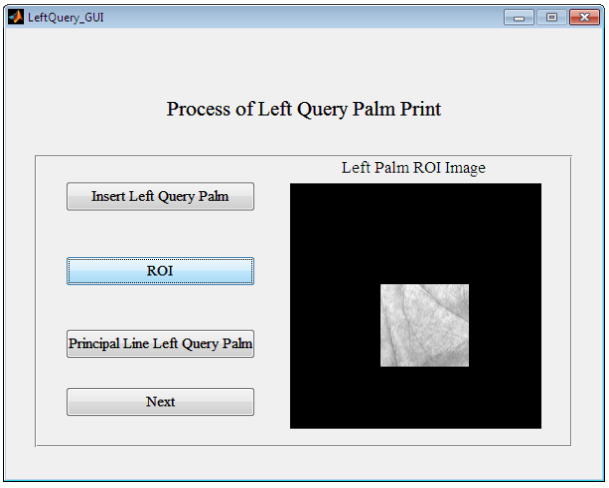

Figure 6: Left query palm print

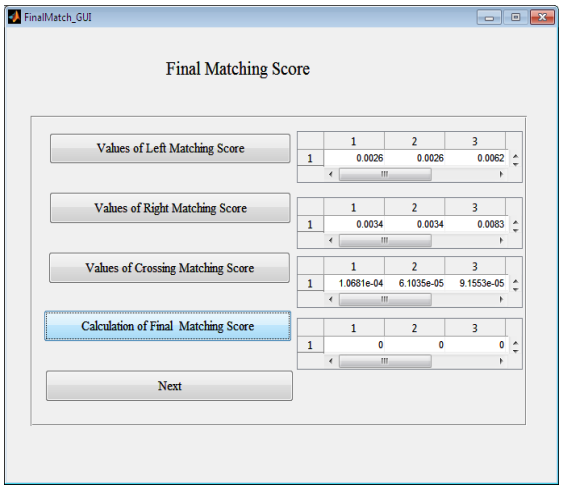

Figure 9: final matching score

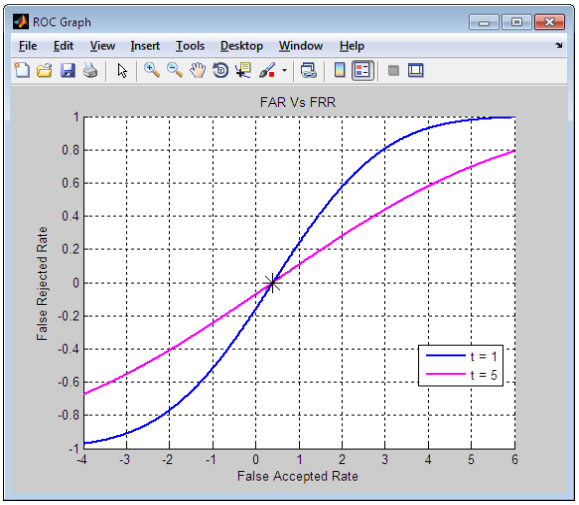

Figure 10: FAR vs FRR

VIII. CONCLUSION

In this process, we have investigated the relationship between two orientations of a palmprint to identify the more discriminative orientation and then used a group of neighboring direction indicators to represent the relation of these orientations. The neighboring direction indicator can not only essentially represent the most dominant orientation feature of the palmprint, but can also better denote the multiple orientations of some special points having double dominant orientations. In addition, a simple and effective smoothing convolution has been introduced to improve the precision of the orientation feature of the palmprint. Experimental results show that the proposed method can achieve higher accuracy in palmprint recognition than the state-of-the-art orientation-based methods. Moreover, the proposed method gives the most competitive performance in multispectral palmprint verification.

REFERENCE:

[1] Komal, Accurate Personal Identification Using Left and Right Palmprint Images Based on ANFIS Approach International Journal of Mineral Processing and Extractive Metallurgy 2017; 2(2): 13-20

[2] Srushti Kureel "Shape and Texture based Palm Print Recognition System for Biometric identification", International Journal of Engineering Trends and Technology (IJETT) – Volume 50 Number 1 August 2017

[3] Mouad M.H. Alia "Multi-Algorithm of Palmprint Recognition System Based on Fusion of Local Binary Pattern and Two-Dimensional Locality Preserving Projection, 7th International Conference on Advances in Computing & Communications, ICACC-2017, 22-24 August 2017, Cochin, India.

[4] Ms. Fathima Ummer Ayinikkalayil, "A PCF Based Multimodal Palmprint Recognition Method Using Matching Score Level Fusion", Imperial Journal of Interdisciplinary Research (IJIR) Vol-3, Issue-5, 2017

[5] Haifeng Sang, Yueshi Ma, Jing Huang, "Robust Palmprint Recognition Base on Touch-Less Color Palmprint Image Acquired", Journal of Signal and Information Processing, pp. 134-139, 2013

[6] Anouar Ben Khalifa, Lamia Rzouga, Najoua Essoukri BenAmara "Wavelet, Gabor Filters and Co-occurrence Matrix for Palmprint Verification", International Journal of Image, Graphics and Signal Processing (IJIGSP), ISSN: 2074-9082, Vol. 5, No. 8, June 2013

[7] Apurva Puranik, Rahul Patil, Varsha Patil, Milind Rane, "Touch less, Camera Based Palm Print Recognition", International Journal of Applied Research and Studies (IJARS) ISSN: 2278-9480 Volume 2, Issue 4, April 2013.

[8] G. Seshikala, Dr. Umakanth Kulkarni, Dr. M. N. Giriprasad, "Pal Print Feature Extraction Using Multi Scale Wavelet Edge Detection Method", International Journal of Advanced Research is Electrical, Electronics and Instrumentation Engineering, ISSN 2278 – 8875, Volume 1, Issue 1, July 2012

[9] K. P. Shashikala, K. B. Raja, "Palmprint Identification Based o DWT, DCT and QPCA", International Journal of Engineering an Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1 Issue-5, June 2012

[10] Ashutosh Kumar, Ranjan Parekh, "Palmprint Recognition in Eigen-space", International Journal on Computer Science an Engineering (IJCSE), ISSN : 0975-3397, Vol. 4, No. 05, pp. 788-794, May 2012.

[11] R. Gayathri, P. Ramamoorthy, "Multifeature Palmprint Recognition using Feature Level Fusion", International Journal of Engineering Research and Applications (IJERA), ISSN: 2248-9622, Vol. 2, Issue 2, pp. 1048-1054, April 2012

[12] Jinyu Guo, Yuqin Liu, Weiqi Yuan, "Palmprint Recognition Using Local Information From a Single Image Per Person", Journal of Computational Information Systems, ISSN: 1553-9105, Vol. 8 Issue 8, pp. 3199-3206, April 2012

[13] Jyoti Malik, G. Sainarayanan, Ratna Dahiya, "Personal Authentication Using Palmprint with Sobel Code, Canny Edge And Phase Congruency Feature Extraction Method", ICTAC Journal on Image and Video Processing, ISSN: 0976-9102 Volume: 02, Issue: 03, February 2012.

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