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MULTIMODAL BIOMETRIC SECRET KEY USING RECOGNITION SYSTEM BASED ON FUSION OF PALM PRINT AND IRIS

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Abstract:

The technological growth has a serious impact on security which has its own significance. The core objective of this project is to extract the palm print features using the local appearance based method for the accurate identification with single sample per class. The biometric based person identification plays a major role in wide range of applications such as Airport security, Driver's license, Passport, Voting System, Surveillance. This project presents palm print recognition based on granular computing and feature extraction using Discriminative Robust Local Ternary Pattern (DRLTP) approach. Here granular computing and palm print features will be presented to match the changes. Then, DoG pyramid will be formed from successive iterations of Gaussian images. By this granulation, palm print features are segregated at different resolutions to provide edge information, noise, smoothness and blurriness present in a palm image. In feature extraction stage, DRLTP is used to extract the features describes texture and edges with better discrimination. This feature is useful to distinguish the maximum number of samples accurately and it is matched with already stored original face samples for identification. This proposed approach reduces the computation time and also increases the efficiency.

1. Introduction:

Manipulating data in the form of an image through several possible techniques. An image is usually interpreted as a two-dimensional array of brightness values, and is most familiarly represented by such patterns as those of a photographic print, slide, television screen, or movie screen. An image can be process ad optically or digitally with a computer.

To digitally process an image, it is first necessary to reduce the image to a series of numbers that can be manipulated by the computer. Each number representing the brightness value of the image at a particular location is called a picture element, or pixel. A typical digitized image may have 512 × 512 or roughly 250,000 pixels, although much larger images are becoming common. Once the image has been digitized, there are three basic operations that can be performed on it in the computer. For a point operation, a pixel value in the output image depends on a single pixel value in the input image. For local operations, several neighboring pixels in the input image determine the value of an output image pixel. In a global operation, all of the input image pixels contribute to an output image pixel value.

2. Related Works:

In [1] Ahmed A.Mona, Ebied M.Hala, Horbaty M.E, and Abdel-Badeeh M. Salem analysis the person identification. The palm vein authentication has level of accuracy because it is located inside the body and does not change over the life and cannot be stolen. The technical aspects of recent approaches for the detection of region of interest (ROI), segment of palm vein pattern, feature extraction and matching. They used the palm vein pattern, ROI extraction feature extraction, matching and very high accuracy. The contactless palm vein authentication technology consists of image sensing and

software technology palm vein recognition system consist of infrared palm image capture detection of region of interest and pre processing and palm in pattern extraction, feature extraction and feature matching .palm vein technology works by identifying the vein patterns in an individual palm . When a user's hand is hand over a scanner, a near infrared light maps the location of the veins.

In [2] Bahgat S.F., Ghoniemy S. And Alotaibi M. introduces the concept of biometric authentication technology identifies the person. In the method the account shoulders body characteristics or behaviour are registered in a database and then compared with others. Since veins are internal to the human body, its information is hard to duplicate. Compared with a finger or the back of a hand a palm has a broader and more complicated vascular pattern and thus contains a wealth of differentiating features for personal identification. The multi model authentication technique based on palm veins is a personal identifying factor, to increase the accuracy of security recognition. Palm vein authentication uses an infrared beam to penetrate the uses a hand as it is held over the sensor the veins within the palm of the user are returned as gray lines. As each biometrics technology has its merits and shortcomings, it's difficult to make direct comparison but because vein authentication relies on biological information on the interior of the body

In [3] Baochang zhang, Yongsheng gao, sanqiang Zhao, and jianzhuang liu discussed LDP is a general framework to encode directional pattern feature based on local derivations. The n^{th} order LDP is proposed to encode the $(n-1)^{th}$ order local derivative direction variation which can capture more detailed information the first order local pattern used in local binary pattern. LBP in nature represents the first order circular derivate pattern of image, a micro pattern generated by the concatenation of the binary gradient directions to the best of our knowledge no high order local pattern operator has been investigated for face representation. The PCA representation can hardly capture some variations in the training dataset, such as pose in face recognition. Independent Component Analysis (ICA) takes higher order statistics into account, and is suitable for learning complex structure in the dataset.

In [5] Qin Bin Pan Jian-Fei Cao Guang-Zhong and Du Ge-Guo discussed the vein identification system's identify a certain person by acquiring the local infrared image of hand and extracting vein pattern. The vein identification systems are widely used in security and surveillance filed, but most of them ignores the likeness detection requirement or only check the temperature to prevent spoofing. The vein images are related with vital signs such as oxygen saturation in human blood and heart rate. They can prevent the identification spoofing and improve the security capability of vein identification system.

In [7] Xiangqian Wu, Enying Gao, Youbao Tang and kuanquan Wang was discuss the vein patter. The vein patterns rely on the interior biological information of the body and therefore, cannot be easily damaged, changed or falsified. The vein recognition system which extracts and combines the dorsal, palm and finger vein for personal recognition. The matched distance for decision by employing SVM classifier. The system is tested on a larger database and the result as satisfactory with equal error rate of 0.00223%. However, the traditional token or knowledge based personal authentication. As an important member of biometric family, the vein patterns rely on the interior biological information of the body.

The existing system is the gender recognition is based on ridge and valley features analysis. The statistical features included are principal components and local binary pattern and statistical texture feature. The disadvantage of existing system are

doesn't differentiate local contract and shape changes and low discriminative power and limits the representation of features about texture and they inefficient texture feature due to shift variance and less accuracy for various lighting condition of images due to the delivery of insufficient descriptors

3. Palm Vein Authentication:

The biometrics-based mechanized human recognizable proof is now highly popular in a wide range of civilian applications and has a turned out to be intense distinct option for conventional (password or token) identification systems. Human palms are easier to introduce for imaging and can uncover an assortment of data. Therefore, palm-print research has invited a lot of attention for regular citizen and scientific utilization. On the other hand, similar to some of the popular biometrics (e.g., fingerprint, iris, face), the palm-print biometric is likewise inclined to sensor level satire attacks. Remote imaging using a high-resolution camera can be utilized to uncover essential palm-print points of interest for conceivable spoof attacks and impersonation. Therefore, extrinsic biometric components are required to be more powerless for spoofing with moderate efforts.

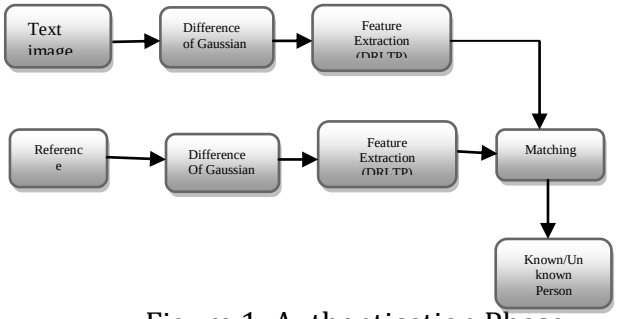

Figure 1: Authentication Phase

a. Palm Print Recognition:

The biometrics-based mechanized human recognizable proof is now highly popular in a wide range of civilian applications and has a turned out to be intense distinct option for conventional (password or token) identification systems. Human palms are easier to introduce for imaging and can uncover an assortment of data.. Therefore, palm-print research has invited a lot of attention for regular citizen and scientific utilization. On the other hand, similar to some of the popular biometrics (e.g., fingerprint, iris, face), the palm-print biometric is likewise inclined to sensor level satire attacks. Remote imaging using a high-resolution camera can be utilized to uncover essential palm-print points of interest for conceivable spoof attacks and impersonation. Therefore, extrinsic biometric components are required to be more powerless for spoofing with moderate efforts.

Palm vein authentication works by contrasting the example of veins in the palm (which show up as blue lines) of a person being authenticated with a pattern put away in a database. Vascular examples are special to each individual, according to Fujitsu research — even identical twins have distinctive examples. Furthermore, since the vascular examples exist inside the body, they cannot be stolen by means of photography, voice recording or fingerprints, along these lines making this method of biometric authentication more secure than others

b. Principles Vascular Pattern Authentication:

Hemoglobin in the blood is oxygenated in the lungs and conveys oxygen to the tissues of the body through the arteries. After it discharges its oxygen to the tissues, the deoxidized hemoglobin returns to the heart through the veins. These two types of hemoglobin have diverse rates of receptiveness. Deoxidized hemoglobin absorbs light at

a wavelength of about 760 nm in the close infrared district. At the point when the palm is lit up with near-infrared light, unlike the image seen by the human eye the deoxidized hemoglobin in the palm veins ingests this light, thereby reducing the reflection rate and causing the veins to show up as a dark example. In vein authentication based on this principle, the region used for authentication is captured with close infrared light, and the vein design is extracted by image processing and registered. The vein example of the individual being confirmed is then verified against the pre- registered pattern.

c. Preprocessing:

The palm-vein pictures in contact-less imaging present a great deal of translational and rotational variations. Therefore, more stringent pre-preparing steps are obliged to concentrate a stable and aligned ROI. The pre-processing steps essentially recoup a settled size ROI from the procured pictures which have been normalized to minimize the rotational, translational, also, scale changes. This is trailed by the nonlinear upgrade so that the vein patterns from ROI images can be observed all the more obviously. Since the power capacity of a computerized image is only known at discrete points, derivatives of this capacity can't be characterized unless its accept that there is an underlying continuous intensity function which has been inspected at the picture focuses.

d. Feature Extraction:

The standardized and upgraded palm-vein pictures delineate bended vascular network/patterns, and these vessels can be approximated by little line portions which are fairly bended. Along these lines, in this project, we propose to use two new approaches to concentrate such line-like palm-vein highlights. Likewise, a neighborhood matching scheme that can effectively account for more successive rotational, translational varieties, and also to some image deformations in the acquired image. Keeping in mind the end goal to learn the adequacy and robustness of the proposed approach for the palm-vein identification, we performed thorough tests on both contact-less and contact- based database systematically evaluated and compared every one of these systems together with our proposed ones, so that we can get more insights into the problem of palm-vein identification. For matching the palm prints, we need to extract some features first. The extracted features are then used for matching. A component's portion extraction and coordinating calculations are line based, subspace based, statistical and coding based approaches.

e. Line based approach:

This approach develops edge detectors and makes use of the magnitude of the palm lines. The palm's extents lines are anticipated in x and y coordinates forming histograms. After this, the to begin with and second request subordinates of the palm pictures are calculated. The first order derivative is used to identify the edge points and comparing bearings. The second order derivative is used to identify the magnitude of lines. At that point the Euclidian separation is utilized for coordinating. Subspace based approach: This approach makes use of Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA) and Independent Component Analysis (IDA). The spatial coefficients are considered as the elements utilized for coordinating. This methodology not needs any prior knowledge of the palm prints.

f. Gaussian Smoothing Process:

Granulation is the act or process of forming or crystallizing into grains. This approach is used to represent the information in several parts to extract the features. For detection of granules, 2D Gaussian low pass filter is used to generate difference of

Gaussian (DOG). Then image will be down sampled to make difference of Gaussian pyramid at each iteration level.

A Gaussian smoothing is the result of blurring an image by a Gaussian function. It is a widely used effect in graphics software, typically to reduce image noise and reduce detail. Gaussian smoothing is also used as a pre-processing stage in computer vision algorithms in order to enhance image structures at different scales see scale space representation and scale space implementation.

Mathematically, applying a Gaussian blur to an image is the same as convolving the image with a Gaussian function. By contrast, convolving by a circle (i.e., a circular box blur) would more accurately reproduce the bokeh effect. Since the Fourier transform of a Gaussian is another Gaussian, applying a Gaussian blur has the effect of reducing the image's high-frequency components; a Gaussian blur is thus a low pass filter.

The idea of Gaussian smoothing is to use this 2-D distribution as a `point-spread' function, and this is achieved by convolution. Since the image is stored as a collection of discrete pixels we need to produce a discrete approximation to the Gaussian function before we can perform the convolution. In theory, the Gaussian distribution is non-zero everywhere, which would require an infinitely large convolution kernel, but in practice it is effectively zero more than about three standard deviations from the mean, and so we can truncate the kernel at this point.

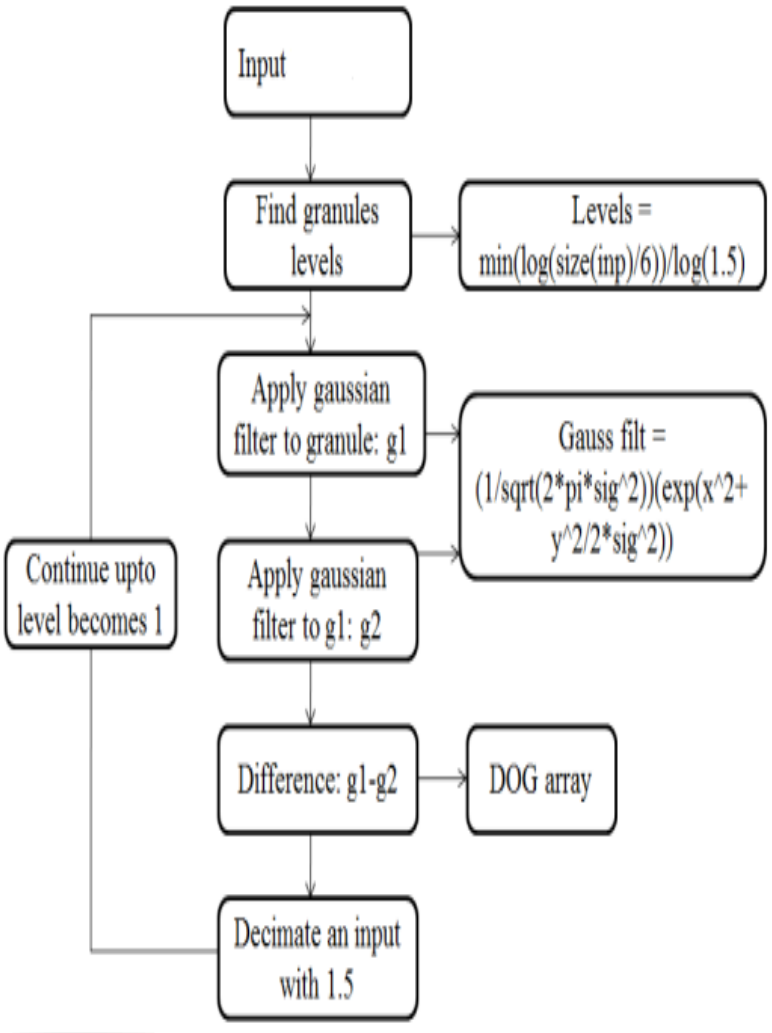

Figure 2: Gaussian Smoothing Process

Likewise, a neighbourhood matching scheme that can effectively account for more successive rotational, translational varieties, and also to some image deformations in the acquired image. Keeping in mind the end goal to learn the adequacy and robustness of the proposed approach for the palm-vein identification, it performed thorough tests on both contact-less and contact- based database systematically evaluated and compared every one of these systems together, so that we can get more insights into the problem of palm-vein identification.

For matching the palm prints, we need to extract some features first. The extracted features are then used for matching. A component's portion extraction and coordinating calculations are line based, subspace based, statistical and coding based approaches.

4. Result:

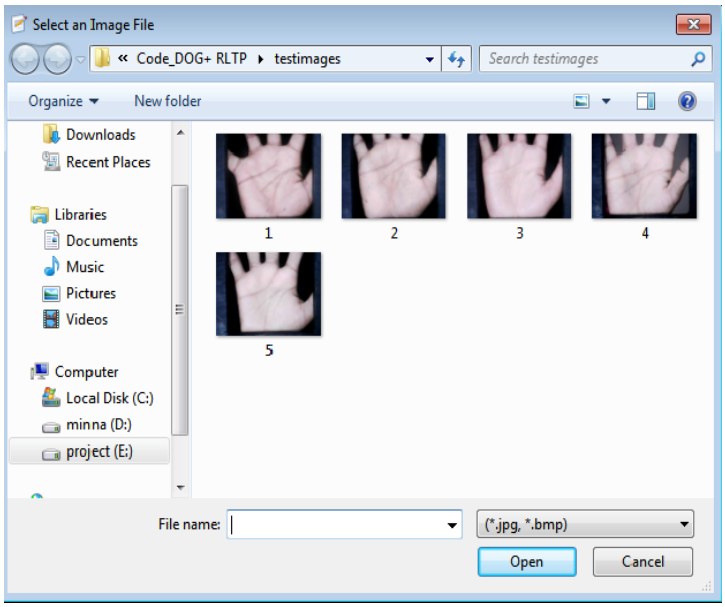

Figure 3: Select the Test Image

Figure 3 illustrates the image to select to test

Figure 4: Image to test

Figure 4 illustrates the select image to be tested

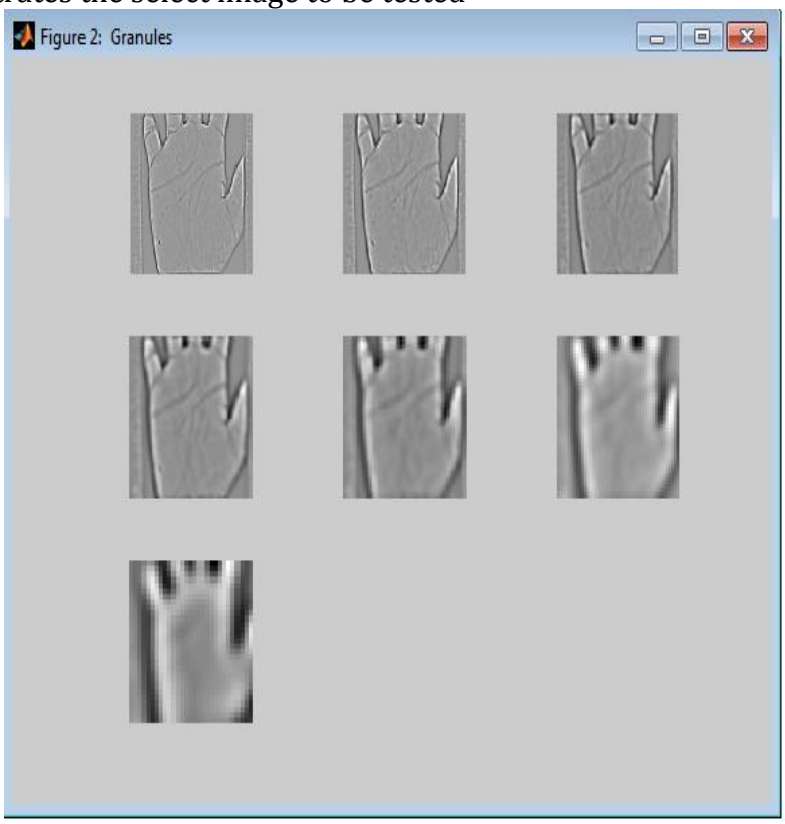

Figure 5: Granules Extraction

Figure 5 illustrates the image to extract by the granules it was to be detect the edges

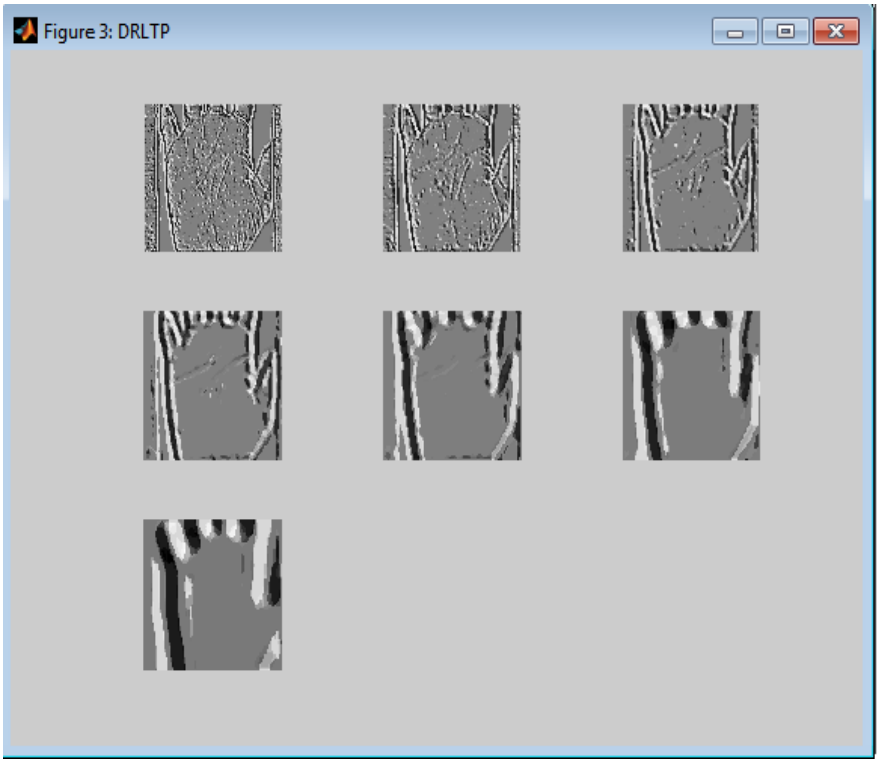

Figure 6: DRLTP Extraction

Figure 6 illustrates the image to extract and reduce the image noise

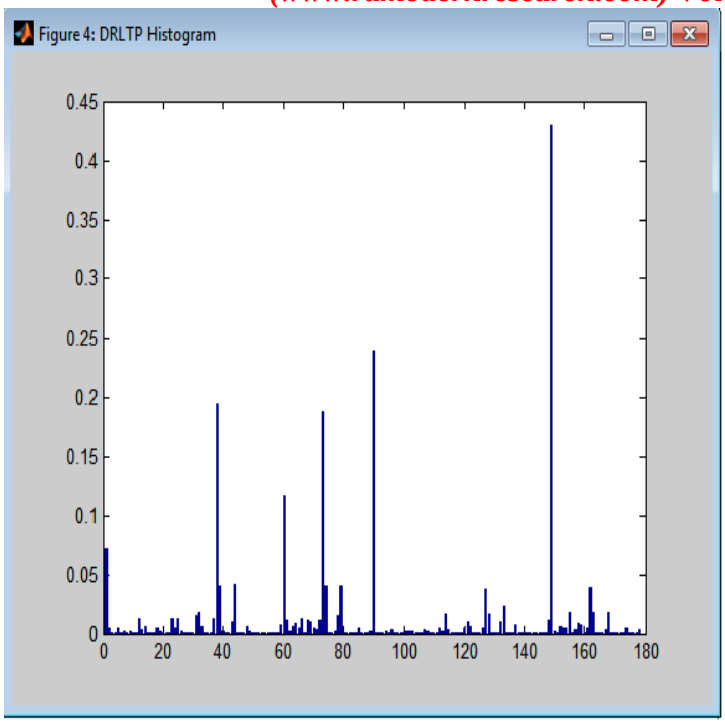

Figure 7: DRLTP Histogram

Figure 7 DRLTP was analysis to reduce the noise in the image and then tells the person is known or unknown person

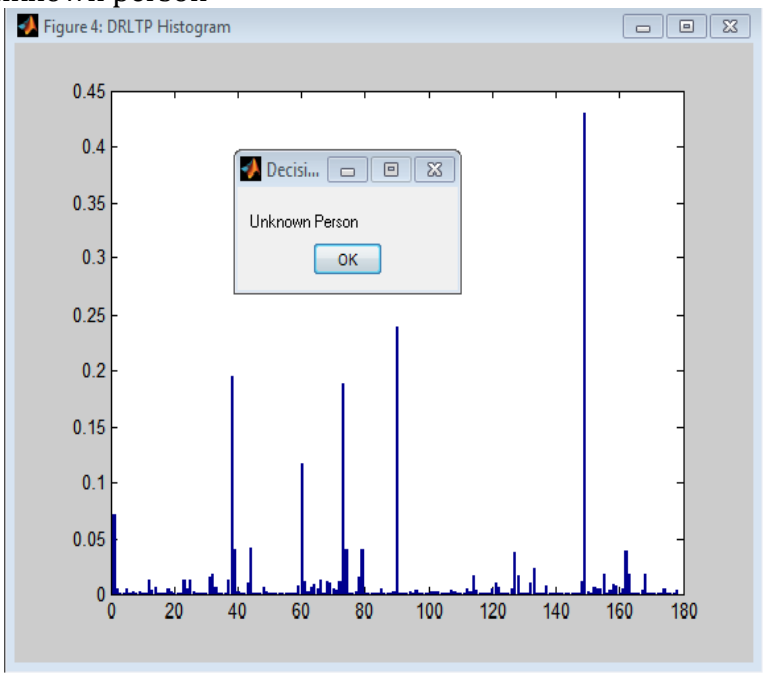

Figure 8: know person or unknown person

Figure 8 illustrates the test image is known or unknown

5. Conclusion and Future Work:

Several existing methods have been reviewed for palm-print recognition. In the proposed approach, DOG and DRLTP is applied to the palm image and the features are extracted, dominant spectral features have been extracted such as the major lines. The textures are extracted by using DRLTP and DOG. This approach helps in increasing the performance and accuracy of the system. A lot of work has to be done with the feature extraction algorithms as well as the matching algorithms. The aim of working on the

palm print recognition system is to develop a system with increased speed and accuracy.

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