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Finger Vein Detection Combining Segmentation, Gabor Filter and Matched Filter

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Abstract: ***This paper proposes a method of personal identification based on the finger-vein patterns. A camera under the IR light transmission captures the finger hence capturing the finger vein patterns. We systematically develop a new approach for the finger vein feature extraction using Repeated Line tracking, Gabor filters and Matched Filter. The result after the combinations of these methods is more accurate than the results of the individual method. The aim of this paper is to investigate finger-vein technology.***

Keywords: Gabor filter, filter, pattern recognition, finger-vein detection.

1. Introduction

Biometrics means life measurement but the term is usually associated with the use of unique physiological characteristics to identify an individual. Generally, it is the study of measurable biological characteristics. The application which most people associate with biometrics is security. Traditional Security Methods were based on things like Passwords and PINs. However, there are problems with these methods. For example, passwords and PINs can be forgotten or stolen. Use of biometrics has helped in handling these issues. Biometrics deals with the recognition of a person using his or her biometric characteristics. Most of the current available approaches for finger vein recognition have similarities on the feature extraction method which utilized the features from the segmented blood vessel network for recognition. However, because of the optical blurring and skin scattering problems, the finger vein images are not always that clear and may show irregular shadings. Therefore, segmentation errors can occur during the feature extraction process due to the low qualities of finger vein images. When the network is not segmented properly, the recognition accuracy may be decreased. . It is higher accuracy rate of finger vein is not unconnected with the fact that finger vein patterns are virtually impossible to forge thus it has become one of the fastest growing new biometric technology that is quickly finding its way from research labs to commercial development.

Similar to fingerprint recognition, finger vein recognition as well contains image pre-processing, feature extraction and matching. Finger vein segmentation; thinning and image normalization are all image pre-processing work. The acquired Finger image is initially binarized, so that we are able to divide the Finger region from the background region. It is followed by the inference of the distance from centre position of the binarized Finger to the boundary of Finger. Finger vein contains ridge and valley lines.

The technique will be using GABOR Filter, Median Filter and Repeated Line Tracking method for recognition.

2. Generalized Algorithm

I. Consider a finger image as input.
II. Binarize the image and store the coordinates.
III. Get the boundaries of input image and store it.
IV. Get the region of interest of input image and store it.
V. Perform repeated line tracking to track the vein patterns.
VI. Create database and store the coordinates using step II,III,IV and V.
VII. Search the input image in database.
VIII. If present the matched vein displayed else unmatched.
IX. Compare the PSNR and computation time of the previous work and the present algorithm.

3. Result Discussion

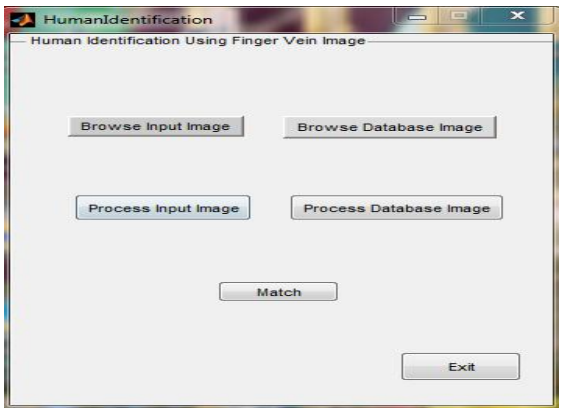

Figure 1: GUI layout

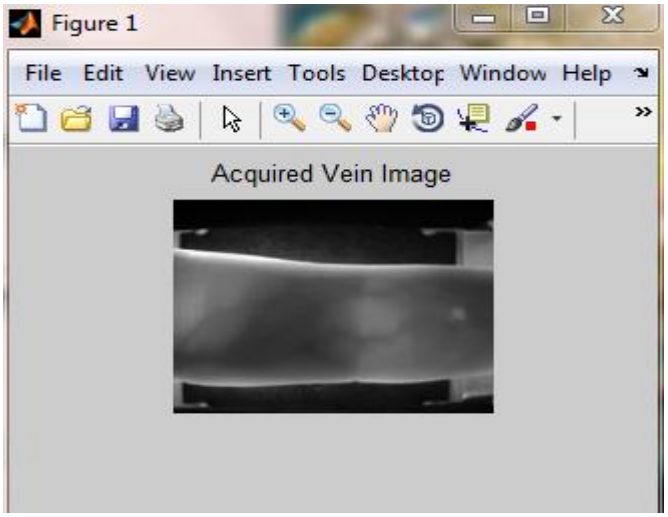

Figure 2: Vein image

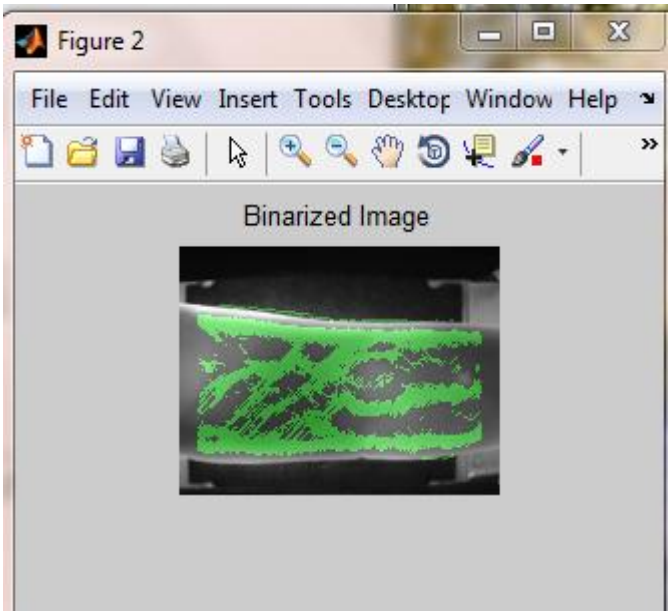

Figure 3: Binarized image

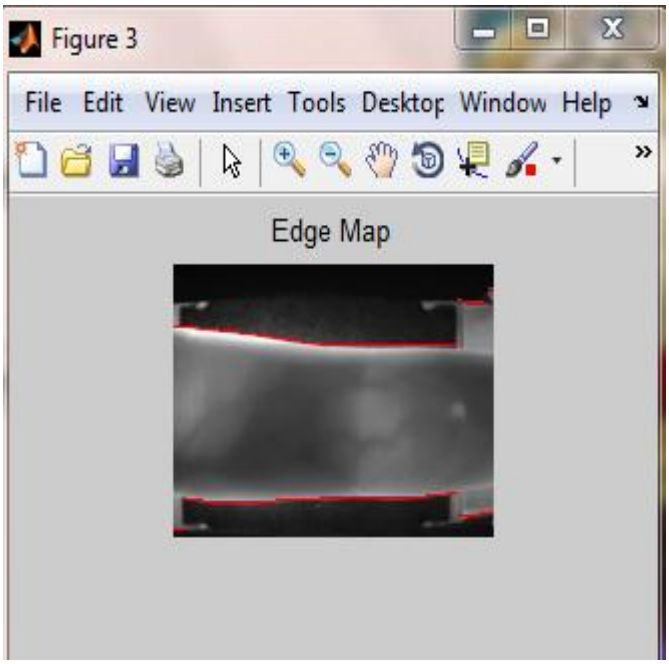

Figure 4: Edge map image

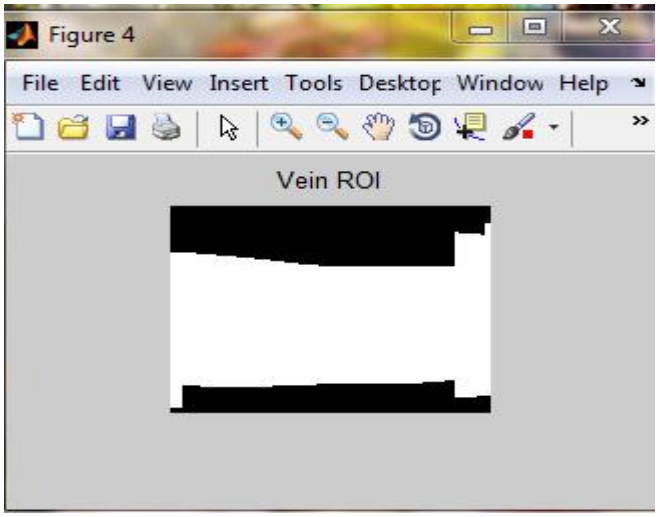

Figure 5: Vein ROI image

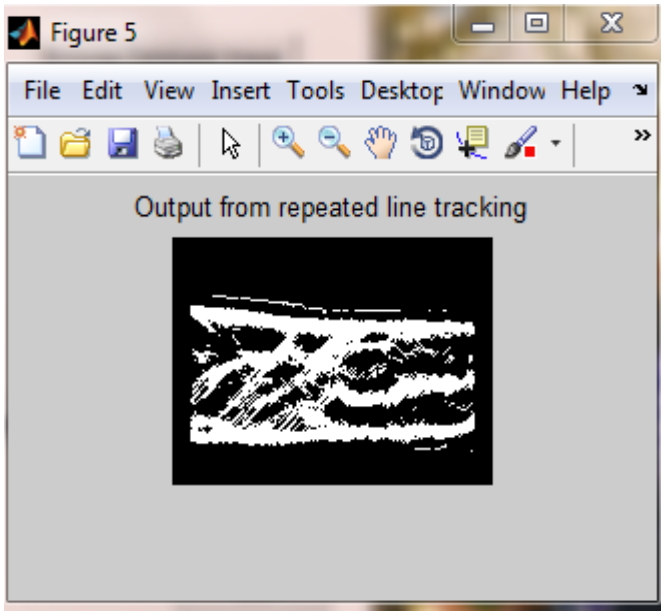

Figure 6: Image of output of repeated line tracking

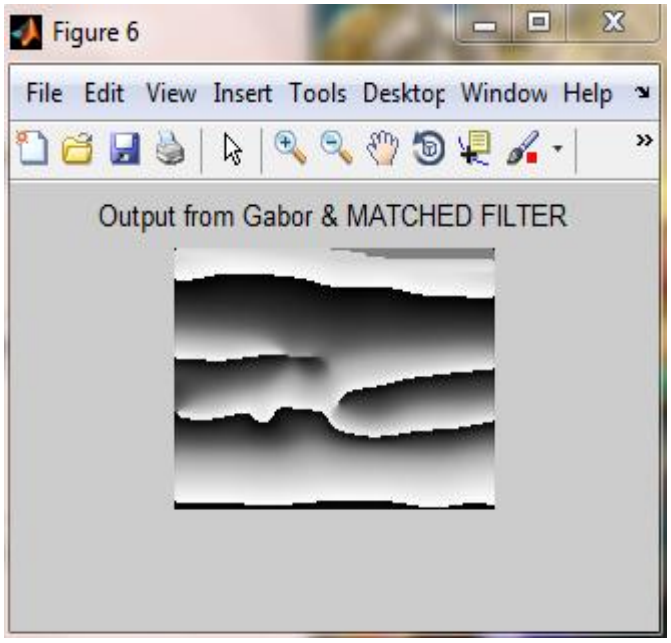

Figure 7: image of output from Gabor & matched filter

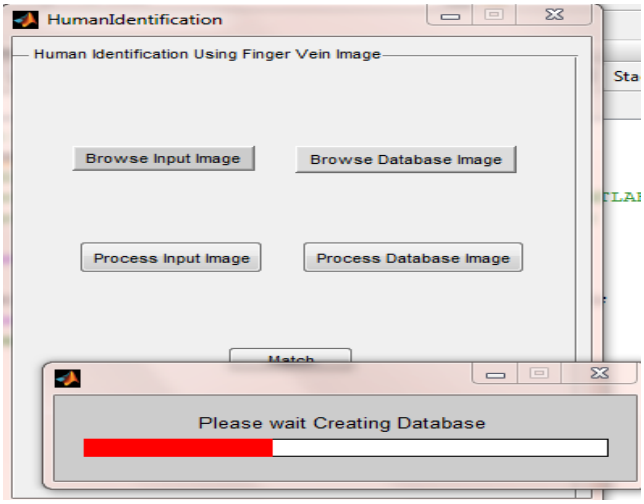

Figure 8: GUI layout creating database processing

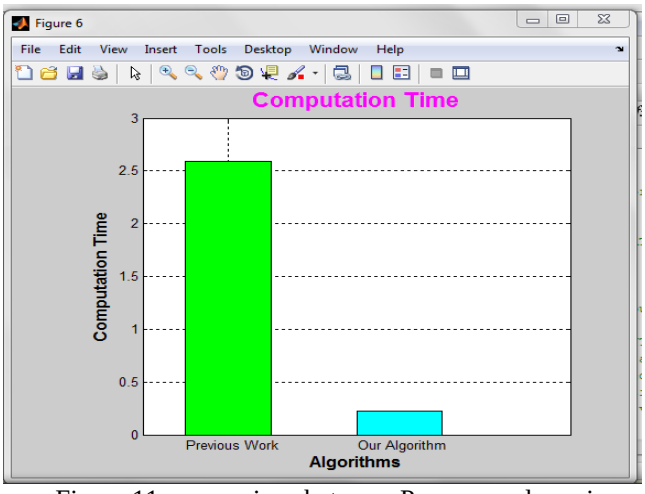

Figure 11: comparison between Propose and previous work

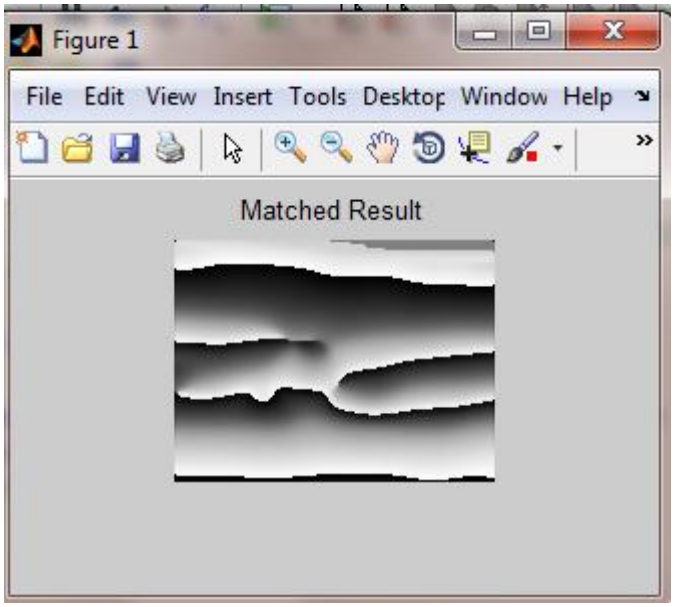

Figure 9: image of Matched result

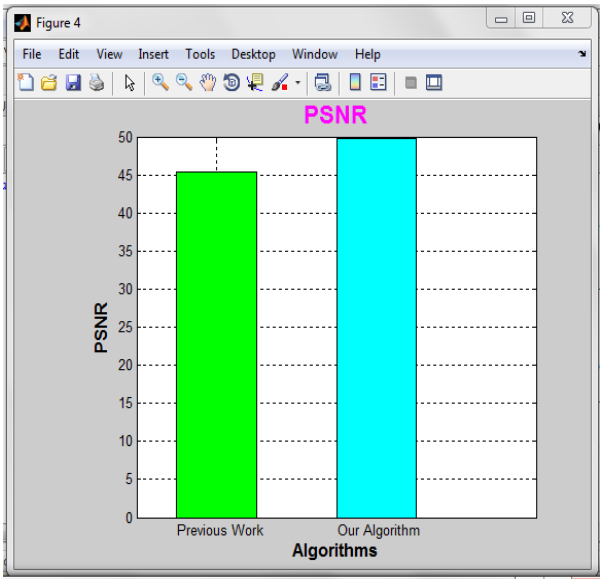

Figure 12: PSNR value of previous and propose work

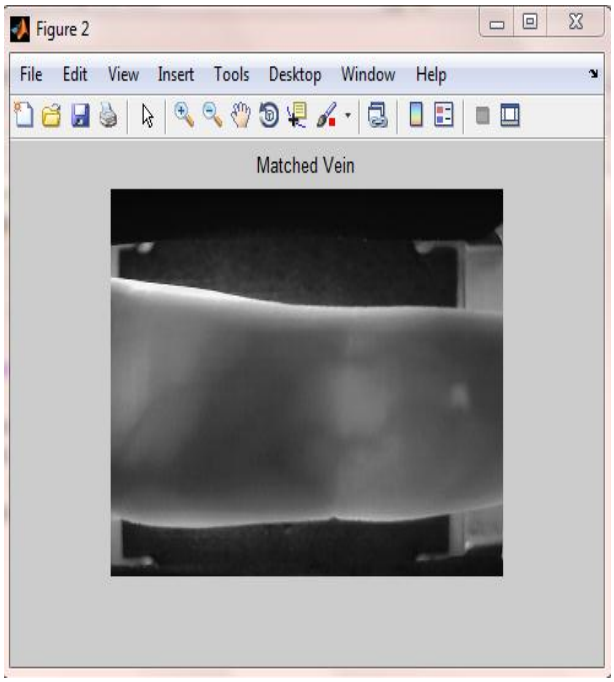

Figure 10: Image of matched vein

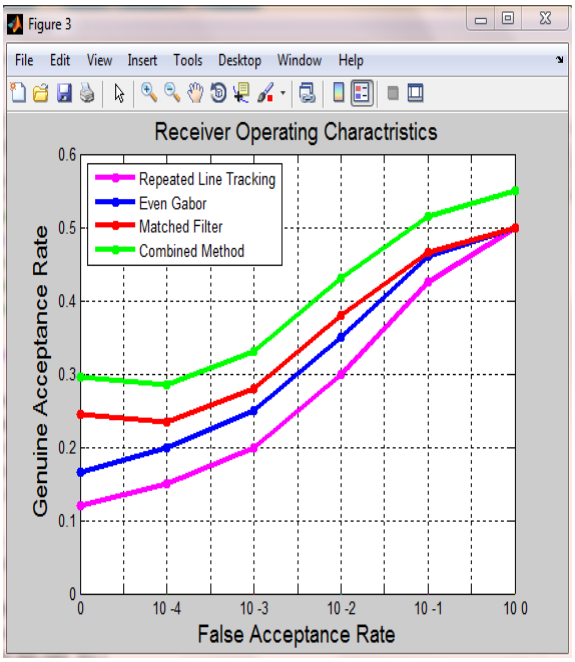

Figure 13: To performance comparison of different techniques

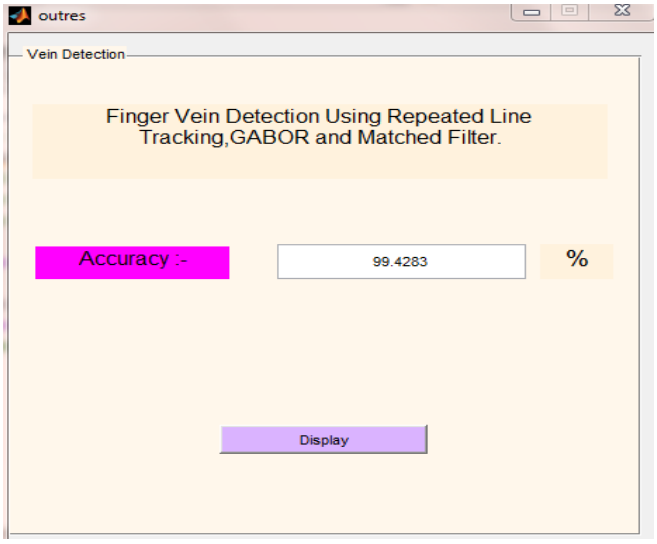

Figure 14: GUI layout of accuracy value

The above figure shows the result of work done. Here identified the vein of body by combine three techniques i.e. repeated line recognition, Gabor filter and matched filter. Here also comparison the PSNR value of previous and propose work
and find out propose work PSNR value better than previous work.

4. Conclusion

This paper presents a complete and fully automated Vein image matching framework by simultaneously utilizing the vein surface and vein subsurface features, i.e., from arm-vein images. This paper present a new algorithm for the arm-vein identification; which can more reliably extract the Finger-vein shape features and achieve much higher accuracy than previously proposed Finger-vein identification approaches. Our arm -vein matching scheme will work more effectively in more realistic scenarios and leads to a more accurate performance; as will be demonstrated from the experimental results. This is shown in result here combine three technique whose PSNR value better than previous technique and accuracy of this techniques is 99.4283% which is much better than previous technique. Here we examined a complete and fully automated approach for the identification of low resolution vein-surface for the performance improvement.

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