

# Hand Palm Vein Authentication by Using Junction Points with Correlation Method

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## Abstract:

Hand palm vein authentication is a biometric modality, which can be used to identify a person. In this paper, palm vein authentication by using Junction point with correlation method is proposed. The process of training and testing the palm vein will take less time to produce the output Our proposed method effectively reduce the processing time and increase the accuracy rate.

**Keywords**— Biometric, Junction point, Hand palm vein, Correlation method.

## I. INTRODUCTION

In the digital world, it is very difficult to maintain our personal records and securing data from intruders. Today every person can easily access their information anytime and anyplace. At the same time with the help of modern technology and advanced techniques unauthorized access of other persons is also increased. To overcome these problems highly secured and more accurate hand palm vein authentication is proposed.

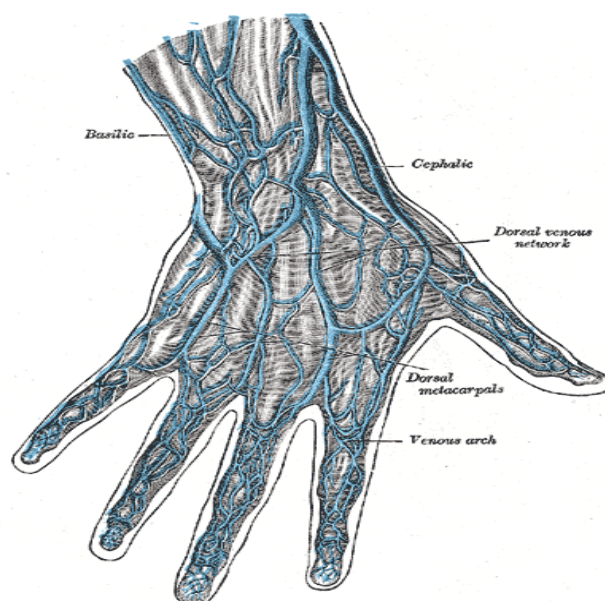


Fig1: Major veins of the hand area (Figure 573 in [15]).

The personal identification system, capturing the palm vein pictures are improved suitably and shared of the quality performance. The palm vein positions are acknowledged and the link positions, which take into their positions and direction of palm veins, are removed to symbolize the merged skin textures. The enthusiasm of the investigation is the link point including the interconnecting spots of the palm vein outline areas are not an aspect in moreover of the two outlines and it presents a new quality aspect that can be performed for detection. Connecting point demonstration significantly diminishes the breathing space have to compared as the frontage of the exhibition [2].

A person has a rest of his/her wrist, and on a quantity of devices, the middle of his/her palm, sensor can produce a infrared light ray from scanner which passes through the palm rest in device with few seconds. Nothing like the skin, through which nearest infrared light ray passes and then take up the junction point line edges of blood cells in the internal surface elegant through the vein, enlightening the blood cells, reason it able to be seen in the scanner. Consequently the infrared ray light are unseen to the sensor which is not perform to take up, blood cells include vein and vessel. Palm vein

image captured by the camera, which take pictures of the light ray range, show as a black set of connections, dazzling the palm layer sample against the lighter backdrop of the palm vein pictures [12].

## II. PREVIOUS RESEARCH

Palm Vein substantiation is getting higher and contentious development work in which self-determination groups communicate anxiety in excess of confidentiality and uniqueness concerns. Today [3], biometric acts and policies are being progressed and some other production principles are performed very well.

Identification of a human being through his body involving that the human being body is superficially well-known personality structures of an extraordinarily influential tool for personality administration of Biometric appreciation [4].

Palm vein verification system established as a fresh biometric techniques employing the vein prototypes surrounded by one's palms for delicate recognition. Vein prototypes are dissimilar for each palm vein and for each human being [6] is concealed bottom of the skins exterior position, falsification is tremendously not easy. These exclusive characteristics of palm vein model detection set is separately from preceding appearances of some other methods and enclose led to its embracing the foreign country economical associations as their most recent protection knowledge.

The hypothetical basis and complexities of palm vein identification is exposed at primary level. Then, [8] the doorsill feature extraction process and contraction technique of palm vein figures are intensely deliberated and an innovative doorsill segmentation process and an enhanced provisional contraction techniques are going to be developed. The scheme of palm vein image attributes are removing based on the finishing ends and tripping ends are deliberated in the beginning, and the corresponding techniques based on spaces is used to go with the palm vein images.

Identification systems [9] are offering biometric procedures using extraction of palm vein constructions. For conservative procedures, it is essential to utilize luxurious-quality of figures, which insist of expensive collection of procedures. The implementation way is to making to inexpensive plans are probable. The product of this method is demonstrates that they could be extracted the palm vein arrangements are as profitably as using luxurious quality of figures.

The palm vein authentication system using the palm vein verification tool that uses blood container prototypes as individual categorizing aspects. Achievement of some classification systems are allows as an appliance in open places or in atmospheres [7].

Palm vein verification system consists of miniature Palm vein scanner tools that's very easy to handle and standard to use one and all [11], extremely wonderful and rapid. Just put our palm on the superiority tool of scanner and inside a few instants it interprets your restricted coating samples. A palm vein image is full and palm model is recorded into the file.

## III. PROPOSED RESEARCH

In a new palm vein authentication algorithm proposed in the basics of junction points and correlation method. In this method palm vein pictures are captured in accurate manner with the help of vein scanner at the aspect level. The palm vein outlines are removed the joint pixels, which take into their arrangement and direction of the palm veins, which are removed to symbolize the merged skin textures. The enthusiasm of the investigation is the link point including the interconnection spots of the palm vein outline areas are not an aspect in moreover of the two palm vein outlines and it presents a new quality aspect that can be performed for detection. The below algorithm steps operating for our proposed method.

### A. Algorithm steps:

Step1: To read the vein Image from scanner

If image name == 0

Return

End

Step2: Extracting the inner layer of the palm vein by using segmentation process

Step3: Removing the noise by using wiener function

wiener2 (I, [M N])

I-Input Image

M-Mean

N- Standard Deviation

Step4: To truncate the background portion using Region of Interest

Step5: Picking out the inner layer of vein edges for junction points by applying mallet filter edge

Step6: Applying a mallet filter to a region in an image for detecting the veins

Step7: Identifying the junction points in the palm vein images by using the correlation method

Step8: Palm vein authentication, whether to finding the person is Matching person or non-matching person based junction points

```
c=corr2(I, img);
```

```
If(c==1)
```

```
    MsgBox('Matching')
```

```
Else
```

```
    MsgBox('Non-Matching')
```

```
End
```

### B. Segmentation

The segmentation technique is widely used to segment the input palm vein image into meaningful regions. Region segmentation algorithm is widely preferred because of its additional flexibility which allows pixels which belong to multiple classes with varying degrees of membership.

This function calculates and plots the intensity values along a line segment or a multiline path in an image. The line segmentation is taken by specifying their coordinates as input arguments.

### C. Removing Noises

In this method we are going to reduce the noises by using wiener filters. Filtering is used to remove the unwanted noises in an image. The filtering is a process which is used to remove the noises and improve the quality of the image. This procedure can be applied for all scanning vein images.

### D. Image registered and Region of Interest position

Arrange the hand palm veins placed in the slot of screen, figure alignment is required. In the proposed method sample, inflexible check can be much appropriate, because the essential division of the palm captured is exclusive of any get in touch. Hence, a routine non-rigid image registration method is taking up. These model transformation between two figures as close at hand affine, but internationally flat. The representation also clearly demonstrates the limited and general variations in image intensity values. This advanced technique is built upon the discrepancy of multi-scale element, tolerating it to detain both huge and little-size alterations.

The quality level of the combination can be done, matching attains or resolution level with different fusion models. Most of the previous information's on multi-modal alert on merging the results of variety of classifiers at the choice of intensity values. The palm vein are fused at the matching attain range for user identification. The palm vein is extracted the line based on the connecting regions, the system was tested on a database with hand palm vein images. The experimental result gives you an idea about the effectiveness of the method in terms of the detection rate is very close to the maximum level.

### E. Junction Point (JP) Detection

The connecting point is meant by the pixel where two or more outlines are meeting and the intersections are used as the prominent skin textures for entity categorization procedures or to get better boundary recognition. In progress intersection of investigation techniques consist of difficulty, which affects a cover in excess of an associate- province of the figure, and dispersal, which increase terrain sequences from pixel-to-pixel based on a rest of regulations. In this technique, the connecting position is described as the joining pixel of the more than three contour sections and a rapid connecting detector is developed. The connecting ends of the palm vein contour sections coupled with their guidelines of palm veins are calculated. Alteration numbers are used to identify the intersection utilities. The boundary detections are slighted using morphological functions. After that, the interior position used is surrounded by the 3x3 neighborhood connection. Here the 3x3 pixel regions are demonstrated as follows:

The crossings point of the P is defined as

$$S = \sum_{i=1}^8 |f(Z_{i+1}) - f(Z_i)|, f(Z_9) = f(Z_1) \quad (1)$$

Where  $f(y)$  is the double value (0 or 1) of point at  $y$ . The centre point of  $Z$  is measured to be a connection end if  $Z$  is an edge point and if  $S \geq 6$

### F. Cross Correlation on Join Point Extraction

Cross correlation is the best method for calculating the two Join Extractions Point in

$$R_{xy} = \frac{X^i u \cdot Y^i u}{\sqrt{|X^i u| |Y^i u|}} \quad (2)$$

The above formula has been explained in the following manner : the values of X variable are pre-defined and the Y variable is resulted values. If both particular values (i.e.) the value of Rxy is equal to 1, then the particular person is an authorized person. In this proposed work, the resulted value of Rxy is 0.98 which means that the person is an authorized person.

The skin textures of merged palm vein pictorial representations are as a set of connection ends which are belongs to the palm vein contour direction at each texture position.

Whole constraints are as compared with the exterior illustration, e.g. palm vein, or contour image. Given a set Z of joint ends, described as model position, and a reservation position of Q of k joint point n. 24 dot pixels are needed to store the direction. Therefore, the whole images are needed to store for 5n bytes only. The mathematical outputs as of our file demonstrate with the intention of average numbers of joint ends is about 28. The overall necessity is  $[5 \times 28] = 140$  bytes.

The verification value of the outline similarities are computed as follows:

$$SS = \frac{2}{N_a + N_b} \sum_{i=1}^M \sum_{i=1}^N L_a \cap L_b \quad (3)$$

The open database contains palm vein images and the logical operation “AND”;  $N_a$  and  $N_b$  are the amount of the contour ends in the prototype and the experimental palm vein pictures are correspondingly. SS is connecting between 0 and 1. The contour is symbolized as the finishing end and direction of sequence code in the contour on the end. Suppose the length of a palm line is S, the length of the chain code will be  $(S \pm 1)$ . Since 3 bit are needed to store a direction code (zero, one, and seven),  $3 \pm (S-1)$  bits needed to correspond to the whole chain code. The direction of end pixel one needs two byte to be accumulated. Therefore, total of  $[3 + 2 \pm (S-1)] / 8$  bytes are needed to store each palm vein line. The mathematical outputs from our file demonstrate that the overall records of palm vein outline are about 37 and the standard distance of the contour is about 21 points. The standard necessity is  $37 \times [2 + 3 \times (21-1)/8] = 351.5$  bytes.

### G. Authentication mechanism

Hand Palm vein verification uses the biometric sample of person palm as own recognition records. A palm has a joint ends and edge detection is more difficult of biometric sample and consequently containing prosperity of make different features for private detection. The hand palm vein is a best part of the human body for this knowledge, it normally does not have hair in the palm which can be a problem for get something on the film biometric sample, and it is less risk to change in a skin color. When the image is captured by using infrared ray in the scanner take up light ray enclose a wavelength absorbs the deoxygenated hemoglobin in the blood flow, during the palm vein testing. Based on this feature, the vein authentication device translates the black lines of the infrared ray image as the junction point sample of the palm, and then matches it with the previously registered junction point value of input and base pattern of the individual. The contour extraction and the joint ends are beginning from left hand side to right hand side. We are going to take the 3, 10 and 27 joint ends in palm vein descriptions correspondingly. Pattern of the feature extraction is a large amount of connecting pixels can be identified in the merged aspect than one in the palm vein only. There are three, ten and twenty seven connecting ends in the palm vein image and merged images recognizing the testing period.

## IV. EXPERIMENTAL RESULTS

### A. Input image and Segmentation

Get an input image from the scanner and extract the inner layer of the hand palm vein image by using segmentation process. Image creates an graphics object by interpreting each element in a color map.

Wiener de-convolution can be used effectively when the frequency characteristics of the image and additive noise are known, to at least some degree. In the absence of noise, the Wiener filter reduces to the ideal inverse filter. Remove the noise, by using the wiener function.

Fig2: Palm Vein Segmentation

*B. Region of Interest (ROI)*

Fig3: ROI performance of palm vein image

The registered palm vein image appears ROI with the base image is to truncate the background portion by discarding any areas that would extrapolate beyond the extent of the base image.

*C. Intersecting point*

Intersecting palm image is pick out the inner layer of vein edges for calculate junction points with correlation method by applying mallat filter edge.

Fig4: Intersecting point of Palm vein images

*D. Region growing of palm vein Lines (Mallet filter)*

Region growing is the process of applying a filter to a region in an image, where a binary mask defines the region.

*E. Junction point identification*

Easily identify the junction point in the palm vein image with the identifying the intersect point of two more lines.

An account of connection points stands for chronological pronouncement points in the situation course map based on the chronological data qualified to the condition movement. The sample registered palm vein is accumulating into the folder beside through the individual information of the testing periods.

To select control points in two related images which are used to identify the meeting point in the hand palm vein. Input is the figure that desires to be distorted to transport it into the organizing scheme of the base figure. Input and foundation points of palm vein can also be changeable that embrace grayscale, true color, or binary images, or sequences that recognize files restraining these images. The proposed system of recognized processing period of time in (sec) is less than previous method.

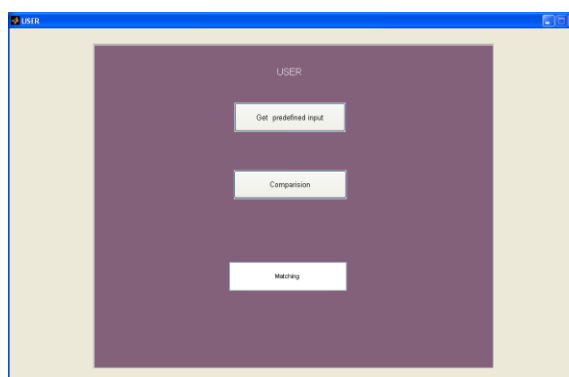
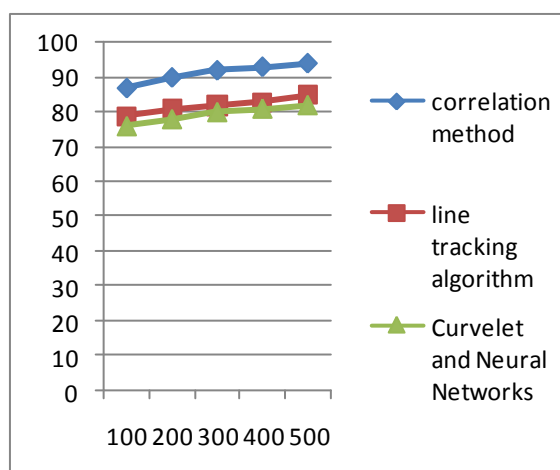


Fig2: Palm vein Verification performance

**TABLE 1:**

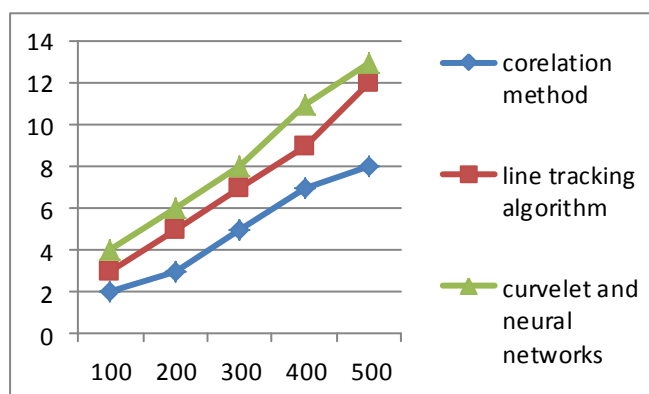
THE PERFORMANCE OF EXISTING VS. PROPOSED SYSTEM IN PALM VEIN AUTHENTICATION ACCURACY AND TIMING PERFORMANCE

Performance	Palm image	Process time(sec)	Accuracy
Palm Vein authentication using curve let and neural networks	500	13ms	82%
Palm Vein authentication using line Tracking Algorithm	500	12ms	85%
Palm vein authentication using Gabor filter and SIFT	500	10ms	90%
Proposed	500	8ms	94%



X Axis-Total No of Palm Images Y Axis-Authentication performance in percentage

Fig 3: Graphical representation of Existing vs. Proposed Authentication Performance Results



X Axis-Total No of Palm Images Y Axis-Mille seconds

Fig4: Graphical Representation of Existing vs. Proposed Authentication Timing performance in Mille seconds

## V. CONCLUSION

The hand Palm vein authentication using junction points with correlation method easily find out the person's authentication. The advantage of the proposed system is less processing time and high accuracy than the existing system

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