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Palm Vein Technology

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Abstract - *Palm vein technologies are one amongst the upcoming technologies which are highly secure. It's the world's first contactless personal identification system that uses the vein patterns in human palms to verify a personality's identity. It's highly secure because it uses information contained within the body and is additionally highly accurate because the pattern of veins within the palm is complex and unique to every individual. Moreover, its contactless feature gives it a hygienic advantage over other biometric identification technologies.*

Key Words: **Palm vein, Verification, Vein Pattern, ROI, Palm Vein Images.**

1. INTRODUCTION

Recent advances in information technology and also the increasing demand for security have led to the rapid development of biometric-based automatic personal identification systems. Traditional biometric characteristics include 1.face, 2. Fingerprint, 3. Palm-print, 4. Iris, 5.Retina, 6. Gait, 7.hand geometry, etc. Biometric-based identification systems using these media are successfully utilized in many safety access applications like Justice and enforcement, border control and airport, customs, Healthcare, and banks. The tremendous growth within the demand for more user-friendly and secured biometrics systems has motivated researchers to explore new biometric features and traits. Palm vein technology has gained the researchers' attention because the vein patterns are internal to the material body and can't be stolen. It's a high degree of accuracy. The vein patterns are non-vulnerable to spoofing attacks. Even for the identical twins, the DNA patterns are going to be the identical but their palm vein patterns are unique. Therefore, vein verification provides higher security and privacy for the user.

Palm vein holds the subsequent merits:

• The human palm vein pattern is extremely complex and it shows a large number of vessels.

• The biometric information is found inside the shape, and thus it's protected against forgery and manipulation.

• The position of the palm vein vessels remains the identical for the entire life and its pattern is exclusive.

• coloring, skin dirtying, surface wounds, skin humidity, skin temperature, aging don't have a significant influence to enroll and to authenticate the palm vein pattern correctly.

Because of these, palm vein seems to a far better biometric feature than fingerprint and face.

For extracting the knowledge contained during a palm vein image, variations independent of the judgment of features need to be captured amongst a group of palm vein images. This information is then used for encoding and comparing individual palm veins.

Normally, blood vessels extend in our body, showing a transparent network and good connectivity. However, during this procedure, various factors like environmental illumination, temperature, light scattering in imaging finger tissues affect the imaging quality of vein patterns. Therefore, the acquired vein images include not only vein patterns but also noise and irregular shadowing, so it's very difficult to completely segment the vein features. Usually, some vein patterns are missed and false vein patterns are generated in some regions from the vein image, which degrades the distinctiveness, leading to low verification accuracy. Currently, several methods are proposed to segment the vein network from the vein image for verification.

2. Literature Survey

[1] D. Zhang et al. developed an online verification method using palm vein and palm print modalities. Palm prints and palm vein images were acquired simultaneously and matched filters were used for feature extraction.

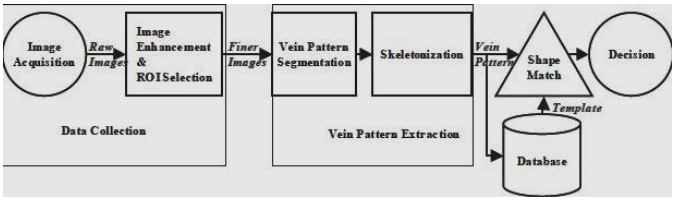
[2] A. Kumar et al. proposed an ant colony optimization technique for bimodal knuckle verification which utilizes the fuzzy binary decision tree method. Considering the knuckle verification as a two-class classification problem, A. Kumar et al. used a fuzzy decision tree (FDT) to classify the claimed identity into any of the genuine (accept) or the imposter (reject) classes based on the available training data.

[3] Zhang L, Li L, Yang A, Shen Y & Yang M, "Towards contactless palm print recognition: A novel device, a new benchmark, and a collaborative representation based identification approach", Pattern Recognition, Vol.69, (2017), pp.199-212. The author devised and developed a novel palm print image acquisition device, which is highly user-friendly

and can acquire high-quality palm- print images. A small and cost-effective set up is employed in small scale applications.

[4] Sasikala R, Sandhya S, Ravichandran K & Bala Subramaniam, "A survey on human palm vein identification using Laplacian Filter", IJIRCCE, (2016). In this paper, 'Human Identification Using Palm-Vein Images Using Laplacian Filter. A new method of personal authentication based on palm-vein has been discussed.

3. Methodology



Veins are hidden underneath the skin and are generally invisible to the oculus and other visual inspection systems. However, human superficial veins have higher temperatures than the encircling tissue. Supported this fact, the vein pattern within the back of the hand is captured employing a thermal camera. E. an oblong region within the hand images is defined because the region of interest (ROI). The clearness of the vein pattern within the extracted ROI varies from image to image, therefore, the standard of the photographs must be enhanced before further processing. After removing the speckling and other high-frequency noise, the vein pattern images are normalized to possess pre-specified mean and variance values. The normalization process is to scale back the possible imperfections within the image because of the sensor noise and other effects. After noise reduction and normalization, the standard of the image gets improved. However, the vein pattern should still be surrounded by many faint white regions. To get an improved representation of the form of the vein pattern, it's necessary to separate the vein pattern from the image background. Because the gray-level intensity values of the vein vary at different locations within the image, global thresholding techniques don't provide satisfactory results. The binary image of the vein pattern are successfully segmented from the first image taken before after applying the local thresholding algorithm. As the size of veins grow as folks grow, only the form of the vein pattern is employed because the sole feature to acknowledge each individual. An honest representation of the pattern's shape is via extracting its skeleton. After applying the thinning algorithm the skeletons of the vein pattern are successfully extracted and also the shape of the vein pattern is well preserved. Vein pattern matching is completed by measuring the road segment Hausdorff distance between a pair of vein patterns.

4. CONCLUSIONS

In this paper, we attempted to explore the discriminant capability of the contactless palm print. A biometric system that recognizes the duplicates the shapes of the vein pattern within the rear of the human hands. Vessel patterns are unique to each individual, as are other biometric data like fingerprints or the patterns of the iris. Unlike some biometric systems, vessel patterns are almost impossible to counterfeit because they're located beneath the skin's surface. Palm Vein recognition technology is secure because the authentication data exists inside the body and is therefore very difficult to foll. It's also highly accurate. Moreover, its non-intrusive feature gives it a plus over other identity verification technologies.

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