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Palmprint Recognition using Novel Fusion Algorithm

***R.Udayakumar**

Dean- Computer science and IT, Kalinga University, Raipur, CG, India

*deancsit@kalingauniversity.ac.in, rsukumar2007@gmail.com

ABSTRACT: Palmprint is a promising biometric feature for use in access control and forensic departments. Already availed researches on palmprint recognition mainly concentrates on low-resolution (about 100ppi) palmprints. But for high-security applications forensic usage), high-resolution palmprints (500ppi or higher) are required from which more useful quality information can be extracted. In this paper, we introduce a novel- recognition algorithm for very high-resolution image. The main contributions of the proposed algorithm include the following: 1) use of multiple features namely minutiae, principle lines, density and orientation, palmprint recognition to significantly improve the matching performance of the conservative algorithm. 2) Design of a quality-based and adaptive orientation field estimation algorithm which performs better than the present algorithm in case of regions with a large number of creases. 3) Use of a novel-fusion algorithm for an detection application which performs better than conservative fusion methods, e.g., SVMs,Neyman-Pearson rule or weighted sum rule. Besides, we analyze the discriminative influence of different characteristic combinations and find that concreteness that is very useful for palmprint recognition. Experimental outcome on the database containing 14,576 palmprints show that the proposed algorithm has achieved a good piece. In the case of verification, the recognition system's False Rejection Rate (FRR) is 16 percent, which is 17 percent lesser than the best existing algorithm at a False Acceptance Rate (FAR) of 10^-5, while in the credential experiment, the rank-1 live-scan fractional palmprint recognition rate is enhanced from 82.0 to 91.7 percent.

KEYWORDS: Palmprint, orientation field, the composite algorithm, density map, data fusion.

I. INTRODUCTION

Palm print recognition inherently implements many of the same matching characteristics that have allowed fingerprint recognition to be one of the most well-known and best revealed biometrics. Both palm and finger biometrics are represented by the information existing in a friction ridge impression.

This information combines ridge structure, ridge flow and ridge characteristics of the raised portion of the epidermis. The represented data by these friction ridge impressions allow a determination in corresponding areas of friction ridge impressions either originated from the same source or could not have been made by the same source.

Because fingerprints and palms have both uniqueness and performance, they have been used for over a century as a trusted from a identification. However palm recognition was slower in becoming automated due to some restraints in computing capabilities and live-scan technologies. This paper on palmprint recognition using Novel Fusion algorithm provides a brief overview of the historical progress of future implications for palm print biometric recognition.

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Fig. 1. Developed palm print authentication system with structured light imaging and an example of the use of the system.

Palm Identification

The are three groups of marks which are used in palmprint identification:

- Geometric features, such as the width, length and area of the palm. Geometric featuresare a coarse measurement and are relatively easily duplicated. In themselves they are notsufficiently distinct.
- ∟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 highlydistinctive and are not easily duplicated, principal lines may not be sufficiently distinctiveto be a reliable identifier in themselves; and
- Point features or minutiae. Point features or minutiae are similar to fingerprint minutiaeand identify, amongst other features, ridges, ridge endings, bifurcation and dots.Palm creases and ridges are often superimposed which can complicate feature extraction.

Some specialist terms describe the techniques used in palm, hands and feet recognition:

- Ridgeology is the study and identification of the friction ridges found on palms, fingersand feet.
- ∟Edgeoscopy is the study of the detail and characteristics of ridge edges.
- ∟Palmar Flexion Crease Identification studies creases on palms cause by flexing the hand.
- As with fingerprint recognition, there are three principal palm matching techniques.

Theseare:

- minutiae-based matching, the most widely used technique
- correlation-based matching, and
- ridge-based matching.
- Data Capture

There are three capture methods:

- Off-line, where palm prints are inked onto paper and later scanned into the palm print system.
- On-line, where palm prints are directly scanned.
- Real-time, where palm prints are scanned and processed in real-time.

There is continuing research into the use of palm and hand prints for biometric identificationusing, for example, eigenspace techniques described as eigenpalm and eigenfinger. Thistechnique uses features extracted from the fingers, thumb and palm which are mathematicallytransformed and consolidated to provide an overall matching.

Other techniques being researched include cross one and two-dimensional ratios of the locations of finger creases13, quantized co-sinusoidal triplets, Gabor filters, Fourier Transforms, wavelets, Principal Component Analysis (PCA) and Independent.

Reader Types

Palm readers are generally optical, although they may incorporate other reader technologiessuch as capacitive sensors also used in a “liveness” test. Other technologies includeultrasound, and thermal imaging. In this respect palm and hand readers are similar tofingerprint readers. Some palm readers have the capability of capturing 10-print fingerprints,as well as palm prints.

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Low resolution readers (generally less than 100 dpi) can effectively only record principal lines and wrinkles. High resolution readers (generally greater than 400 dpi) are able to record point features.
Hand geometry, for example the points at which fingers are attached to the hand or the gapsbetween fingers, is used to establish the co-ordinates of the hand in relation to the reader forfeature extraction and comparison purposes.

Reading Difficulties
Where users hands do not fully contact the palm readers, there made be some difficulty in obtaining a clear image. A complicating factor here is a change in scale caused by increasingor varying the distance between the reader and palm.
Another difficulty is in capturing a clear image of the hollow of the palm which may not fullycontact the reader. This has been solved, to some extent, by providing curved readers thatfully contact all parts of the palm.
Other difficulties have been caused by shifting position, closing fingers or placing the handon different parts of the reader when registering. Again this has been largely solved bydesigning hollows for the palm and fingers to occupy or by providing pins to separate andlocate the hand on the scanner.Clearly a degree of user co-operation is required in registering palmprints or using biometrichand scanners. Because of the need to touch the hand reader, other concerns include hygieneand latent prints.

Palm Recognition
Some palm recognition systems scan the entire palm, while others allow the palm image to besegmented in order to improve performance and reliability. In general terms, reliability andaccuracy is improved by searching smaller data sets. Palm systems categorise data basedupon the location of a friction ridge area.

II. EXISTING SYSTEM

A novel fusion scheme for an identification application which performs better than conventional fusion methods like weighted sum rule, SVMs, or Neyman-Pearson rule, and another one algorithm at a False Acceptance Rate of 10^-5, while in the identification experiment, the rank-1 live-scan partial palmprint recognition rate is improved from 82.0 to 91.7 percent. Research on palmprint recognition mostly concentrates on low-resolution (about 100 ppi) images which are mainly captured by contactless devices. For low-resolution images, palmprint ridges cannot be observed, and the matching is mainly based on crease and texture features. Extracted the hand shape and principal line features to build the palmprint recognition system. Presented the datum point invariance and line feature matching characteristics in palmprint verification. . Tried to represent and match the principal lines with feature points which locate on the principal lines and are extracted by a series of morphological operations. Matched the principal lines by the interesting points, which are extracted by the Plessey operator

Disadvantages

- Low resolution
- Recognition scan partial rate is low level

III. PROPOSED SYSTEM

A multifeature-based high-resolution palmprint recognition system in which minutiae; orientation field, density map, and principal line map are reliably extracted and combined to provide more discriminatory information. Novel orientation field estimation algorithm is not significantly affected by the presence of creases. It can adaptively choose a suitable estimation method according to the qualities of different regions. And it achieves a higher recognition palmprint acquisition device using a CCD camera and a 2D Gabor phase encoding scheme to extract palmprint textures. In highlighted the discriminative power of principal lines and used those to design a palmprint verification system. A modified fuzzy C-means cluster algorithm for competitive code based palmprint recognition. A region-growing could extract the orientation field on palmprints in the presence of creases. And a novel minutia descriptor, Minutia Code, was utilized. In the matching stage, the weighted sum of minutiae and orientation field similarities was calculated to measure the similarity between palmprints. The algorithm achieved a rank-1 recognition rate of 78.7 percent when searching live-scan partial palmprints on a background database containing 10,200 full palmprints.

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Advantages

- Achieved a good performance
- Good supplement to minutiae for palmprint recognition.
- Highly security

IV. CONCLUSION

We developed a novel high-resolution palmprint recognition system which can handle palmprints with a large amount of creases, leading to much higher accuracy than the previous systems. The main contributions are as follows:
First, use of multiple features for palmprint recognition to significantly improve the matching accuracy.
Second, design of a quality-based and adaptive orientation field estimation algorithm. It can reliably estimate the ridge direction by adaptively choosing suitable estimation method according to the image quality. Third, use of a novel heuristic rule for identification applications to combine different features. Fourth, the discriminative power of different feature combinations is analyzed and we find that density is very useful for palmprint recognition.
We argue that further research on palmprint recognition should focus on handling nonlinear deformation and matching efficiency. Relative nonlinear deformation among different impressions of the same palm is unavoidable in the case of a contact-based scanner. And this significantly affects the matching of minutiae, orientation, and density map, especially in the case of palmprints that have much larger size as compared to fingerprints. Another challenge for high resolution palmprint recognition is fast matching in a large-scale database. A better indexing and searching method should be studied.

REFERENCES

1. Kalaiprasath, R; Elankavi, R; Udayakumar, R; , Cloud security and compliance-a semantic approach in end to end security, International Journal on Smart Sensing and Intelligent Systems, V-10, I-5, PP:482-494, 2017.
2. Elankavi, R; Kalaiprasath, R; Udayakumar, R; , Wireless Zigbee Network Cluster-Capacity Calculation and Secure Data Conveyance Using Indegree, International Journal on Smart Sensing and Intelligent Systems, V-10, I-5, PP:174-185, 2017.
3. Kalaiprasath, R; Elankavi, R; Udayakumar, R; , A New Approach for Cloud Data Security: From Single to Cloud-of-Clouds, International Journal on Smart Sensing and Intelligent Systems, V-10, I-5, PP:604-613, 2017.
4. Elankavi, R; Kalaiprasath, R; Udayakumar, R; , Data Mining with Big Data Revolution Hybrid, International Journal on Smart Sensing and Intelligent Systems, V-10, I-5, PP:560-573, 2017.
5. Elankavi, R; Kalaiprasath, R; Udayakumar, Dr R; , A fast clustering algorithm for high-dimensional data, International Journal Of Civil Engineering And Technology (Ijciet), V-8, I-5, PP:1220-1227, 2017.
6. Gajmal, Yogesh M; Udayakumar, R; , Blockchain-based access control and data sharing mechanism in cloud decentralized storage system, Journal of web engineering, PP:1359–1388-1359–1388, 2021.
7. Gajmal, Yogesh M; Udayakumar, R; , A Bibliometric Analysis of Authentication based Access Control in Cloud using Blockchain, Library Philosophy and Practice, PP:0_1-16, 2021.
8. Shirke, S; Udayakumar, R; , Robust lane identification by using EW-CSA based DCNN, J. of Critical Reviews, V-6, PP:18-21, 2019.
9. Subhash, Ligade Sunil; Udayakumar, R; , A BIG SHARK ADAPTION ALGORITHM BASED RESOURCE ALLOTMENT APPROACH IN CLOUD COMPUTING ENVIRONMENT, PalArch's Journal of Archaeology of Egypt/Egyptology, V-17, I-7, PP:5374-5379, 2020.
10. Gajmal, Yogesh M; Udayakumar, R; , Privacy and utility-assisted data protection strategy for secure data sharing and retrieval in cloud system, Information Security Journal: A Global Perspective, V-31, I-4, PP:451-465, 2022.
11. Gajmal, Yogesh M; Udayakumar, R; , Analysis of Authentication based Data Access Control Systems in Cloud, PalArch's Journal of Archaeology of Egypt/Egyptology, V-17, I-7, PP:5319-5328, 2020.
12. Shirke, Suvarna; Udayakumar, R; , Evaluation of crow search algorithm (CSA) for optimization in discrete applications, 2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI), PP:584-589, 2019.
13. Shirke, Suvarna; Udayakumar, Ramanathan; , A novel region-based iterative seed method for the detection of multiple lanes, International Journal of Image and Data Fusion, V-11, I-1, PP:57-76, 2020.
14. Shirke, Suvarna; Udayakumar, R; , Fusion model based on entropy by using optimized DCNN and iterative seed for multilane detection, Evolutionary Intelligence, PP:44940, 2022.
15. Shirke, Suvarna; Udayakumar, R; , Hybrid optimisation dependent deep belief network for lane detection,

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 4, April 2023 |

| DOI:10.15680/IJMRSET.2023.0604031 |

Journal of Experimental & Theoretical Artificial Intelligence, V-34, I-2, PP:175-187, 2022.

16. Subhash, Ligade Sunil; Udayakumar, R; , Sunflower whale optimization algorithm for resource allocation strategy in cloud computing platform, Wireless Personal Communications, V-116, PP:3061-3080, 2021.
17. Subhash, Ligade Sunil; Udayakumar, R; , A Supremacy–Responsive Resource Distribution Technique for Controlled Workflow Implementation in Cloud Surroundings, Solid State Technology, V-63, I-5, PP:7662-7669, 2020.
18. Sindhu, Velagapudi Swapna; Lakshmi, Kavuri Jaya; Tangellamudi, Ameya Sanjanita; Lakshmi, C; , A Deep Learning Approach For Detecting Type 2 Diabetes Mellitus, 2022 International Conference on Computer Communication and Informatics (ICCCI), PP:44936, 2022.
19. Priyan, Siluvayan; Udayakumar, R; Mala, Pitchaikani; Prabha, Mariappan; Ghosh, Ananya; , A sustainable dual-channel inventory model with trapezoidal fuzzy demand and energy consumption, Cleaner Engineering and Technology, V-6, PP:100400, 2022.
20. Elankavi, R; Kalaiprasath, R; Udayakumar, R; , Potential Exploitation of Broadcasting System Using Multiple Smart Directional Antennas-Help of Sensor Network, International Journal of Mechanical Engineering and Technology (IJMET), V-8, I-6, PP:678-687, 2017.
21. Udayakumar, R; Kalam, Muhammad Abul; , Sentiment Analysis Using Machine Learning Algorithms, Mathematical Statistician and Engineering Applications, V-71, I-3s2, PP:1186–1200-1186–1200, 2022.
22. GAJMAL, YOGESH M; UDAYAKUMAR, R; , Data Access Controls in Cloud: A Survey., International Journal of Pharmaceutical Research (09752366), V-12, I-4, 2020.
23. Udayakumar, R; Khanaa, V; Kaliyamurthie, KP; , Optical ring architecture performance evaluation using ordinary receiver, Indian Journal of Science and Technology, V-6, I-6, PP:4742-4747, 2013.
24. Udayakumar, R; Khanaa, V; Kaliyamurthie, KP; , Performance analysis of resilient ftth architecture with protection mechanism, Indian Journal of Science and Technology, V-6, I-6, PP:4737-4741, 2013.
25. Udayakumar, R; Khanaa, V; Saravanan, T; , Synthesis and structural characterization of thin films of sno2 prepared by spray pyrolysis technique, Indian Journal of Science and Technology, V-6, I-S6, PP:4754-7, 2013.
26. Udayakumar, R; Khanaa, V; , Health monitoring system for induction motors, Int. J. Eng. Comput. Sci, V-2, I-4, PP:1117-1122, 2013.
27. Udayakumar, R; Khanaa, V; , Quantum Computers-A Revolution InComputing, Quantum, V-8, I-4, PP:33-36, 2013.
28. Khanaa, V; Udayakumar, R; , Protecting privacy when disclosing information: k anonymity and its enforcement through suppression, database, V-1, I-2, 2012.
29. Khanaa, V; Udayakumar, R; , Hybrid Fuzzy Approches for Networks, International Journal of Innovative Research in science, Engineering and Technology, V-12, I-3, PP:24-31, 2012.
30. Udayakumar, R; Khanaa, V; Saravanan, T; Saritha, G; , Cross layer optimization for wireless network (WIMAX), Middle-East Journal of Scientific Research, V-16, I-12, PP:2013, 2012.
31. Udayakumar, R; Thooyamani, KP; Khanaa, V; , Coarse-Grained Parallel Genetical Gorithm to Solve the Shortest Path Routing Problem Using Genetic Operators, Middle-East Journal of Scientific Research, V-15, I-12, PP:1651-1654, 2013.
32. Khanaa, V; Udayakumar, R; , Efficient Pc Controlled By Hand Movement Using Mems Sensor Mouse, Indian Journal of science and Technology, V-12, I-6, PP:1438-1442, 2012.
33. Udayakumar, R; Khanaa, V; , Sixth Sense Technology, International Journal Of Engineering And Computer Science, V-2, I-4, 2013.
34. Udayakumar, R; Thooyamani, KP; Khanaa, V; , Secure Incentive Protocol for Multi-Hop Wireless Network with Limited Use of Public Key Cryptography, Middle-East Journal of Scientific Research, V-20, I-11, PP:1651-1656, 2014.
35. Udayakumar, R; Kaliyamurthie, KP; Khanaa, TK; , Data mining a boon: Predictive system for university topper women in academia, World Applied Sciences Journal, V-29, I-14, PP:86-90, 2014.
36. Udayakumar, R; Saravanan, T; , Tailored Image District Processing Precision Andwritten Appreciation, Middle-East Journal of Scientific Research, V-20, I-11, PP:1615-1625, 2014.
37. Udayakumar, R; Thooyamani, KP; , Khanaa, Deploying site-to-site VPN connectivity: MPLS Vs IPSec, World Applied Sciences Journal, V-29, I-14, 2014.
38. Udayakumar, R; Thooyamani, KP; , Random projection based data perturbation using geometric transformation, World Applied Sciences Journal, V-29, I-1, PP:24-31, 2014.
39. Thooyamani, KP; Khanaa, V; Udayakumar, R; , Wide area wireless networks-IETF, Middle-East Journal of Scientific Research, V-20, I-12, PP:2042-2046, 2014.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

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40. Khanaa, V; Thooyamani, KP; Udayakumar, R; , Modelling Cloud Storage, World Applied Sciences Journal, V-29, 2014.
41. Khanaa, V; Thooyamani, KP; Udayakumar, R; , Elliptic curve cryptography using in multicast network, World Applied Sciences Journal, V-29, 2014.
42. Khanaa, V; Thooyamani, KP; Udayakumar, R; , Two factor authentication using mobile phones, World Applied Sciences Journal, V-29, I-14, PP:208-213, 2014.
43. Khanaa, V; Thooyamani, KP; Udayakumar, R; , Patient monitoring in gene ontology with words computing using SOM, World Applied Sciences Journal, V-29, 2014.
44. Kaliyamurthie, KP; Parameswari, D; Udayakumar, R; , Malicious packet loss during routing misbehavior-identification, Middle-East Journal of Scientific Research, V-20, I-11, PP:1413-1416, 2014.
45. Udayakumar, R; Saritha, G; Saravanan, T; , Modelling and Simulation of Electromechanical Systems Working with Nonlinear Frictional Loads and Controlled by Subordinated Control System of Coordinates, Middle-East Journal of Scientific Research, V-20, I-12, PP:1918-1923, 2014.
46. Saravanan, T; Saritha, G; Udayakumar, R; , Cassette Steganography for Entrenched Metaphors in Squashed Videos, Middle-East Journal of Scientific Research, V-20, I-12, PP:2475-2478, 2014.
47. Udayakumar, R; Khanaa, V; Saravanan, T; , Energy Demand Management Motor Control Using Multilevel Inverter, Middle-East Journal of Scientific Research, V-20, I-12, PP:2613-2619, 2014.
48. Thooyamani, KP; Khanaa, V; Udayakumar, R; , Wireless cellular communication using 100 nanometers spintronics device based VLSI, Middle-East Journal of Scientific Research, V-20, I-12, PP:2037-2041, 2014.

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