

Hand Recognition System Design

Harleen Kaur*
Simranjeet Kaur**

Abstract

In the field of Biometrics, attributes, for example, fingerprints, hand and face distinguishment and voice check utilized for personality confirmation are increasing higher worthiness rate. One of the biometric frameworks, hand distinguishment has been viewed as most suitable and adaptable for security application. Geometric estimations of the human hand have been utilized for personality verification as a part of a framework. This paper depicts a method for hand biometric peculiarity extraction utilizing hand form matching. Euclidian separation is gotten from beginning reference point and after that tip and valley purpose of finger is figured. At that point apply some scientific computation to compute the hand geometry gimmicks like finger length, width and border.

Keywords: hand geometry, feature extraction, mathematical calculation.

Introduction

In today's reality biometric systems are picking up consideration. Physiological or behavioral attributes of the individual are ruined distinguishment. The physiological qualities infers utilizing human body parts for verification and behavioural attributes suggests activities utilizing body parts like voice, mark and stride and so on. The accompanying are a few gimmicks of biometric frameworks:

- Universality: which implies the trademark ought to be show in all people.
- Uniqueness: every individual have novel qualities.
- Permanence: its imperviousness to maturing.
- Measurability: that it is so natural to gain picture or sign from the single person.
- Performance: how great it is at perceiving and recognizing people.
- Acceptability: the populace must be ready to give the trademark.

In all cases there ought to be a database to store biometric gimmicks. The framework part is to contrast an information and all the entrances in the database

Harleen Kaur*

Management Education & Research Institute

Simranjeet Kaur**

Management Education & Research Institute

and check if there is a match, to affirm the personality of the single person. To think about any sort of biometric attributes its important to speak to them in a stable manner.

This is separated into two assignments:

1. Speak to a biometric trademark in reproducible and stable peculiarity such that oppose data variability.
2. Analyze such peculiarities so clients can precisely be recognized.

Proposed system

The scanner is used to take image. The features are extracted by using image processing techniques and mathematical calculations.

The palm print biometric system include following steps:

Acquisition

Using scanner image is captured. The image taken is a colour image with no deformity providing easy, less-cost, non contact, effortless and user-friendly acquisition process. The hand's position is not fixed in this process. The image is taken in three different angles (90,180, -180), stored in jpeg format. In case finger is missing the system is unable to process the image.

Pre-processing

The next step is Palm Print pre-processing. The image is prepared for feature extraction. At this stage colour

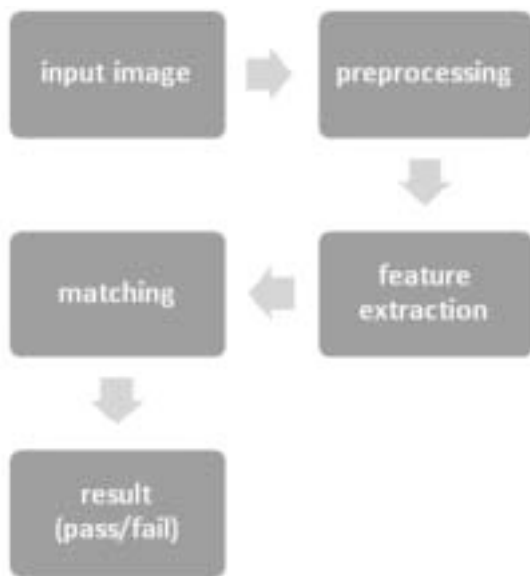


Figure 1. System architecture

image is transformed to gray level image then the noise pixels from the gray image is reduced.

Edge detection

After elimination of noise the picture contains locales of highly contrasting pixels. It is obliged just edges are contained in picture to concentrate geometric gimmicks. Subsequently the areas of white space are obliged to change over to a picture containing the limit of the white pixels just. The edge identification calculation is utilized for this reason. The calculation changes over all pixels to dark pixels barring the one at the limit of highly contrasting. The calculation must guarantee that the thickness of this limit is as low as could reasonably be expected.

It is troublesome for edge identification calculation not to miss any edges. It is likewise critical that no non edges are recognized as edges. These two focuses characterize the lapse rate. There are likewise two different qualities that a decent edge discovery calculation ought to groups. The separation between the genuine edge and the edge found by the system ought to be as low as could be expected under the circumstances. Likewise the strategy ought not give various reactions to single edges.

Algorithm

Step1: gradx and grady to be dead set, the qualities returned by the portions.



Figure 2. Acquisition of palm print

Step2: compute plot of the edge $\theta = \tan^{-1}(\text{gradx}/\text{grady})$.

Step3: theta approximated to one of these qualities 45, 90, 135 and 0 or 180.

Step4: Traverse along the edge toward the approximated theta and set any pixel to 0 which is not along theta.



Figure 3. RGB color to gray color

The estimate in Step 3 is fairly substantial. This is carried out on the grounds that since a pixel has just 8 encompassing pixel and the edge need to continue to one of these plot. An area including 45 degrees is shaped for each of the four plot 0, 45, 90 and 135. The theta quality lies in one of these locales and approximated to the edge in whose district it lies.

Feature Extraction

This is the most important module in a biometric system which extracts the features of hand geometry. The features of hand print are calculated by using reference point: a) Tip point of all fingers including thumb. b) Starting and ending reference point c) hand centred d) length of major axis e) length of minor axis f) Perimeter

-1	0	+1
-2	0	+2
-1	0	+1

Figure 4. The kernel to calculate the gradient along X axis

+1	+2	+1
0	0	0
-1	-2	-1

Figure 5. The kernel to calculate the gradient along Y axis



Figure 6. Feature extraction

Matching

This is last step. The features extracted in the previous step are matched with the features of that individual stored previously in the database. The system produces a match score based on this comparison. The match score represents the closeness of the current image with the one in the database. A highest score represents a high closeness of the images. Based on experiments a threshold value is decided which lies in the range of match score. If the match score is less than the threshold value the image is rejected. If the match score is higher than the threshold the image in the database.

References

1. Saraf Ashish - Design of Hand Geometry Based Recognition System Department of Computer Science & Engineering Indian Institute of Technology Kanpur in Jan 2007.
2. Arun Ross A.K.Jain and S.Pankati. A prototype hand- geometry based veri_cation system. Int'l Conference on Audio- and Video-based Biometric Person Authentication (AVBPA), pages 166{171, March 1999.
3. A. K. Jain and N. Duta. Deformable matching of hand shapes for veri_cation. International Conference on Image Processing, pages 857{861, October 1999.
4. L. Wong and P. Shi. Peg-free hand geometry recognition using hierarchical geometry and shape matching. IAPR Workshop on Machine Vision Applications, pages 281{284, 2002.
5. Mongkon Sakdanupab and Nongluk Covavisaruch, A Fast and Efficient Palmprint Identification.

Experiments and results

The 50 clients are included in trials. From every client six picture of hand is taken, three from left and three from right hand. It is utilized for the enrolment procedure to characterize the clients' layouts, or peculiarity vectors. The peculiarities are separated and therefore match the database.

Conclusion

The Hand geometry has proved to be a reliable biometric. The proposed system shows how features are extract using very simple mathematical formulas. We are attempting to improve the performance of hand geometry based verification system by reducing the amount of features and incorporating new features. Further we can develop a multi model biometric system to improve the efficiency of the system.

6. google references
7. Gnanou Florence Sudha, M. Niveditha, K. Srinandhini, and S. Narmadha Hand Based Biometric Recognition Based on Zernike Moments and Log Gabor Filters, International Journal of Research and Reviews in Information Sciences (IJRRIS).
8. Kostunica B. Ray, Rachita Misra: Palmprint as a Biometric Identifier, on IJECT Vol. 2.
9. A. Kirthika and S. Arumugam: TEXTURE AND COLOR INTENSIVE BIOMETRIC MULTIMODAL SECURITY USING HAND GEOMETRY AND PALM PRINT in International Journal of Advances in Engineering & Technology.
10. Arun Ross on A Prototype Hand Geometry-based Verification System.
11. Sarat C. Dass, Yongfang Zhu, Anil K. Jain: Validating a Biometric Authentication System: Sample Size Requirements in IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE.
12. Anil K. Jain, Arun Ross, and Sharath Pankanti: Biometrics: A Tool for Information Security on IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY.
13. Karthik Nandakumar, Anil K. Jain and Arun Ross: Fusion in Multibiometric Identification Systems: What about the Missing Data.