

INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

Finger Print Recognition using Fuzzy Logic and Genetic Algorithm

Vikas Hooda* ,Sumiran Daiya** , Sumit Dalal***

*M.tech Scholar, ECE Department

**M.tech Scholar, ECE Department

***Head of Department, ECE Department

S.K.I.E.T.M, Laldrawan , Bahudargadh

Abstract: Bio-metric schemes work on interactive bio-metric data to identify any given person. The most common used biometric parameters are signature, fingerprints, Face, keystroke and iris these biometrics vary with environment and age. Fingerprint authentication states the auto-mated way of identifying a counterpart between two humans using their fingerprints. However, their individuality and uniformity over they have been used for very long time, as more recently fingerprints have become automated due to improvements in computing. Fingerprint alteration is the process to the thoughtful obfuscation of the fingerprints by anyone for masking his/her identity.

Keywords: Biometric, Fingerprint, GA, Fuzzy logic.

I. INTRODUCTION

The physiological or behavioral characteristics are distinguished between unknown person & unauthorized person. This is done by biometric methods. These may be retina recognition, face recognition and finger print recognition. As main characteristics of biometric are that these are different for different persons and can't forgotten or lost.

There are some traditional knowledge based and token based technique to make biometric system more reliable. There are many disadvantages like if id card or passport is rushed out it can be easily replaced. It is like if a person have different account with different passwords and one account is hacked but another account remain safe. As it is done by all the biometric account is broken.

Among the different biometric authentication, fingerprint is best one biometric. It is more powerful biometric to identify a person authenticity. Fingerprint is most efficient and secure technique to identify a person.

Biometrics have wide range of applications like forensics use such as criminal identification and other security. Now a days, Biometric are widely used in different civilian applications which having strong potential. These application are like banking, e commerce and access control. As there is increase of digital marketing and the digital transaction, smart cards, credit cards in each and every field, these biometric systems are used. Different online transaction, web access biometric systems are used. These are the traditionally token based process for accessing physical control applications. As biometric application increase day by day so these technology may be used for remote login and data access application. These are traditionally knowledge based authentication. In upcoming years, biometric systems are more trust worthy as compare to other systems. There are other than the basic application many more application like voter id, pan card registration, diverging license, time and attendance.

The rest of paper is design as given as. The overall past work is describe in Section II. Section III describes the methodology used for proposedwork. Result analysis describe in section IV. Finally , the conclusion of paper is describe in section V.

II. PREVIOUS RESEARCHES

Alessandra A. Paulino et al., 2013 [1] tells identification different fingerprints based on crime scene. Hough Transformation applied for getting orientation field information.

Ajita Rattani, et al., 2014 [2] differentiate a live finger from a fake fingers. In this improvement is up to 46% with adaptive approach

Carsten Gottschlich, et al., 2014 [3] compare the average accuracy with proposed technique to traditional technique. The best algorithm is applied to a data LivDet 2013. It providesdevice diversity using the same evaluation protocol.

Daxin Tian et al., 2014 [4] propose new inspired model based on biometric for handoff decision in the proposed heterogeneous network applied for different fingerprints

Marasco, Emanuela g Wu et al., 2014 [5] discuss many issues related to the security of the fingerprint recognition. These are highly high-lighted with different attacks

Jain, Anil K., et al. (2016) [6] tell about the fingerprint recognition. The performance parameters are true accept rate, false accept rate. The study is for 6 months child. From the overall study , it is clear that true accept rate is 98.9 % & false accept rate is 0.1 %

Myers, L. J. et al. (2016) [7] investigates a minimized cost fingerprint recognitions system for use with the combination of a least quality images and cropped fingertips. These were a minutia overlay, Fourier wedge-ring detector, SVD invariants and moment invariants. 100 % Recognition was achieved with a number of the techniques presented

Belguchchi, Rima, et al. (2016) [8] tell about template protection scheme. Experiments are conducted on fingerprint databases from the FVC. The overall result shows that context is used on the texture features.

Di Martino et al. (2016) [9] concentrate on the estimation of reliability of different biometric output of the systems. A no. of experiments is done with the different database. These database images are used to compare their performance parameter.

INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

Wang, Kejun, et al. (2016) [10] tells touchless different fingerprint recognition. These systems have more advantages with high security, high acceptance rate.

In the recent field of biometric, finger print is latest research .

Mohammed et al. (2016) [12] design a EVM machine using fingerprint recognition system. The proposed system allows voter to scan his fingerprint, then compares it with the pre-saved fingerprints in the database. After the verification, voter can be vote

Zhang, Qing, et al. (2016) [13] proposed different matching methods in the fingerprint recognition. In order to improve the recognition accuracy of the fingerprint system unsuccessful minutiae system is used. In this paper, fingerprint recognition accuracy is improved as compare to traditional systems.

Peksinski, Jakub, et al. (2017) [14] propose a new performance parameter for measure the digital image quality & measuring parameter is Image quality index. It is denoted by Q. In the proposed work , the image quality index is improved as compare to traditional one.

Kundu, Sumana et al. (2017) [15] proposed a neural network classifier The first classifier is an learning technique based on OCA , Second learning the combination of backbone learning , perception learning. The performance parameter is false positive rate, true positive rate. These are also the visit the second classifier is a combination of different BO Network. , NR.

III. METHODOLOGY

Our proposed architecture enumerates a detailed design for automatic identification fingerprint images. In the proposed work, we have to design new ANFIS –FRS as show in fig 1. In this work, the images are collected from the Latent fingerprint database initially; Fingerprint image as input process firstly. After that , different statistical order are made. These are like 1st -order features, 2nd-order statistical features, and 3rd-order features for images are calculated. In our research work, the studies related to identifying the images without any human intervention. The proposed work is studied for different identification of finger print with the genetic and the neural network identification. These are the identification matching database images. For miniature extraction genetic algorithm is used. In this complete fingerprint image is classified in three statically features, 1st order image statistical features , 2nd order statistical features and 3rd order statistical feature. After calculating all these features, we construct a feature vector for the given fingerprint images having direction 45°, 90°, 135° and 180°. After that all these calculations these value given to classifier. In the classifier, image with trained set and test set are classified differently. These sets are differently carried out in the different phase as indicated in the flow chart. ANFIS classifiers are used to identify the fingerprint recognisatation. Orientation field separation algorithm is used to separate the overlapped fingerprints. But during the separation, some valleys and ridges of the fingerprints are lost. Due to this template fingerprint images are difficult to match. Hence Hough transformation alignment algorithm to reconstruct the orientation field. After the alignment, feature extraction with

minutiae and pores are used. For fingerprint matching the pore-matching algorithms were executed. Genetic algorithm is used to provide better approximation of the solution for the survival of fitness. According to level of fitness, a new set of approximation are created by the process of selection at each generation. By the use of genetic algorithm, level of fitness in problem domain and breeding together easily solve. From this process evaluation of population is done for proper suit. These are exempted by natural adaption.

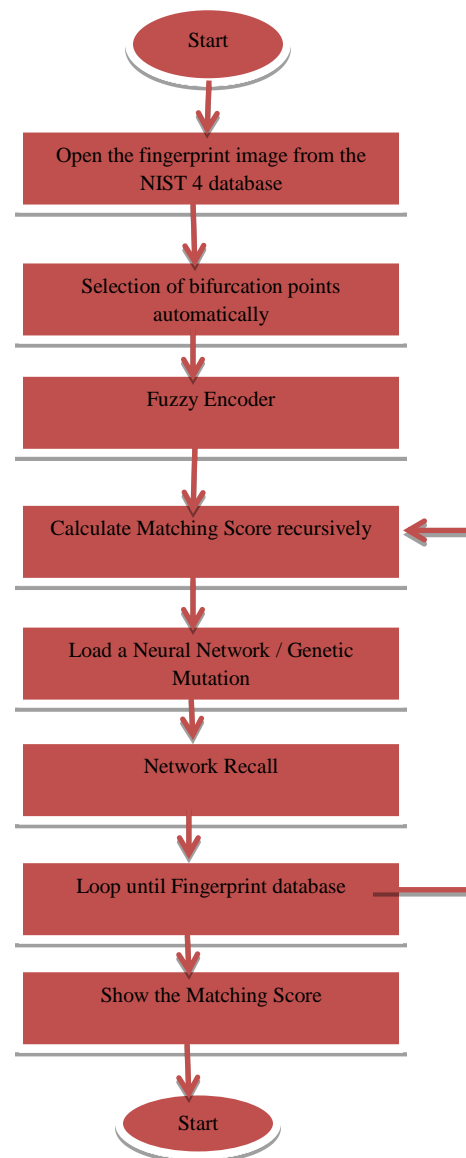


Fig. 1: Proposed Flow Chart of the Process

IV. RESULT ANALYSIS

In our work, we have provides three types of features that are essential to fingerprint matching. These are Level 1, Level 2 and Level 3 respectively. Level 1 indicates address singular points, Level 2 indicates ridge ending and bifurcation and

INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

level 3 indicates pores, dots and ridge contours. The image quality is computed from 1 to 5 integer value. In this highest quality is denoted by 1 and the worst quality is denoted by 5. There are two features of minutiae one is ridge ending and another one is bifurcation. The point where a ridge ends abruptly known as ridge ending minutiae and the point where a ridge forks or diverge into branches known as ridge bifurcation. The ridges are shown in fig 2.



Fig. 2: fingerprint 1 and 2 Region



Fig. 3: Fingerprint 1 & 2 orientation



Fig. 4: Separate Fingerprints

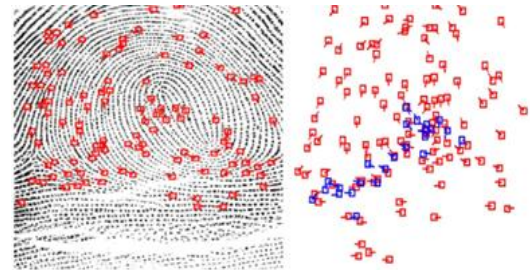


Fig. 5: Minutiae Extraction

In the genetic algorithm, different process occur like selection, crossover, and mutation genetic operators being applied to a population. These are part of neural networks represented as vectors. In addition to these meta heuristic algorithm is used based on population are used to train of neural networks with back propagation. These are used along with momentum and differential evolution. Genetic algorithm based search is shown in fig 6

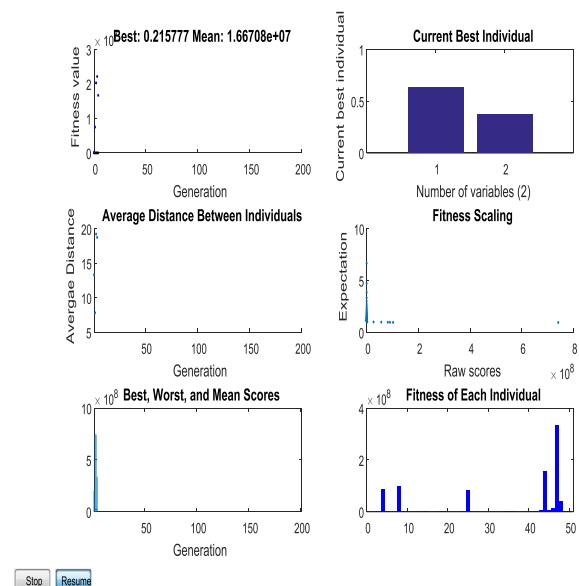


Fig. 6: Genetic Algorithm based optimization of the Features (initial phase)

INTERNATIONAL JOURNAL FOR ADVANCE RESEARCH IN ENGINEERING AND TECHNOLOGY

WINGS TO YOUR THOUGHTS.....

In table 1, we tested the 5 fingerprints images. These fingerprint images store in the database. All the fingerprint images are loaded into proposed system for the verification. Ninety percentage data is matched correctly. In another one 4 fingerprint impression correct one.

Table 1: Comparison of Result Verification of different fingerprint

Input Fingerprint	No. of Fingerprint Images	Database Fingerprint Images from People No.					Correctness
		1	2	3	4	5	
1	4	4M	0	0	0	0	100 %
2	4	0	4M	0	0	0	100 %
3	4	1	0	0	0	0	80 %
4	4	0	0	0	0M	1M	80 %
5	4	0	0	0	0	0	100%
Total Percentage of Correctness							90%

V. CONCLUSION

In this paper, genetic algorithm is used for minutiae extraction of the fingerprint image. Since all the false minutiae are deleted using neural network. The result shows that genetic algorithm is used and the recognition rate is 98.34 % and accuracy is 97.12 %. The corrections percentage is 90%.

REFERENCES

[1] CarstenGottschlich, EmanuelaMarasco, Allen Y. Yang, and BojanCukic. "Fingerprint liveness detection based on histograms of invariant gradients." Proc. IJCB. Clearwater, FL, USA (2014).

[2] DaxinTian, Jianshan Zhou, Honggang Qi, Yingrong Lu, Yunpeng Wang, Jian Wang, and Anping He. "A Bio-Inspired QoS-Oriented Handover Model in Heterogeneous Wireless Networks."Journal of Applied Mathematics 2014.

[3] Marasco, Emanuela, and Arun Ross. "A Survey on Antispoofing Schemes for Fingerprint Recognition Systems." ACM Computing Surveys (CSUR) 47, no. 2 (2014): 28.

[4] Jain, Anil K., Sunpreet S. Arora, Kai Cao, Lacey Best-Rowden, and AnjooBhatnagar. "Fingerprint Recognition of Young Children."IEEE Transactions on Information Forensics and Security (2016).

[5] Myers, L. J. "A cost effective fingerprint recognition system for use with low quality prints and damaged fingertips." (2016).

[6] Belguechi, Rima, Adel Hafiane, Estelle Cherrier, and Christophe Rosenberger. "Comparative study on texture features for fingerprint recognition: application to the BioHashing template protection scheme." Journal of Electronic Imaging 25, no. 1 (2016): 013033-013033.

[7] Di Martino, Luis, Alicia Fernandez, Rafael Grompone von Gioi, Federico Lecumberry, and Javier Preciozzi."A statistical approach to reliability estimation for fingerprint recognition." In Biometrics Special Interest Group (BIOSIG), 2016 International Conference of the, pp. 1-8. IEEE, 2016.

[8] Wang, Kejun, Jinyi Jiang, Yi Cao, Xianglei Xing, and Rongyi Zhang. "Preprocessing Algorithm Research of Touchless Fingerprint Feature Extraction and Matching."In Chinese Conference on Pattern Recognition, pp. 436-450.Springer Singapore, 2016.

[9] Chan, Kevin, Andrew Radcliff, Jeffrey Chudik, Katrina Molina, Alex Hirsch, Brennon Morning, Evan Pulliam, and Stephen Elliott. "Subject Movement at Different Force Levels in a Fingerprint Recognition System."In Proceedings of the International Conference on Security and Management (SAM), p. 223. The Steering Committee of The World Congress in Computer Science, Computer Engineering and Applied Computing (WorldComp), 2016.

[10] Mohammed, AreejAbdallahEbrahim, EkramAbdallahAbdalrahman Osman, and ZeinabElnazeir Mohammed Abdelraheim. "Implementation of Electronic Voting System Using Fingerprint Recognition Technique."PhD diss., Sudan University of Science and Technology, 2016.

[11] Zhang, Qing, Yilong Yin, and Gongping Yang. "Unmatched minutiae: useful information to boost fingerprint recognition." Neurocomputing 171 (2016): 1401-1413.

[12] Peksinski, Jakub, GrzegorzMikolajczak, and Janusz Kowalski. "The Use of the Universal Quality Index for User Recognition Based on Fingerprint Analysis." In Multimedia and Network Information Systems, pp. 75-87. Springer International Publishing, 2017.

[13] Kundu, Sumana, and GoutamSarker. "A Programming Based Boosting in Super-Classifer for Fingerprint Recognition." In Advances in Computational Intelligence: Proceedings of International Conference on Computational Intelligence 2015, pp. 319-329. Springer Singapore, 2017.

[14] Drahanský, Martin, OndrejKanich, and Eva Brezinová. "Challenges for Fingerprint Recognition—Spoofing, Skin Diseases, and Environmental Effects." In Handbook of Biometrics for Forensic Science, pp. 63-83.Springer International Publishing, 2017.