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Palm Print Recognition Using K-Means Clustering with Global Features

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Abstract: ***In these days there is a risk that others can access the same information anywhere and anytime. Currently passwords, personal identification cards are used for personal identification. Now a days Biometric based recognition is the most popular human recognition pattern. Biometrics measures individual's unique or behavioural characteristics to authenticate personal identity. It provides more reliable and efficient means of identity verification. The physical dimension of hand known as palm geometry contains information that is capable of authenticating the identity of an individual. The goal of biometrics verification system consists in deciding whether two characteristics belong to same person or not. In this case image can be used for verification purposes. The term global states that whole image of the palm is considered for verification. Main work in this case is the pre-processing of image, then extracting the features, creating the data set, k-mean clustering algorithm and back propagation algorithm is used and performance is compared in both the cases.***

Keywords—Biometric verification, Hand geometry, Palm recognition, Neural Networks, Pre-processing, Feature extraction.

I. INTRODUCTION

Every person needs security and for that thing we take various measures to make our system more and more secure so that no one can break security and integrity of the system. Biometric based recognition is an automated method to uniquely recognize people by their natural biological characteristics, such as fingerprints, retina, iris, face, palmprint, voice pattern and signature. The key point about an identification that is non transferable means it can't be given or lent to another individual so nobody can get around the system they personally have to go through the control point. Biometric identification can provide externally accurate, secured access to information, fingerprints, palm vein & iris scan produce absolutely unique data set's automated biometric identification can be done rapidly & uniformly, without and reading does the "best" job of ensuring secure authentication each of the different method has inherent advantages and disadvantages.

Palm print recognition has been a topic of research from many years. Palm print based person recognition is a new biometric modality which is getting more acceptances.

Biometrics is the most secure and reliable tool for the identification and recognition of human, because it can't be stolen, but it can be borrowed. It is always associated with users. Many features of human body can be used as the purpose of biometrics based application. These may be physical like, face, finger palm or may be either behavioural like signature, speech and gait. These biometrics based identification are more secure than conventional information passing method, because there is no information to be exchanged between servers. These are some security parameter that is associated with biometrics.

- Biometrics is based on the uniqueness of human features.
- Biometrics is associated with single individual so it can't be shared with other.
- Biometrics properties cannot be loss, until the serious accident.
- Biometric features can't be copied.

Palm print has stable line features, rich texture features, low-resolution imaging, low-cost capturing devices, etc. That's why; personal identification based on palm print has become an active research topic.

Many researchers have started the interaction between biometrics and cryptography, two potentially complimentary security technologies. Biometrics guarantees the identification of individuals based on measuring the personal unique features with a high degree of assurance while cryptography assures a high degree of trust in the transactions of information through the communication networks. Any human physiological and behavioural characteristic can be used as a biometric characteristic as long as it satisfies the requirements of universality, distinctiveness, permanence, collectability, performance, acceptability. Few biometric traits that are used to authenticate or identify individuals are Fingerprints, Iris, ECG, Retina, Gait, Footprint, Speech, Face, DNA, etc. Palmprint is also one of the physiological characteristic that can be used to distinguish between individuals. Palmprint is a biometric modality which can be used for authentication of a person's identity because of its richness.

II. PREVIOUS WORK DONE

Many methods has been developed for biometrics based identification, these methods can be roughly classified in two categories: First one is structural based method and second one is statistical features based method.

In structural feature based methods structural information, such as principle lines, wrinkles, minutiae points etc., can be used as features of palm. Although line features can be detected even in the low-resolution palm print images, this kind of methods have to spend much more computation cost on matching the line segments with the templates stored in database. In statistical feature based methods, palm print image is considered as a whole and palm print features are extracted by transforming the image.

Early research on fast palmprint identification can be roughly classified in two categories; hierarchical matching and palmprint classification.Hierarchial matching approaches typically involve first extracting multiple kinds of features and then searching in a layered fashion.

Amit Taneja and Sonika, 2011[1] "Pattern Recognition Using Neural Network of Hand Biometrics" proposed a peg-free hand-geometry verification system has been developed in this thesis work which is independent of orientation and placement of the hand. The system is experimented with a database consisting of 500 images collected over time from 100 users. 5 sample images from each user were used for verification purpose. The verification system extracts the feature vector from the image and stores the template for later verification. FRR is obtained by comparing the two feature vectors of the same hand and FAR is obtained by comparing the feature vectors of two different hands.

Aravind Nalamothu, Hemantha Kumar Kalluri, 2012[2] "Texture based Palm print Recognition using Simple Methods" proposed a palmprint recognition algorithm and results are compared with FFT, DCT and DWT. The texture patterns are spread over entire palmprint image those are used for feature extraction. These features are extracted using simple method standard deviation to achieve high performance with minimum processing time. The more unique and efficient features obtained are used to achieve good accurate recognition rate.

Jobin J, Jiji Joseph, Sandhya Y.A, Soni P. Saji, Deepa P.L. 2012,[3] "Palm Biometrics Recognition and Verification System" shows how to utilize the shape of the palm to extract features using very simple algorithms. The work attempted to improve the performance of hand geometry based verification system by reducing the amount of features and integrating new features.

Eryun Liu, Anil K. Jain and Jie Tian, 2013[4] "A Coarse to Fine Minutiae-Based Latent Palmprint Matching" proposed an efficient and robust latent-to-full palmprint matching algorithm, which can also be applied to full-to-full palmprint matching. To deal with the large number of minutiae in palmprint images, a minutiae clustering algorithm is proposed to group minutiae into several clusters based on the local features (i.e., ridge orientation and ridge period) in minutiae neighbourhood.

Mansi Manocha, Parminder Kaur,2013[5] "Palm Vein Recognition for Human Identification Using NN" present a complete and fully automated palm image matching framework by simultaneously utilizing the palm surface and palm subsurface features, i.e., from palm-vein images.

Rashmi Shrives, Nilmani Verma, Vikas Singh, 2013[6] "Palm print Biometrics using Feed Forward Back Propagation Neural Network" presents a new method for palm print based recognition. Image processing operations are applied to extract the features of palm. Neural network is used as classifier. The result shows that, features that are extracted here give the good accuracy results.

Sumalatha K.A, Harsha H Dept, 2014[7] "Biometric Palmprint Recognition System: A Review" has reviewed for palmprint recognition. Palm print acquisition using CCD based scanner is recommended. Palm code, fusion code, competitive code and the theory of coding method are recommended.

Priyanka A.Mane, A.SGaikwad, 2014[8] "3D Palm Print Classification using Global Features" has proved three dimensional palm print to be significant biometric for personal authentication. 2-D palm print has been recognized as an effective biometric identifier in past decade. 3-D palm print system develops to capture the depth information of palm print.

Mr. Lokhande S.K., Prof. Mrs. Dhongde V.S.,2014[9] "Fingerprint Identification System Based On Neural Network" states purpose to design and develop a pattern recognition system with using Artificial Neural Network (ANN) that can recognize the type of image based on the features extracted from the choose image. Also comparing any two methods of neural network.

Rohit Khokher, Ram Chandra Singh, and Rahul Kumar, 2014[10] "Palmprint Recognition Using Geometrical and Texture Properties" proposed an algorithm to extract geometrical and textural feature of a palmprint for authentication.

III. PROPOSED SYSTEM

3.1 ACQUIRING IMAGE

The image can be captured through various types. We can use digital scanners, CCD-based scanners, video camera, etc. to collect image of human palm. CCD based scanners capture high resolution image. Digital scanners produce low resolution images.

3.2 PREPROCESSING

When the image is acquired it might contain some noise or any other errors, so pre-processing is used to correct distortions. So in this section various processes like noise removal, binarization, segnmentation, erosion, and dilation can be done depending upon the image.

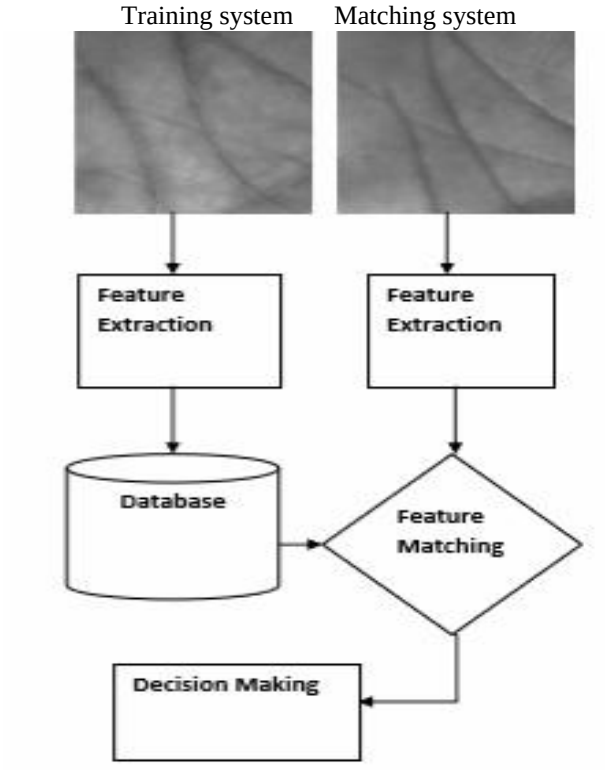

Fig.1 Flowchart of proposed system

3.3 FEATURE EXTRACTION

In this section the features are extracted. Converting the input data to the set of features is called as feature extraction. This is the major step in case of palm recognition because the features are the only way through which different individuals can be distinguished. If the features are extracted in a perfect way, only then the data set will extract the relevant information in order to perform the relevant task. In our work we will focus upon following features:
Geometrical features include palm length, area, perimeter, difference between centre ratio, no object, etc.
Texture features includes principal lines, creases, wrinkles, etc can be used.

3.4 MATCHING

The last process of the system is matching. This phase determines the degree of similarity between the stored data set and claimed features. Here the features extracted in previous stage are matched with features of particular individual. This is basically done to achieve the satisfaction level in case of authentication.

3.5 DECISION

After the matching process has been done, the system accepts the person if the features matched with the data set stored otherwise it is rejected.

IV. STRUCTURE USED FOR CLASSIFICATION

4.1 K-MEAN CLUSTERING

This non hierarchical method initially takes the number of components of the population equal to the final required number of clusters. In this step itself the final required number of clusters is chosen such that the points are mutually farthest apart. Next, it examines each component in the population and assigns it to one of the clusters depending on the minimum distance. The centroid position is recalculated every time a component is added to the cluster and this continues until all the components are grouped into the final required number of clusters.

4.2 BACK PROPAGATION

Back propagation, an abbreviation for "backward propagation of errors", is a common method of training artificial neural networks. The method calculates the gradient of a loss function with respects to all the weights in the network. The gradient is fed to the optimization method which in turn uses it to update the weights, in an attempt to minimize the loss function.
Back propagation requires a known, desired output for each input value in order to calculate the loss function gradient. It is therefore usually considered to be a supervised learning method, although it is also used in some unsupervised networks such as auto encoders. It is a generalization of the delta rule to multi-layered feed forward networks, made possible by using the chain rule to iteratively compute gradients for each layer. Back propagation requires that the activation function used by the artificial neurons (or "nodes") be differentiable.

V. CONCLUSION AND FUTURE WORK

This paper will represent a complete study of palm image recognition. Various pre-processing operations will be applied. We will examine a comparative evaluation of k-mean clustering and back propagation algorithm on same data set based on various performance measures.

In future this work can be extended to the fusion of geometrical and texture features with any other type of neural network in order to give better results in case of biometric security system.

REFERENCES

[1] Amit Taneja and Sonika, "PATTERN RECOGNIZATION USING NEURAL NETWORK OF HAND BIOMETRICS" Volume 2, No. 7, July 2011 Journal of Global Research in Computer Science.

[2] Aravind Nalamothu, Hemantha Kumar Kalluri, "Texture based Palm print Recognition using Simple Methods", International Journal of Computer Applications (0975 – 8887) Volume 50 – No.4, July 2012.

[3] Jobin J., Jiji Joseph, Sandhya Y.A, Soni P. Saji, Deepa P.L., "Palm Biometrics Recognition and Verification System", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 1, Issue 2, August 2012

[4] Eryun Liu, Anil K. Jain, and Jie Tian, "A Coarse to Fine Minutiae-Based Latent Palmprint Matching" IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 35, NO. 10, OCTOBER 2013

[5] Mansi Manocha, Parminder Kaur, "Palm Vein Recognition for Human Identification Using NN", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-3, Issue-7, December 2013

[6] Rashmi Shrivas,Nilmani Verma,Vikas Singh, "Palm print Biometrics using Feed Forward Back Propagation Neural Network", International Journal of Computer Applications (0975 – 8887) Volume 74– No.3, July 2013.

[7] Sumalatha K.A, Harsha, "Palmprint Recognition System: A Review", Volume 4, Issue 1, January 2014 International Journal of Advanced Research in Computer Science and Software Engineering Biometric.

[8] Priyanka A. Mane A. S. Gaikwad, "3D Palm Print Classification using Global Features" Volume 2, Issue 7, July 2014 International Journal of Advance Research in Computer Science and Management Studies

[9] Mr. Lokhande S.K., Prof. Mrs. Dhongde V.S. ME, "Fingerprint Identification System Based On Neural Network" International Journal of Innovative Research in Science, Engineering and Technology, Volume 3, Special Issue 4, April 2014.

[10] Rohit Khokher, Ram Chandra Singh, and Rahul Kumar, "Palmprint Recognition Using Geometrical And Texture Features" (ICRSET'2014), March 21-22, 2014 Dubai (UAE).

[11] Gitanjali Sikka1, Er.Vikas Wasson, "Palm Vein Authentication: A Review" Volume 3 Issue 9, September 2014 International Journal of Science and Research (IJSR)

