Multimodal Biometrics system for feature extraction of iris and fingerprint

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Abstract :We propose in this paper a multimodal biometrics system for feature extraction of iris and fingerprint . That basic objective of a biometric detection system is to automatically discriminate between subjects in a reliable manner, Multimodal biometric detection systems aim to provide false acceptance rate (FAR) and false rejection rate (FRR) for two or more physical or behavioral traits.The proposed multimodal biometric system has used principal component analysis and fisher's linear discriminate methods for individual iris matchers authentication and minutia for fingerprint and the novel rank level fusion method is used in order to consolidate the results obtained from.

Keywords —**PCA,Multimodal biometrics, fingerprint recognition,iris recognition, minutiae extraction.**

I. INTRODUCTION

Biometrics is the science and technology of measuring and analyzing biological data. In information technology, biometrics refers to technologies that allow human body features, such as DNA, fingerprints, eye retina, for authentication purposes. In electronic banking, e-commerce,and smart cards and privacy and security of information stored in various databases, Automatic personal identification has become very important Subject. Accurate automated personal identification is now required Use in a wide range of civil applications includes ATM, Passports, cellular telephones, and driver Licence.Traditional knowledge-based means PIN and token-based means ID card due to identity fraud .The pin can be forgotten by person and Tokens can be lost or stolen.[2]Biometrics, which refers to identifying Individuals based on their physical or behavioral characteristics.A biometric identification or verification system is one. .Multimodal biometric systems are a relatively new approach that combines multiple biometric traits to overcome problems such as intraclass variability, inter class similarity, data quality, non university, sensitivity noise, and other factors such as unimodal biometric systems. It can improve one's performance Biometric system is considerable.In addition, it can effectively. The main challenge in highly accurate design, secure, and professionally deployed biometric systems is the inaccessibility of continuous high recognition results to

ensure high quality data.However, there are largely unresolved issues in the dimensions and overall decision making issues. This paper has the ability to successfully overcome this challenge through a novel feature extraction We use principal component analysis and linear differential analysis. This paper presents a multi-dimensional biometrics system using two features (iris and fingerprint).The proposed system is designed for applications where the training database contains a iris and fingerprint images for each individual. The final decision is made by fusion at "Rank level method" in which feature vectors are created independently for query images and are then compared to the enrolment templates which are stored during database preparation for each biometric trait.

II. LITERATURE SURVEY

Multimodal technology is not new to the medical world. Regular and confirmatory examination is also often preferred in regular medical checkups. Incorporating evidence from more than one source will increase the overall accuracy of the system. [15] .

Sumit Shekar et.al[8] is used iris and fingerprint and face modalities and having accuracy is 97.5%.

Abhishek nagar et.al[5] used iris,fingerprint and face biomeric modalities and having accuaracy is 97%.

Anil K.Jain et al used fingerprint modalities and having accuracy is 91%.

Robert Snelick et al [6]used Fingerpint and Face modalities and having accuaracy is 95.5%

A.Muthukumar et.al[7] used iris nad fingerprint modalities and having accuracy is 95.5%.

Vincenzo conti et.al[5] is used fingerprint and iris modalities and having accuracyis96%

P.Jonathon Phillips et.al used fingerprint and facial and having accuracy is 92%.

III. BIOMETRIC SYSTEM

A biometric system is essentially a pattern recognition system that receives biometric data from one person, which removes the attribute set with acquired data and compares this query image with the Enrollment template in the database. Depending on the context of the application, a biometric system may also work in verification mode or identity mode. The effectiveness of a biometric system can be seen by the following characteristics: performance, scalability.

IV. MATERIALS AND METHODS

A simple biometric system has four basic components: A simple biometric system has four basic components:

1) sensor module that receives biometric data;2) Feature extraction modules are processed to extract feature vectors;3) matching modules where query images are compared with nomination templates;4) Decision-making module in which the identity of the user is accepted or rejected.

Any human physical or behavioral characteristic can serve as a biometric facility as long as it does not meet the following requirements [1] [2] [9]

In single biometric use only one modality means it may be fingerprint or it may be iris.

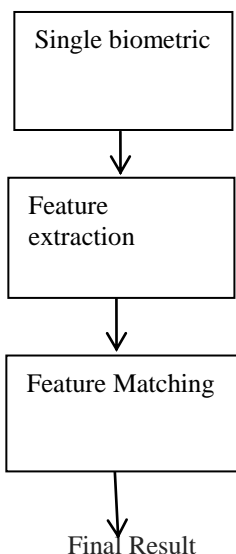**Block diagram of unimodal biometric**

Figure 1: unimodal biometric

Block diagram of multimodal biometrics. In multimodal biometrics, we have used two modality 1) fingerprint 2) iris characteristics.

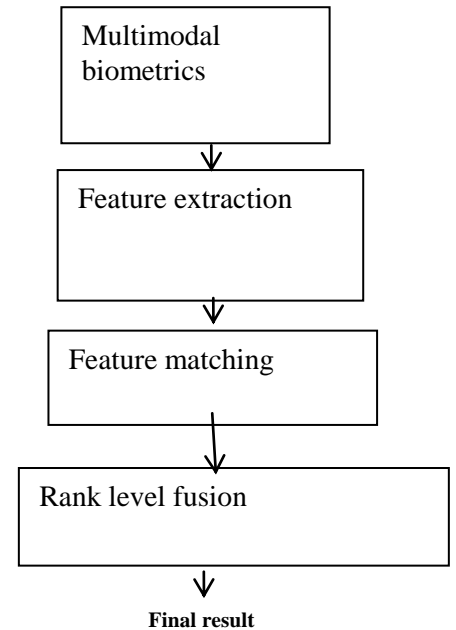**Block diagram of multimodal biometrics system**

Final result
Figure 2: Multimodal biometrics

The proposed methodology for the classification of fingerprint and iris using Rank level fusion.

Preprocessing of fingerprint: We collected live data from the computer science department. to improve image quality and then performed preprocessing on the fingerprint image.

Capture the image using Futronic FS88 and An image histogram is a type of histogram that serves as a graphical representation of the colour distribution in a digital image. [1] It plots the number of pixels for each colour value.Gray scale is converted in binary image using threshold the image.Adaptive thresholding is the method where the threshold value is calculated for smaller regions and therefore, there will be different threshold values for different regions.A region of interest (ROI) is a part of an image that you want to filter or perform some other operation. And extract feature using Minutia .Matching is done using minutia edge.

We can find out Recall, Precision, Specificity, and f_score using the following formula.

Recall=true positive/(true positive+false negative)

speficity=true negative/(false positive+true negative);

precision=true positive/(true positive+false positive);

F-score: The harmonic mean of precision and recall(sensitivity)

f_score=2*true positive/(2*true positive+false positive+false negative)

Preprocessing of Iris: We had collected live data from the computer science department. First capture the image for iris using Iscan 2 cross match technologies.Both the inner boundary and the outer boundary of a typical iris can be taken as circles using localization. In image processing, normalization is a process that changes the range of pixel intensity values. Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further image analysis. Extract the features using Gabor filter, then use PCA method for reduction of dimension and use LDA uses the class information and finds a set of vectors that maximize the between-class scatter while minimizing the within-class scatter.

Principal Component Analysis

Is a dimension reduction tool can be used to reduce a large set of variables to a small set of variables that contains most of the information in large set.

Principal component analysis is performed on a symmetric matrix. It can be correlation matrix or co-variance matrix. Correlation matrix is used if the variances of individual differ much,or if the units of measurement of the individual variate s differ.

Fusion in multimodal biometrics

In a multimodal biometric system, after the enrollment phase, the images are average and normalized and then given to its matching phase in which the features are matched and then it is ranked according to the availability of data and the results are obtained.

Fusion at Rank level

Rank-level fusion is a relatively new fusion approach.In multimodal biometric system, rank level fusion can be used to combine the biometrics matching scores from the different biometric modalities .When the production of each biometric match is a subset of possible matches sorted in decreasing order, then fusion can be done at the rank level. The aim of the rank level fusion is to consolidate the rank output by the individual biometric subsystem (matchers) so that consensus rank can be obtained by using three methods to combine the ranks determined by different matchers for each match. [15].

(1)In the highest rank method, each possible match is assigned the highest (minimum) rank, as computed by different matchers.(2) The Borda count method uses the sum of the ranks assigned by individual matchers to calculate the final rank.(3) In the logistic regression method, a weighted sum of the individual ranks is calculated. The weight to be assigned to different matchers is determined by logistic regression.[6][16]

Experimental Results

Fusion using rank level method for Iris and fingerprint

Table no.1

Traits	Recall	Precision	Specificity	F-score
Fingerprint	0.9553	0.9605	0.9942	0.9576
Iris	0.8681	0.8762	0.9823	0.8712

V. CONCLUSION

In unimodal biometrics was less accurate in various parameter to fulfill the identification, security and privacy problems. To overcome this problem we use multimodal biometrics. In which we used a fingerprint and iris images to develop a highly secure and accurate system. The accuracy of rank level method is 99.92% .In future research work on multiple parameters such as Iris,fingerprint, face using a high-resolution camera.

VI. ACKNOWLEDGMENTS

VII. REFERENCES

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