



## A REVIEW ON VARIOUS MULTIMODAL BIOMETRIC TECHNIQUES

Navjeet Kaur<sup>1\*</sup>,

<sup>1\*</sup>M.tech Student, BBSBEC, Fatehgarh Sahib, PTU

Correspondence Author: [navjeet.8@gmail.com](mailto:navjeet.8@gmail.com)

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### Abstract

The best way to check the authenticity of the user is to use their body characteristics as a password such as face, voice, iris, fingerprint, palmprint etc. this makes the system more secured as every human being has different human traits. This paper gives a review on different biometric authentication patterns. The use of multimodal features gives more effective result than a unimodal techniques and hence makes the system more secure and effective.

### Introduction

Biometrics is combination of two Greek words Bios(life) and metrikos (measure). It is recognized that some human body characteristics such as face, gait or voice can be used to distinguish individual from a group of people. In a biometrics system a person is recognized on the basis of physical and behavioral traits. In it pattern recognition is used. In the process of pattern recognition human traits are captured on and then matched with the database.

Biometric operates in two modes on the basis of application context: Verification and Identification

1. In verification mode, the captured data is compared with the template of the used that is already available in the system database. In verification mode systems the person whose motive is to be recognized claims an identity such as personal identification number (PIN), a user name, or a smart card, and the system compares that identity to figure whether the claim is true or not. This mode is applied for positive recognition where the goal is to prevent multiple people to use same identity.
2. In identification mode, the system compares the captured data with the whole database templates. In this system one-to-many comparisons are done for an individual's identity. Identification is a critical component in negative recognition applications where the system establishes whether the person is who she denies to be.

### Related work

A brief review of the previous research work done in the field of content based video retrieval is presented in the following paragraphs:

Phalguni gupta et al in the paper “ Multimodal biometric system for the efficient human recognition” proposes the multimodal identification method using four traits i.e. face, fingerprint, iris and signature and the results are obtained by computing the matching score using score level fusion. various feature extraction techniques are used to extract the features of four traits like (KDDA) kernel Direct Discriminant Analysis, EBG, Reference point and minutiae matching approach for fingerprints, Haar wavelet and Circular mellin operator for iris. The results shows the better accuracy of multimodal system as compared to unimodal system.

Hariprasath. S and Prabhakat T.N (2013) in the paper “Multimodal Biometric Recognition Using Iris Feature Extraction and Palm print Features” developed a multimodal biometric system based on Wavelet Packet Analysis by encoded the texture of palm print and iris into a sequence of 2-D wavelet packet coefficients using a wavelet packet transform(WPT) approach. At last the pattern matching is done by using the hamming distance based on this the False acceptance ratio(FAR) and False rejection ratio (FRR) is calculated and hence the improved accuracy percentage is achieved.

Mohamed (2013) in the paper “Soft Decision Level Fusion Approach to a Combined Behavioral Speech-Signature Biometrics Verification “described a combined behavioral techniques based on speech and signature biometrics modalities. Soft decision level fusion based Gaussian mixture models (GMM), in which the (EM) and (GEM) algorithms for estimating the parameters of the mixture model and the number of mixture components have been compared. The test performance of the fusion, EER=0.0 % for "EM" and EER=0.02 % for "GEM", show that the combined behavioral information scheme is more robust and have a discriminating power, which can be explored for identity authentication. Fusion is done at decision level.

Mohamad Abdolahi, Majid Mohamadi, Mehdi Jafari(2013) in the paper “Multimodal Biometric system Fusion Using Fingerprint and Iris with Fuzzy Logic “ utilize the four modalities i.e. iris, retina, face and fingerprint. In this paper improved accuracy is Obtained as compared to unimodal method by using the decision level. Hamming distance and fusion fuzzy logic is used for Comparing and deciding to verification.

Linlin Shen, Li Bai, and Zhen ji in the paper titled “Hand based Biometrics fusion palm print and finger knuckle print” has used a fusion technique by integrating a multiple hand based biometrics. For fusion making the fusion code and decision level fusion strategy are used. The experimental results were performed on public poly U palm print and FKP database. Tests were done on



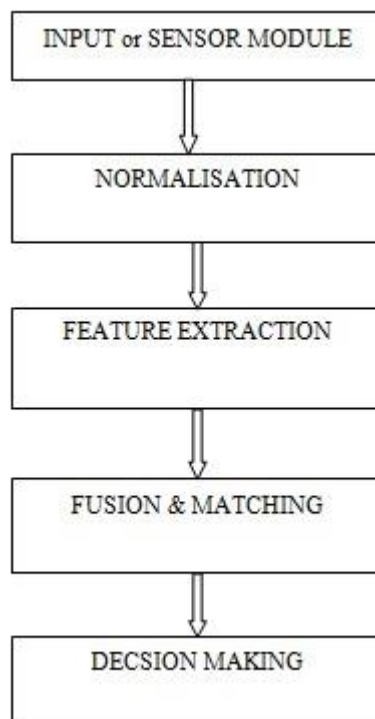
single modal biometrics and then on multimodal biometrics. The accuracy of the multimodal systems was found to be much more significantly improved.

Amit Deshmukh in the paper “Feature Level Fusion of Face and Fingerprint Modalities using Gabor Filter Bank” has used a gabor filters as it reduces the processing time. Further it has also shows the use of PCA and LDA for dimensionality reduction and recognition purposes The proposed system uses ORL face database and FVC2002 database for evaluation of results. Experimental results shows the improved accuracy of multimodal biometrics as compared to uni modal biometrics

**Table 2.1: Comparison Table of Literature Review**

Researchers	Parameters used	Technique	Accuracy
Phalguni gupta et.al	Face,fingerprint,iris ,signature	Face- Elastic Bunch Graph matching algorithm Fingerprint- Gabor filtering Iris- Haar wavelet and mellin operator Signature- Euclidiean distance	97%
Hariprasath.S et .al	Iris and palm print	Iris and palmprint- wavelet packet transform	94.2%
Mohammad Abdulahi et.al	Fingerprint and Iris	Fuzzy logic	98.3%
Linlin Shen et.al	Palm print and finger knuckle print	Gabor wavelets	89.2%
Amit Deshmukh et.al	Face and Fingerprint	Gabor Filter bank	99.25%

**Methodology of biometric system**



A simple biometric system consist of following basic components

1. Input or Sensor module : we can input data using database or using sensor which acquires the biometric data
2. Normalisation: It is a process that changes the range of pixel intensity values to bring the image or signal into a range



3. Feature extraction module : where the acquired data is processed to extract feature vectors using various feature extraction techniques
4. Matching module where feature vectors are compared against those in the template;
5. Decision-making module in which the user's identity is established or a claimed identity

## Conclusion

This paper present the review on the methodology of multimodal biometrics as multimodal biometrics are preferred to be the more secured method as compared to the unimodal method. Multimodal method can include any of the modalities present like fingerprint,palmprint,iris,handwriting,signature,iris etc and hence provides the more secure and accurate results as compared to the unimodal method.

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