Multi –Model Biometric Fusion of Previous Techniques-Review

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Abstract **-** In a Multimodal biometric system, the real fusion method is required for combining information from several single modality systems. Information safety and verification of person have become a significant factor in security systems. Personal ID Numbers or passwords and key devices such as smart cards are not reliable and accurate techniques in secure situations. Today biometric recognition is one of the most vital techniques for the security. Single biometric systems smart various difficulties such as noisy data, inter-class similarities, intra-class variations, non-universality and improper error rate. To speechless these challenging issues, multimodal biometric systems are utilized. In this paper, a multimodal biometric system mixing fingerprint and speech in making a personal identification is familiarized. The processed information is collective with the help of fusion algorithm in total level in which feature vectors are made self-sufficiently for query images and are then linked to the enrolment templates which are stored during database research for each biometric trait. Based on the contiguity of feature vector and template, each subsystem computes its own matching score.

Keywords **–** Biometric trails, Feature Extraction, Fusion Techniques, Fingerprint and Speech.

I. INTRODUCTION

The word biometrics is resultant from the Greek word Bio and Metric. The term biometrics relates to the measurement of features of a living Bio-thing in order to identify a person. Biometrics uses numerous physiological or behavioural features [1]. Common physiological biometric capacities include fingerprints, iris, face, hand, retina, etc. While common performance biometric measurements include signature, speech, rhythm, etc. Single biometric systems have boundaries like uniqueness, high deceiving rate, high error rate, non-universality and noise.

A biometric system contains of three major components: sensor component, feature extraction module and identical module. The presentation of a biometric system is inclined by the reliability of the sensor used and the degrees of choice offered [2] by the features removed from the sensed signal. Additional, if the biometric trait being sensed or measured is noisy, the subsequent matching score computed by the matching module may not be reliable.

II. MULTIMODEL BIOMETRIC

Multimodal biometric identification system is exploited for solving these limitations. Multimodal biometric is the arena of pattern recognition investigation recognizing the human identity based on physical designs or behavioural patterns of human [3]. Biometric technique provides the separate features of a person which is always dominant. Multimodal biometric systems are a recent attitude developed to overcome these problems. These systems demonstrate significant enhancements over unimodal biometric systems, in terms of higher accuracy and high conflict to spoofing. Various Types of Biometric systems: Iris, Ear, Speech, fingerprint and face etc.

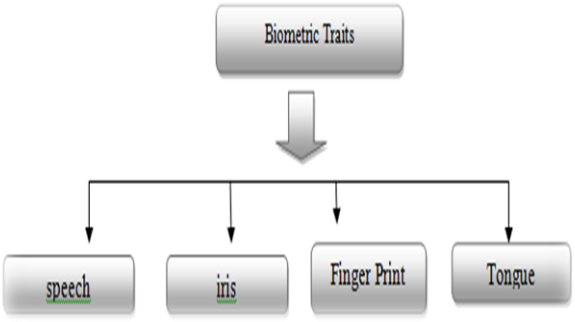

Fig.1: Biometric Traits

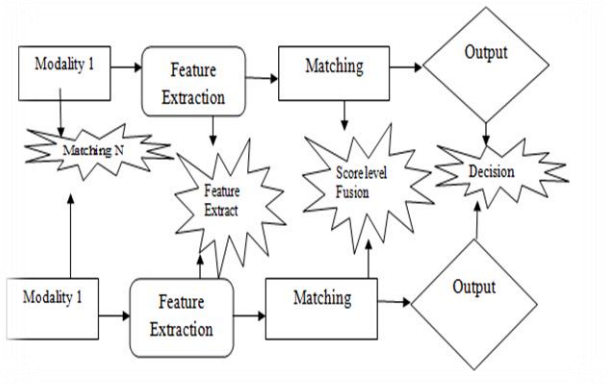

Fig.2: Multi model Biometric System

1.1 Iris Recognition: Iris Recognition is the best way of recognition in today's world. There are some features that make iris recognition high efficient and precise like: steady, exclusive, flexible, reliable, and non-invasive [4].

1.2 Ear Recognition: Ear recognition in the field of biometrics is a new method. The structure of the ear is robust because it does not change with the facial expressions. The external ear constitutes the most

unique design, characteristic features and peculiarities for the purpose of identification.

1.3 Fingerprint Recognition: A fingerprint is the feature outline of one finger and it is supposed that each fingerprint is unique. Each person has his own fingerprints with the stable uniqueness. So fingerprints have being used for ID and recognition.

1.4 Speech Recognition: The area of this module is to convert the speech waveform, using digital signal processing tools, to a set of structures for further analysis. This is often mentioned as the signal-processing front end.

III. OVERVIEW OF PRIOR WORK

Sangram Bana1 et.al, 2012[5] studied and execution of a fingerprint recognition organization based on Minutiae based matching quite regularly used in various fingerprint algorithms and techniques. The method mainly involves abstraction of minutiae points from the sample fingerprint images and then acting fingerprint matching based on the number of particulars pairings among two fingerprints in query.

Surbhi Garg et.al,2014[6] describes as, iris recognition is a generous of the biometrics technologies based on the physiological appearances of human body, associated with the feature recognition based on the fingerprint, palm-print, face and sound etc., the iris has selected benefits such as uniqueness, stability, high appreciation rate, and non-infringing etc.

Vincenzo Conti et.al, 2010[7] The paper is a state-of-the-art spread of multi-biometrics, offering an advanced perspective on features fusion. In bigger detail, a frequency based approach results in a standardized biometric vector, integrating iris and fingerprint data. Serially, a hamming distance-based matching algorithm contracts with the combined homogenous biometric vector**.**

Sangeetha, S et.al,2013[8] described as, a multimodal biometric system assimilating fingerprint and speech in making a individual identification was presented. The processed information was mutual with the help of fusion algorithm in score level in which feature vectors are made individually for query images and are then associated to the employment templates which are stored during database research for each biometric trait.

IV. VARIOUS TECHNIQUES USED

(a) Spatial Domain technique using Principle Component Analysis

Principal component analysis is a classic method used for compress higher dimensional data sets to lower dimensional ones for data analysis, apparition [9], feature extraction, or data compression. PCA involves the scheming of the Eigen value breakdown of a data covariance medium or singular value decay of a data matrix, usually after mean arranging the data for each attribute.

Step 1: Get normalizes data from the iris regions. 2-D iris image is represent as 1-D Vector by concatenating each row (or Column) into a long vector

Step 2: Take away the mean image from each image vector. Mean should be row wise.

Step 3: For scheming the Eigen vectors and Eigen values, Compute the covariance matrix.

Step 4: Analyse the eigenvectors and Eigen values of the covariance matrix.

Step 5: The eigenvectors are organised from high to low according to their corresponding Eigen values. Indicate components and forming a feature vector.

Step 6: Derive the new data set once we have chosen the gears, we simply take the transpose of the vector and increase it on the left of the original data set, transposed.

(b) Transform Domain Techniques Using Wavelet Transformation

Wavelet concept is an allowance of Fourier theory in many features and it is introduced as an alternate to the short-time Fourier transform [10] .In Fourier concept, the signal is decomposed into sins and cosines but in wavelets the signal is expected on a set of wavelet functions. Fourier transform would provide good resolve in frequency domain and wavelet would provide good determination in both time and frequency domains. While the wavelet theory was introduced as a mathematical tool in 1980s, it has been widely used in image processing. In discrete wavelet transform disintegration, the filters are specially calculated so that successive layers of the pyramid only include specifics which are not already accessible at the preceding levels.

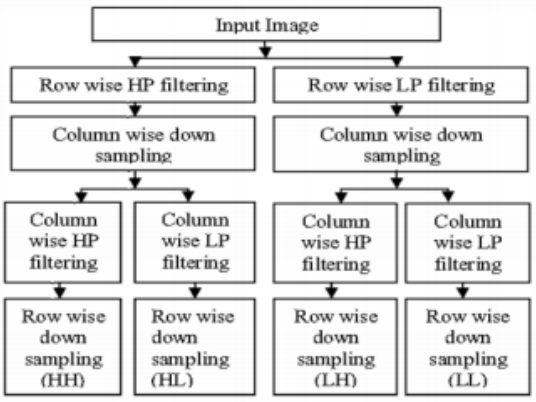

Fig.3 DWT decomposition

The DWT decomposition uses a force of special low pass and high-pass screens and a sub-sampling operation. The productions from 2D-DWT are four images having size equal to half the size of the unique image. So from first contribution image we will get HHa, HLa, LHa, LLa images and from another input image we will get HHb, HLb, LHb,

LLb images. LH means that low-pass filter is functional along x and surveyed by high pass filter along y. The LL image contains the calculation coefficients. LH image contains the straight detail coefficients. HL image contains the vertical detail coefficients; HH contains the crosswise detail coefficients. The wavelet transform can be achieved for multiple levels. The next level of decay is performed using only the LL image. The outcome is four sub-images each of size equal to half the LL image size.

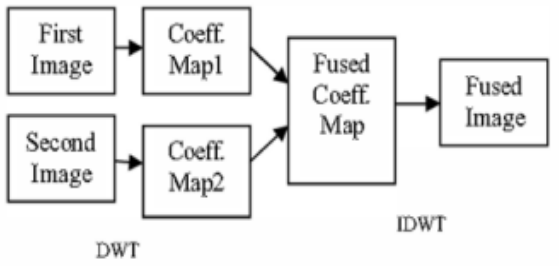

Fig.4 Image fusion process using DWT

V. CONCLUSION

Biometric types are unique to each discrete and remain unchanged during a person's lifetime. These features make biometrics an auspicious solution to the society. In this paper, a vigorous multimodal biometric recognition system integrating fingerprint and speech is planned. Fusion of two biometric traits is carried out at the match score level. The presentation of planned system is compared with each of the two individual biometrics by plotting ROC curves. These curves show that fusion of multiple biometrics advances the recognition performance as associated to the single biometrics. It also averts spoofing since it would be problematic for an imitator to spoof multiple biometric traits of a genuine user concurrently. One of the disadvantages is that database will be very large due to the storage of speech and fingerprint template in memory, therefore extra storage space will be desirable. Increasing user population reporting and reducing enrolment failure are added reasons for combining these multiple traits for recognition.

VI. REFERENCES

[1] Abdolahi, Mohamad, Majid Mohamadi, and Mehdi Jafari. "Multimodal biometric system fusion using fingerprint and iris with fuzzy logic."International Journal of Soft Computing and Engineering 2.6 (2013): 504-510.

[2] Jain, Anil K., Lin Hong, and Yatin Kulkarni. "A multimodal biometric system using fingerprint, face and speech." Proceedings of 2nd Int'l Conference on Audio- and Video-based Biometric Person Authentication, Washington DC. 1999.

[3] Sadeghzadeh, Sayed Hassan, Morteza Amirsheibani, and Anseh Danesh Arasteh. "Fingerprint and Speech Fusion: A Multimodal Biometric System."International Journal of Electronics Communication and Computer Technology (IJECCT) 4.2 (2011): 570-576.

[4] Win, Zin Mar, and Myint Myint Sein. "Texture feature based fingerprint recognition for low quality images." Micro-NanoMechatronics and Human Science (MHS), 2011 International Symposium on. IEEE, 2011.

[5] Bana, Sangram, and Dr Davinder Kaur. "Fingerprint recognition using image segmentation." International Journal of Advanced Engineering Sciences and Technologies 5.0 (2011): 1.

[6] Surbhi Garg et.al," Survey Paper on Phase Based Iris Recognition"International Journals of Advanced Research in Computer Science and Software Engineering, April ,2014.

[7] Conti, Vincenzo, et al. "A frequency-based approach for features fusion in fingerprint and iris multimodal biometric identification systems." IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS PART C, APPLICATIons and reviews" 40.4 (2010): 384.

[8] Sangeetha, S., and N. Radha. "A new framework for IRIS and fingerprint recognition using SVM classification and extreme learning machine based on score level fusion." Intelligent Systems and Control (ISCO), 2013 7th International Conference on. IEEE, 2013.

[9] Vishi, Kamer, and Sule Yildirim Yayilgan. "Multimodal Biometric Authentication using Fingerprint and Iris Recognition in Identity Management." Intelligent Information Hiding and Multimedia Signal Processing, 2013 Ninth International Conference on. IEEE, 2013.

[10] Sahu, Deepak Kumar, and M. P. Parsai. "Different image fusion techniques–a critical review." International Journal of Modern Engineering Research *(IJMER)* 2.5 (2012): 4298-4301.