ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 3, March 2016

A Literature Survey on Multibiometric Pattern Retrieval Security System

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ABSTRACT: Multibiometric systems use multiple sources of biometric information to establish the identity of an individual. By adopting multibiometric systems the recognition performance can be improved. The use of multiple sources of information also ensures that the system is harder to forge and the failure to enroll is less probable . The potential of deploying biometric systems has led to the creation of large multibiometric databases. Therefore, filteringthe database in order to reduce the number of potential candidates for matching is a desirable component of any large-scale biometric system.. Index code is obtained by computing match scores between a biometric input images and fixed set of reference images. The proposed technique is used for generating index codes for classification biometric databases. The proposed technique is extended to retrieve identities from multimodal databases. This method allow fast search in shorter response time.

KEYWORDS: Multibiometric, Filtering, Index code, Image retrieval.

I.INTRODUCTION

Multibiometrics is the combination of one or more biometrics (e.g., Fingerprint, Iris, and Face). Researchers are focusing on how to provide security to the system, the template which was generated from the biometric need to be protected. The problems of unimodal biometrics are solved by multibiometrics. Multimodal biometric systems can employ cascading techniques to speed up the filtering process. In this approach, exhaustive matching is rapidly performed using a modality that has a fast matcher in order to narrow the search space of potential identities. The final identification is then conducted in the reduced search space using a different modality that has a better matching accuracy. Another approach, applicable to algorithms that employ subspace analysis, involves using numerical indexing on the projection coefficients. A method for indexing multimodal biometric databases based on index codes generated by a biometric matcher. The indexing mechanism is executed separately for each modality and the results are combined into a final list of potential candidates.

A modality-specific index code is generated by matching an input image against these reference images, resulting in a set of match scores. During identification, the index code of the input image is compared to the index codes of the enrolled identities in order to find a set of potential matches. The index codes of multiple modalities are fused to improve the accuracy of indexing resulting in a robust and efficient indexing system. This approach relies on a matcher, which is an integral part of every automated biometric identification system. Because the generated index codes are compact and their similarity can be computed rapidly, the approach has low storage requirements and can improve the system response time even for small databases.

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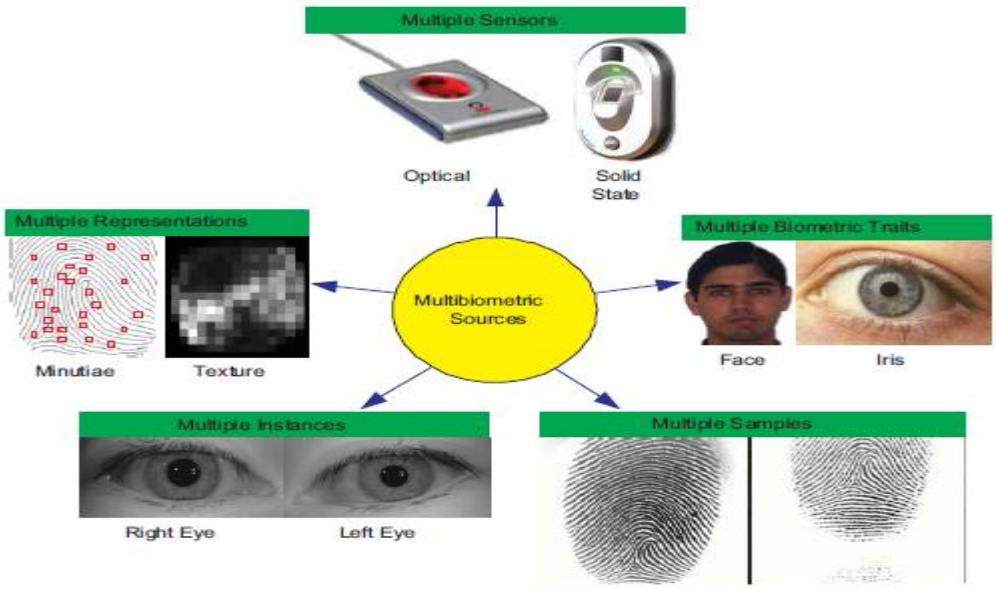

Different types of Multibiometric

II.REVIEW OF LITERATURE

There are very good literature surveys on biometric security system.A.Ross, and A. Jain [2]explained the limitations of unimodal biometric system and how it can be overcomed by using multibiometric system.K.Nandakumar[8] proposed the functionalities of multibiometric system as enrollment, verification, identification.

1) **Biometric-** a biometric authentication system uses the binary code of an electronically stored unique and specific biological, physiological or behavioral characteristics called biometric template, of an individual, which is later compared with the templates present in each and every individual while logging in or requesting for an access, it cannot fall prey to hackers and/or be lost, guessed by anyone, or be shared by anyone else.
2) **Multibiometric**- The term multibiometrics denotes the fusion of different types of information [7] (e.g., fingerprint and face of the same person, or fingerprints from two different fingers of a person). Multibiometric systems can offer substantial improvement in the matching accuracy of a biometric system depending upon the information being combined and the fusion methodology adopted [1].
3) **Filtering-**The retrieval of a small number of candidate identities from a database based on the probe data is known as database filtering. Filtering can be accomplished by using classification or indexing schemes.[13]
4) **Indexing-**the goal of an indexing scheme is to assign a unique index value to every identity in the database. However, the index value of the probe image may not be identical to that of the corresponding identity in the database because the process of biometric acquisition and processing is susceptible to noise. Therefore, the retrieval scheme has to employ some type of neighborhood search in the index space. An efficient indexing algorithm retrieves a small number of candidate identities based on similarity measures that can be computed quickly.

III. PROPOSED SYSTEM

The proposed method is used for generating index code for multimodal biometric databases. In this scheme, indexing mechanism is executed separately for each modality and the results of each modality are combined into a final list of potential candidates. A modality-specific index code is generated by matching an input image against these reference images, there are a set of match scores called as index code of that image. During identification, the index code of the input image is compared to the index codes of the enrolled identities in order to find a set of matches from database.

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General approach for indexing multimodal database is shown in fig 1. By using fusion scheme results in longer index codes. Using longer index codes results in larger variances among them.

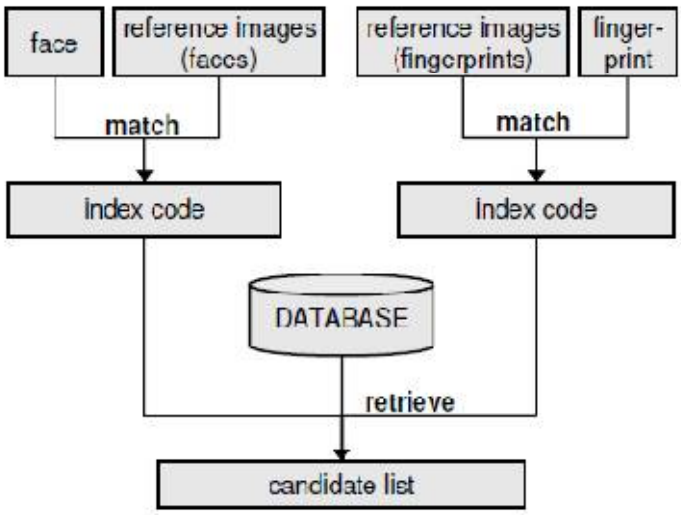

Fig.1

1. Multi-biometric Fusion

Biometric fusion combines biometric characteristics derived from –One or more modalities or technologies (algorithms, sensors) –Multiple characteristics derived from samples –Multiple or repeated biometric instances

2. Indexing Using Match Scores

The proposed indexing technique relies on the use of a *small* set of reference images for each modality. A modality-specific index code is generated by matching an input image against these reference images, resulting in a set of match scores. During identification, the index code of the input image is compared against the index codes of the enrolled identities in order to find a set of potential matches. The output of multiple modalities are fused to further narrow down the list of candidates and increase the hit rate, thereby resulting in a more robust and efficient system. Our indexing approach relies on a matcher, which is an inherent part of every automated biometric identification system.

The generated index codes are compact and so the proposed method has modest storage requirements.

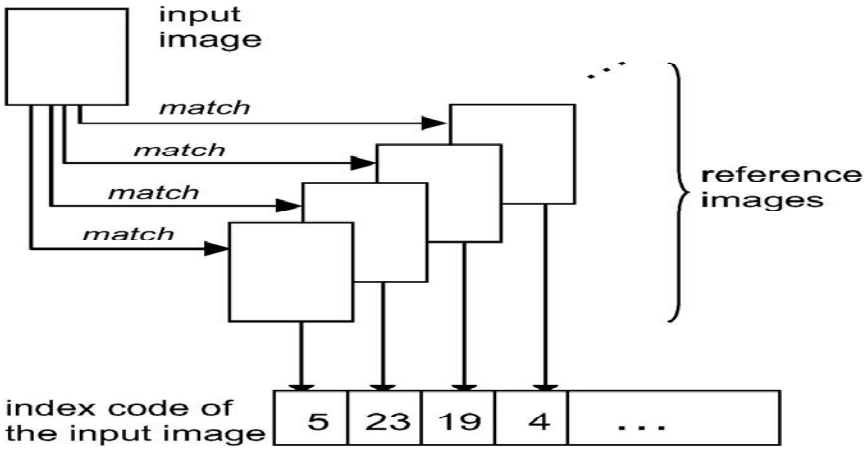

Fig.2

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3. Indexing Performance

The performance of indexing algorithm is commonly evaluated using the hit rate and penetration rate.

Hit rate = Nh/N ……(1)

Where Nh number of tests in which the correct identity is present in the candidate list and N is the total number of tests.

The penetration rate denotes the average % of gallery entries that have to be retrieved based on the index scheme.

$$\text{Penetration rate} = \frac{1}{N}\sum_{i-1}^{N} Li \div M$$

……(2)

3.1 Similarity Measure for Index Codes using Pearson coefficient

The association between two index codes can be measured by their correlation. Index codes belonging to the same identity are expected to have a strong positive correlation. Index codes belonging to different identities are expected to be uncorrelated. In this implementation we used the Pearson product-moment correlation coefficient.

ρ (Sx, Sy) = Cov(Sx, Sy) / [Var(Sx), Var(Sy)]1/2 ……(3)

3.2 Similarity Measure for Index Codes using Euclidean distance

Index codes can also be viewed as points in a Euclidean space, and the similarity between them can be measured by their spatial proximity. Two examples of such measures are the Euclidean distance.

$$12(Sx, Sy) = (\sum_{i=1}^{n}(Sxi - Syi)^2)^{1/2} \quad \ldots\ldots (4)$$

3.3

Similarity Measure for Index Codes using Cosine similarity

And the cosine similarity

$$\cos(Sx, Sy) = Sx \,.\, Sy \div (Sx \,.\, Sx)^{1/2} (\text{Sy. Sy})^{1/2} \ldots\ldots(5)$$

IV.CONCLUSION

Multibiometric systems use multiple sources of biometric information to establish the identity of an individual. . By adopting multibiometric systems the recognition performance can be improved. The proposed scheme is capable of reducing the response time of biometric identification system. It is universal and is applicable to any type of multibiometric system.

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BIOGRAPHY

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