International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 3, Issue 6, December 2014)

Multimodal Biometric System Based "Integrating Strategies Approach at Feature Level"

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***Abstract*--Biometric authentication system has become one of the tremendous developing technologies for security based applications. Multimodal biometrics refers the combination of two or more biometric modalities in a single identification. Most biometric authentication systems are done based on knowledge base and token based identification these are predisposed to to swindle. Biometric authentication employs inimitable combinations of measurable physical characteristics- fingerprint, facial features, iris of the eye, speech print that cannot be forged by others. The aim of this paper is to study the fusion at article extraction level for face and fingerprint biometrics. The suggestedtactic is based on the fusion of the two traits by extracting independent feature point sets from the two modalities, and making the two point sets companionable for concatenation. K-means clustering feature reduction techniques are implemented, prior and later the feature point sets combination and the results are appropriately recorded. A comparative graph shows that feature level fusion is more effective as matching score level**.

***Keywords*- MBS, Biometrics, Substantiation, Templates, Fusion, Fingerprint**.

I. INTRODUCTION

In last decade recent years, biometric authentication has seen considerable improvement in reliability and accuracy, with some of the individualities offering good performance. There is no 100 percent accurate possibility of multi-biometric. Multi-biometric systems [1] remove some of the drawbacks of the uni-biometric systems by grouping the multiple sources of information.

These systems utilize more than one physiological or behavioral characteristic for enrollment and verification/identification. Ross and Jain [2] have presented an overview of Multimodal Biometrics with various fusion levels, matching score level and pronouncement level.

However it has been observed that, a biometric system that assimilates information at an earlier stage of processing is expected to provide more accurate results than the systems that integrate information at a later stage, because of the availability of richer information.

The feature level is anticipated to afford better recognition performances.

Fusion at matching score, rank and decision levels have been extensively studied in the literature [3][4].

As a general comment, it is noticed that fusion at feature level is relatively difficult to achieve in practice because multiple modalities may have incompatible feature sets and the correspondence among different feature spaces may be unknown.

Moreover, concatenated feature set may lead to the problem of curse of dimensionality: a very complex matcher may be required and the concatenated feature vector may contain noisy or jobless data, thus prominent to a decrease in the performance of the classifier [5]. Therefore, in this context, the state of the art is relatively poor. Ross and Govindarajan [5] projected a method for thefusion of hand and face biometrics at feature extraction level. Gyaourova et al. [6] fused IR-based on face recognition with visible based face recognition at feature level and reporting a substantial improvement in recognition performance as compared to matching individual sensor modalities. Recently, Ziou and Bhanu [7] projected a multi-biometric system based on the fusion of face features with gait features at feature level.

Even though face and fingerprint represent the most widely used and accepted biometric traits1, no methods for feature level fusion of these modalities have been projected in the literature. The possible reason is the radically different nature of face and fingerprint images: a face is processed as a pictorial image (holistic approach) or as composed by patches (local investigation), while fingerprint is naturally represented by minutiae points. In this paper a recently introduced methodology for face modeling [8] is exploited, which is based on a point-wise representation of a face called Scale Invariant Features Transform (SIFT), thus making the feature level fusion of face and fingerprints possible.

Thus, this paper proposes a novel approach to fuse face and fingerprint biometrics at feature level extraction. The improvement can be obtained applying the feature level fusion which is presented over score level fusion technique.

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Experimental results on real databases are reported byauthorizing the strength of the projected approach in comparison to fusion at score level.

II. Biometric Identification System

A multi model biometric system have some important modules in research areas: i) sensor module – which captures the trait in the form of raw biometric [12] data, ii) feature extraction modules- which process the data to extract a feature set that is a compact representation of the trait, matching module- which employs a classifier to compare the extract feature set with the stored temples to generate the matching scores, decision module- which uses the matching score to either determine an identity or validate a claimed identity, system database module- which uses database pattern using pattern matching technique.

The main working operations that the system can perform are enrolment and testing.

During enrolment biometric information of individual are stored. By testing the multi model biometric system, some critical information will be found out and this information is compared along with the stored patterns. During comparison various sensors will be activated like facials, blood group tester etc. It can saythat it is an image acquisition but it can change according to the characteristics which we want to consider. The feature extraction module performs all the necessary preprocessing- it removes artifacts from the sensor, to enhance the input and use some kind of normalization. In the matching module we extract the features we need and choose which features to extract how to do it, with certain efficiency to create a template. After this in the matching module we are match the input pattern and the database pattern with the pattern matching technique. The last module technological authentication occurs based on the pattern matching technique.

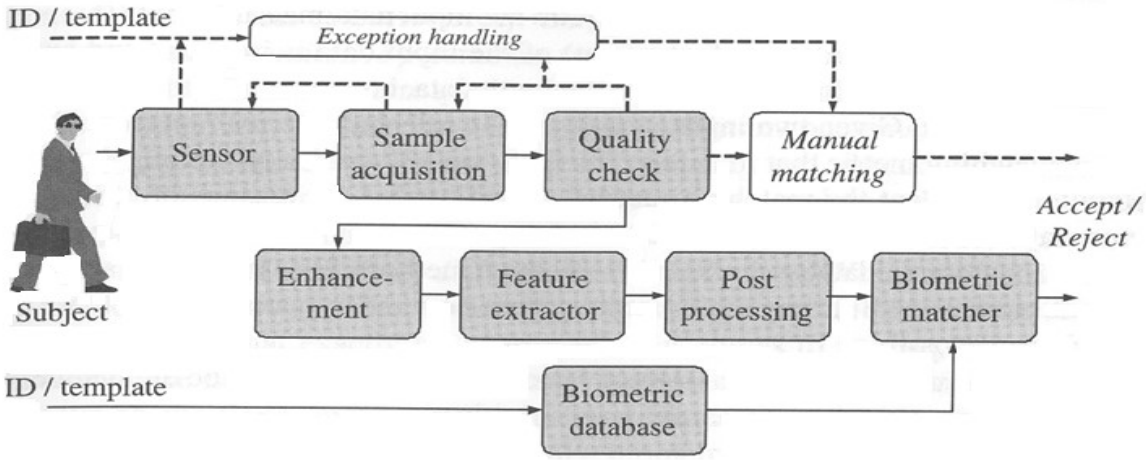

Figure 1

III. Projected Multimodal Approach

The MBS systems fully depend on the stored patterns in the system's memory and application scenario. These patterns will refer the use of two or more techniques at similar time of domain. The applied system will find out the MB and establish an identity for authorized user. The reason behind this method is to combine the two or multi models. The combinations of two or more multi models [11] are necessary to improve the recognition pattern rates. This process can only be done by using the MBS systems because multi model is fully independent on each other. This combined technique will generates the best results of identification.

This technique will improve the security at several stages:-1 the multiple sensors capture the raw biometric data and can be processed and integrate to generate a new data from which feature can be extracted, shown fig 2. The preprocessor abstract the necessary features that are subject to interest. The template will be generated for the abstract features. The decision fusion integrates multiple cues. The input data will be compared with stored patterns in database for matching. When match is found, a user can log in otherwise it will be treated as a falsification. And system will generate a message of unauthorized user is trying to log in the system.

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3.1 PROJECTED MBS PERFORMANCE

The projected system's performance is determined its accuracy. The main widely used standard metrics to determine the accuracy of a system are:

- False accept rate (FAR)
- False reject rate (FRR)
- Failure to enroll rate (FTE)
- Susceptibility to artifacts or mimics

The keytenacity of projected MBS structure is to reduce the error rate as soon as possible and improve the performance of the system by achieving good acceptable rate during identification and authentication.

IV. Multimodal Biometric System Architecture

Here we discussed some of the existing architectures. There areseveral projected levels of combinations of the fusion in this system which is shown in Fig. 2.

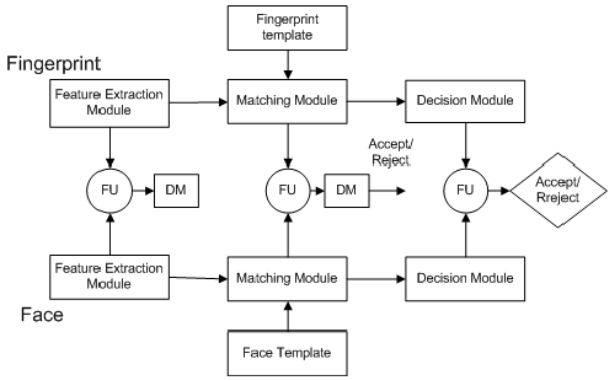

Figure 2. Multimodal Biometric System using Face & Fingerprint

The PS performs their tasks by measuring the accuracy and results of the technology. The whole structure will be based on the projected MBS [10] system which will reduce the error rates and improve the accuracy as well as acceptance report by utilizing the feedback process. The face and fingerprint patterns cannot be accessed without using the correctness. In our projected system still we are using multiple biometric characters of an individual to establish identity.This technology can improve the security in the areas of computer and artificial neural network.This technique certainly will produce an artificial mind for robots.

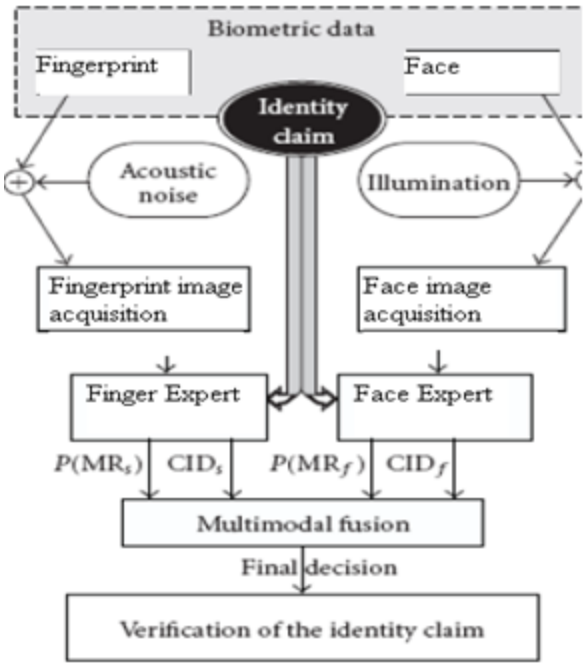

Figure 3.Multimodal Biometric System with reliability information

V. EXPERIMENTAL RESULTS OF BIOMETRIC

Here we are taking multiple set of face images and produce the results for multiple users to find out the accurate results of this experimental research. The ROC graph report (Receiver Operating System) is based on the graph of the (FRR) and (FAR). The results can be performed by using the threshold value which is responsible for pattern matching. During any accident a human can lose their mind, heart beat and their face. But blood group can be match and DNA will produce the true report about that person.

So, improvement can be done by increasing the threshold value greater than 0.1.

Table 1
Result exploration of acceptance-

Threshold	Finger	Face	Finger & Face
0.0	2	3	2
0.5	2	8	2
1.0	2	10	2
1.5	5	11	5
2.0	5	13	5
2.5	6	14	6
3.0	9	14	9
3.5	10	14	10
4.0	10	14	10

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ROC graph

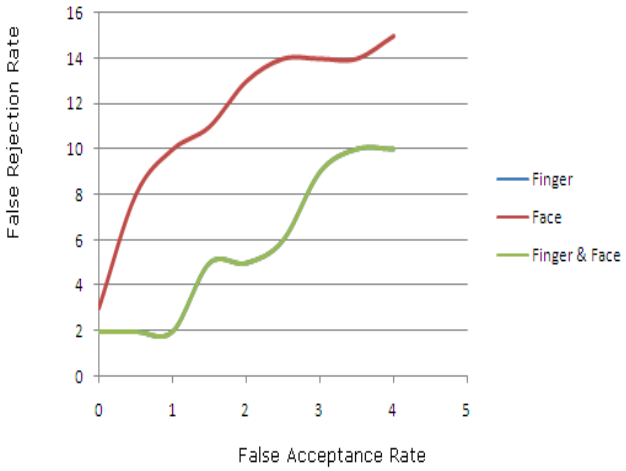

Figure 4

Table 2
Results exploration of false rate

Threshold	Face	Finger	Finger & Face
0.0	4	2	2
0.5	8	3	3
1.0	14	5	5
1.5	14	8	8
2.0	14	8	8
2.5	14	9	9
3.0	14	10	10
3.5	14	10	10
4.0	14	10	10

Receiver Operating Characteristics (ROC) Curve

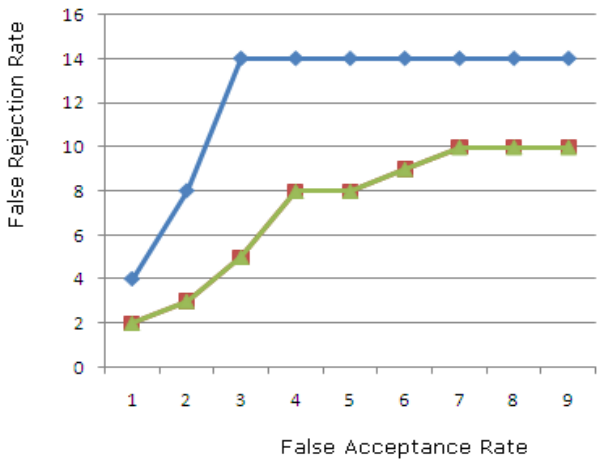

Figure 5

VI. Conclusions

Multimodal biometric systems elegantly address several of the problems present in un-unimodal systemsvarious fusion levels and scenarios are possible in multimodal systems. The MBS can protect the real time world and people bydenying the unauthorized access. Multi model biometric technology can be used in civil as well as government purpose. The MBS is very helpful during building the Visa and Passports of civilians. A citizen of any country can be verified on the behalf of bio metric scan method. Unauthorized access can also be denied by using this technique because this technique is based on the True patterns pair and false pattern pairs. If any falsification will occur during checking it cannot access the user in system. This technique is also helpful for missile and nuclear launching. The performance of multimodal biometric system shows great promise to personal identity in the biometric authentication society.

REFERENCES

[1] J.Wayman , A Jain, D. Maltoni, D.Maio, Biometric systems, Technology ,Degign Performance evaluation, Springer 2005.

[2] A.K.Jain, A.Ross and S.Parbhakarn, "Overview ofbiometric appreciation".

[3] Zongkong, S.Teller, B.Mustaq, D. and Louie,"Intelligence in the field of watermarking and digital interfaces".

[4] A. Ross, J.K.Rosenbolt, and A.K.Jain, "Various fusion techniques and advantages oftheMulti-biometrics".

[5] A.Ross and A.K. Jain, "Information fusion in biometrics".

[6] A. K. Jain and U.Uludag, "Hiding biometric data".

[7] L. I. Kuncheva, C.J. Whitanker, C.A. Shippie and R.P.W.JDuin, "MBScombining patterns based on biomatrics".

[8] D. josaf, D.Daniel, A.K.Jony, Handbook of finger print recognition , Springer 2003

[9] M. Indovina, U. Ulunadag, R.Snelock, A. Mink, "Multi-modal Biometric Authentication methods: A COTS Approach".

[10] http://arxiv.org/pdf/1002.2523

[11] http://danishbiometrics.files.wordpress.com/2010/02/200903401.pdf

[12] http://eprints.uniss.it/2144/1/Rattani_A_ContrCongresso_2007_Feature.pdf