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# An efficient biometric fusion using iris and fingerprint in digital image processing

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## ABSTRACT

***The Biometric systems are the skill for legalization or arrangement of various individuals using person's physical and behavioural personalities. Though these schemes are more sheltered compared to the conservative processes like key authentications, password, they also experience many limitations like noise in the data, intra-class difference and spoof occurrences. One of the explanations to these glitches is to deal multi-biometric schemes also in these type of systems various foundations of biometric data are used. This paper deals with the fusion approach using extraction of the feature vector for biometric traits of human in terms of iris and fingerprints and the performance is evaluated in terms of high recognition rates. The proposed system shows the robustness in the recognition of the unique individuals using their iris and fingerprints fusion process.***

***Keywords***— *Multimodal systems, Biometric fusion, Fusion levels, Iris and Fingerprints, Biometric traits*

## 1. INTRODUCTION

A unimodal and multimodal biometric system is fundamentally a pattern-recognition structure that distinguishes a person grounded on a feature vector plagiaristic approach from a precise physiological or interactive attribute of the individual obsessed for verification or identification determinations. It deals from traditional user substantiation scheme which is based on somewhat that deals with the identification or something that deals with the password or Pin. Hence, the amount of physiological and interactive traits can be exploited in the biometric schemes like a fingerprint, iris, face, hand geometry, palm print, finger vain structure, gait, voice, and signature. Depending on the context of applications, biometric systems may operate in two modes i.e. verification or identification. Biometric verification is the task of authenticating the test biometric sample with its equivalent outline or model according to the entitlement given by the user. Whereas, biometric documentation is the job of associating an investigation process with a number of arrangements or models that are obtainable from a set of recognized or registered persons. Multimodal biometric schemes, which associate two unimodal acknowledgement systems into one solitary technique, can be used to overwhelm the boundaries of separate biometrics. This paper deals with the fusion process that is a robust but critical evaluation on recently established biometrics for the enhancement of the multimodal biometric schemes. It can be realized from previous developed biometric information using a different fusion of biometric information at different stages, such as matching score, feature perspective or decision perspective. The biometric classification process and quantity of the biometric recognition arrangements can be available by examining these fusion points.

**Fig. 1: Trait Sample**

## 2. DIFFERENT BIOMETRIC SYSTEMS

A multi-biometric arrangement performs appreciation based on the indications obtained from multiple foundations of biometric data. Multi-biometric structures can be categorized into six classes which are based on sensors, algorithm, samples, instances and multi-modal. The scenario of multi-biometric systems is depicted as in figure 1.

**(1) Sensor arrangements***:* In sensor systems, diverse sensors are recycled for catching different illustrations of the similar biometric modality to excerpt diverse data.

**(2) Instance systems:** Instance systems deals with the fusion of statistics from multiple occurrences within the equivalent biometric quality.

**(3) Algorithm systems**: In Algorithm systems use unique biometric trait but use dissimilar matching procedures.

**(4) Sample systems***:* In sample systems use solitary senor but numerous samples of the similar biometric characteristic. For

 

instance, using frontal appearance, the left and right outlines are also bagged. Multiple finger impression and also various samples of a speech can be shared. Multiple models may have an incredulous poor routine. But, it needs multiple reproductions of sensors, or the operator may wait an extended period of the interval to be distinguished or a grouping of both.

**(5) Multi-modal scenarios**: In multi-modal schemes use the indication of multiple biometric behaviours to excerpt the biometric data of an individual. These diverse biometric personalities can come after a diversity of modalities. The multi-modal classification is dependable due to the occurrence of multiple liberated biometrics. For instance, a biometric classification may use face and speech for person verification. Multimodal schemes have numerous advantages. Better acknowledgement rates can be accomplished linking different modalities. Higher presentation improvement can be predictable by using substantially uncorrelated behaviours such as fingerprint and iris using correlated behaviours such as voice and lips. They deliver very high security against deceiving scenarios as it is quite hard for an imposter to take off more than one trait concurrently.

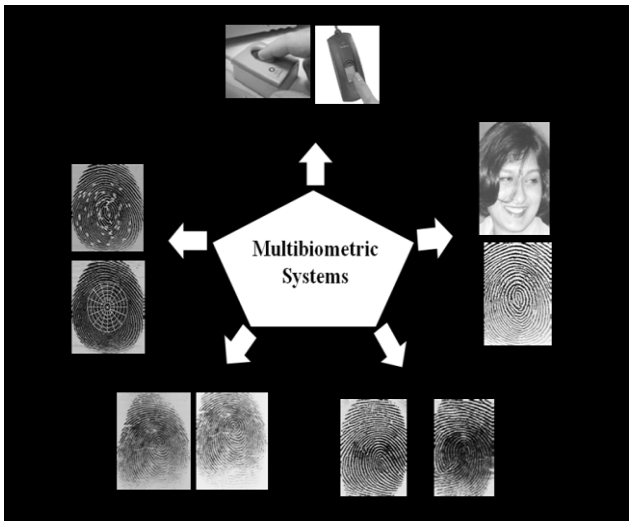


**Fig. 2: Multibiometric systems**

## 3. RELATED WORKS

Sheetal Chaudhary, Rajender Nath et al. [10] developed an energetic multimodal biometric acknowledgement system participating iris, expression and fingerprint based on score level synthesis using numerous support vector functions. Here, SVM is realistic in a similar manner to overwhelm the trouble of absent biometric characters. It reproduces every possible combination of all biometric performances separately. They worked on support vector machines as their method and assessed the acknowledgement rate of 99 percentages. Divyakant T. Meva, C. K. Kumbha Rana et al. [11] offered a biometric scheme which is getting widespread since the last centuries. As per the demand of IT manufacturing, this information is satisfying confirmation and authorization necessities. But Unimodal Biometric arrangements have their own boundaries. To overwhelm the boundaries of Unimodal Biometric Systems, they have worked on the technique of Multimodal Biometric Structures. In their approach, the authors have presumed details among Multimodal Biometric scheme designed and established to improve accomplishment ratio of confirmation. They have improved fingerprint and face acknowledgement methods with match score fusion. They have worried to identify accomplishment ratio using numerous mixtures of weights distributed to fingerprint and face scores. They have originated the success rate of total 93 per cent having failure amounts of 6 per cent. Norsalina Hassan, Dzati Athiar Ramli, and Shahrel Azmin Suandi et al [12] proposed facial synthesis and fingerprint for dynamic recognition pattern. The addition is achieved at the corresponding score level. The consistent tasks for shared modalities are accepted using support vector machines. Hearings on facial expression and fingerprint greatest show that the performances of multimodal biometric arrangement provide healthier acknowledgement related to the unimodal biometric scenario. They have worked on the summing rule and assessed the error rate probability of 0.83. Yogesh. H. Dandawate, Sajeeda. R. Inamdar et al. [13] shows seizing of various biometric atmospheres of a person precisely face, pattern and vein using hardware and also three performances preprocessed and attached cooperatively for cryptography. Palm is designated as a biometric quality as no two palm veins matching part unless they are similar creature also palm has a dressed vascular pattern construction as a good recognizing issue for a person as compared to other biometric typescripts. They worked on principle component examination and Gabor filtering having the total accuracy of 97%. Nassima Kihal, Salim Chitroub and Jean Meunier et al. [14] proposed a biometric arrangement for verification, using a fusion of iris and palm. They have worked on a technique for feature generalization of each process using wavelet packet erosion at four stages. Kamel Aizi Mohamed Muslim Ahmed Sabri et al. [15] obtained a client-server construction for the multimodal biometric process. As a substance, they have worked on two modalities, the iris and impressions to strengthen the security. The unimodal biometrics cannot always be used to perform authentications. They have worked on score level process and calculated the false acceptance and rejection rates.

## 4. PROPOSED WORK

In the proposed approach we have used the score level fusion of the iris and fingerprint using feature extraction, segmentation and minutiae extractions of the fingerprints. We have built a graphical user interface for the proposed system. Firstly we have worked on the iris scenarios for which Hough circular transforms are used and the extracted the vector for independent components for the evaluations of the feature vector. Then the evaluation is done using fingerprints on which binarization and thinning of the image is done using some morphological operations.

## 5. RESULTS AND DISCUSSIONS

This section deals with the implementation which is taken place in MATLAB is based on human-machine interaction.

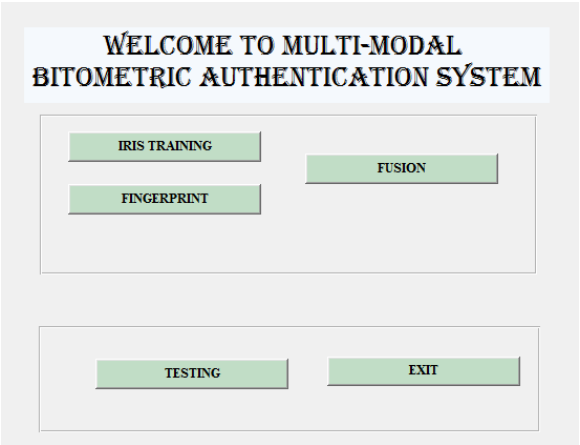


**Fig. 3: Proposed Framework**

The above figure shows the proposed framework which deals with MATLAB GUI and shows the user interface controls for the iris and fingerprints includes panels and pushbuttons.

 

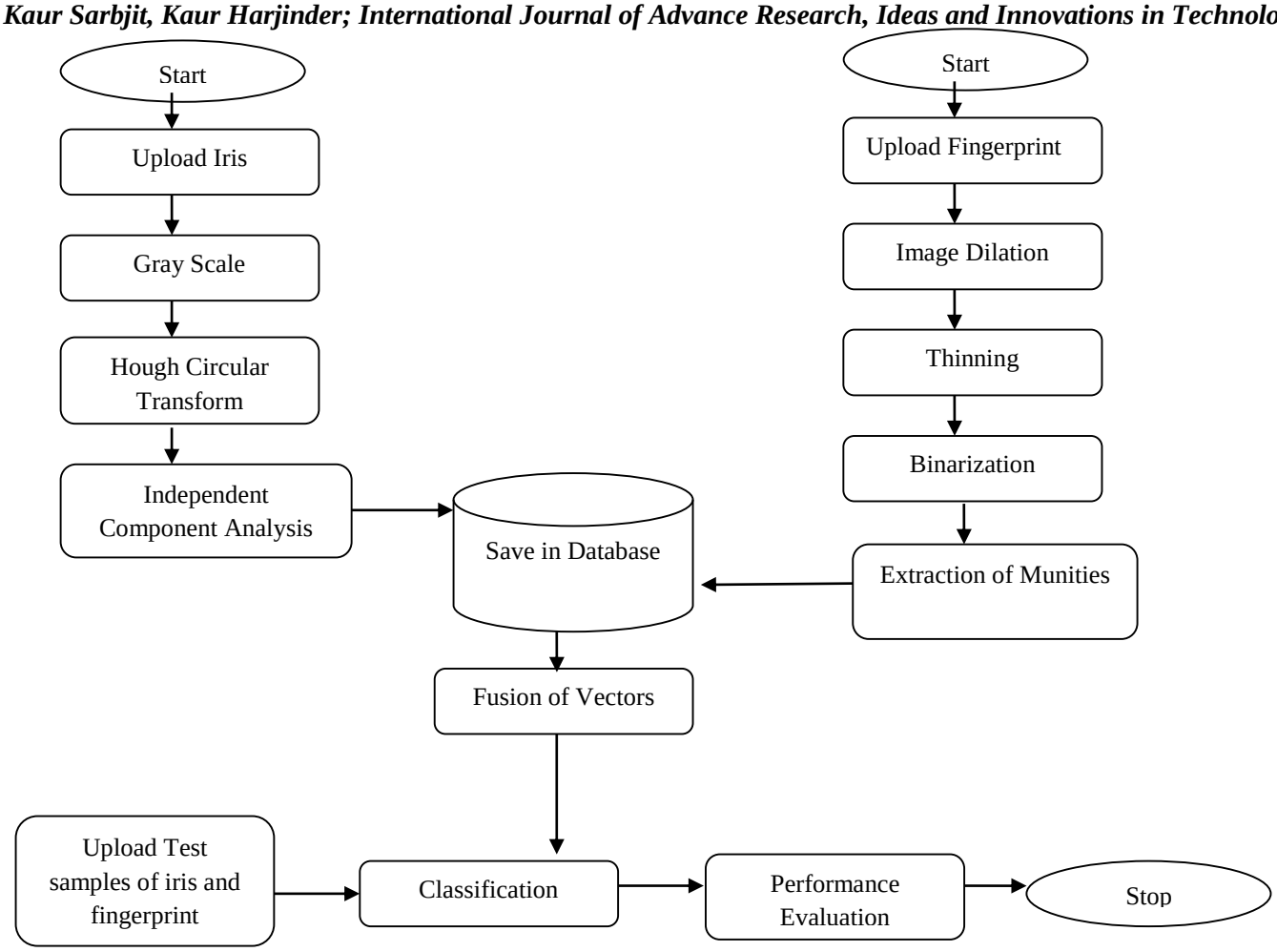


**Fig. 4: Proposed Flow Diagram**

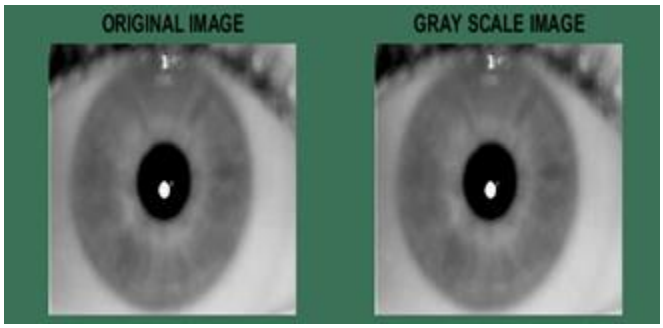


**Fig. 5: Proposed Framework**

The above figure shows the uploading of the image and its grey scale of the original version which will help to process the coloured image also.

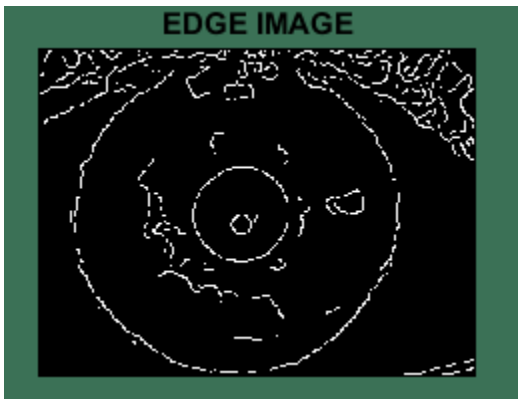


**Fig. 6: Edge Detection**

The above figure shows the edge detection of the image which detects the boundaries of the image and shows the pupil and outer region detections of the applied image.

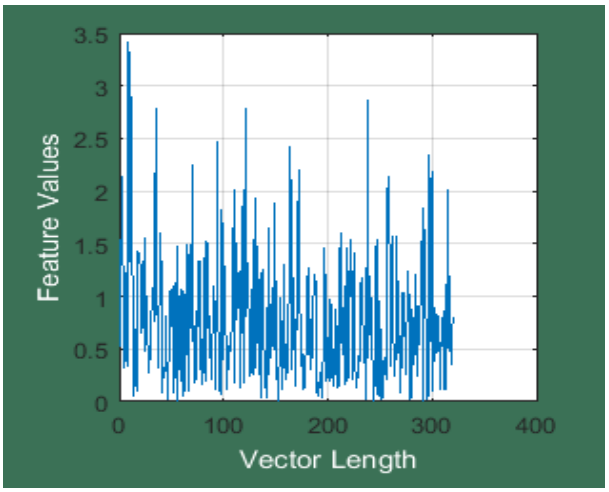


**Fig. 7: Feature Extraction**

The above figure shows the extracted feature vector using ICA which shows the graphical representation of the extracted feature values.

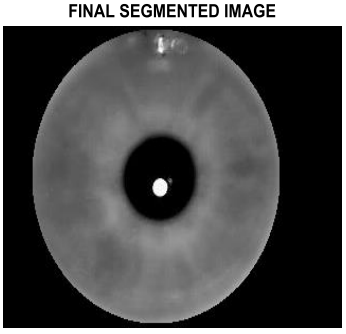


**Fig. 8: Segmented Image**

The above figure shows the segmented image which shows the final segmented region of the inner and outer radius of the pupil which is the really scanned image used for the detection of the individual.

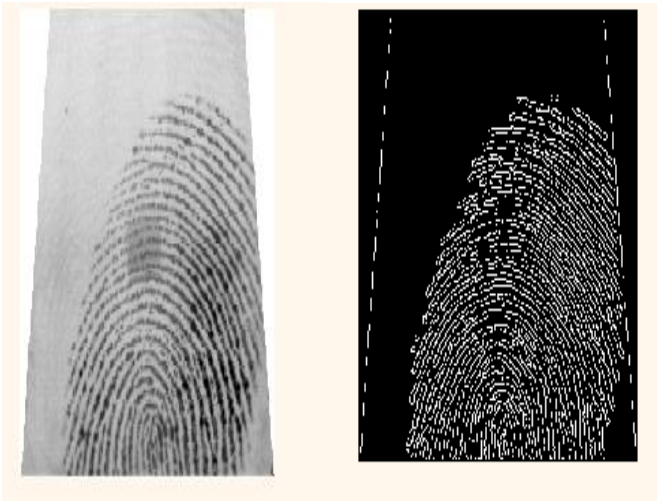

**Fig. 9: Fingerprint Image**

The above figure shows the original fingerprint image ad its detected ridged which is done using canny edge detection approach to detect the more light boundaries also in depth.

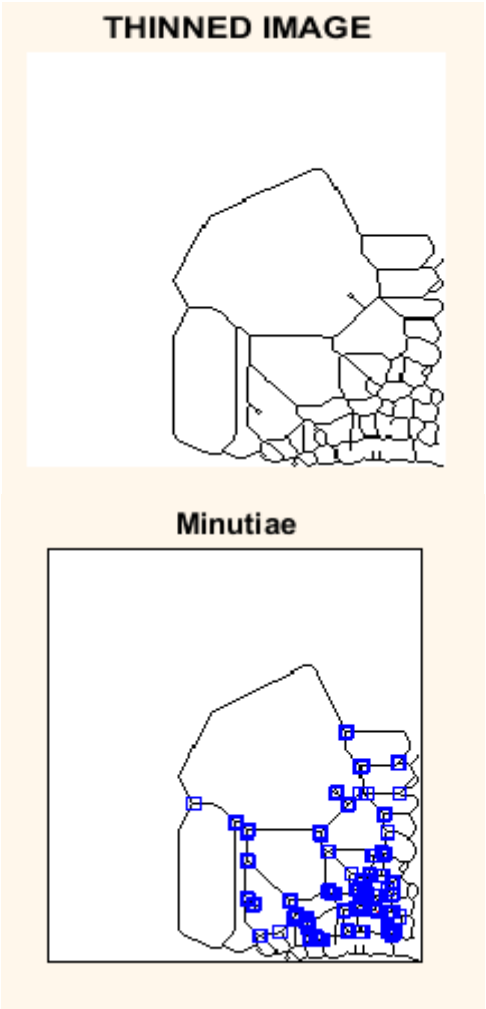


**Fig. 10: Thinning and Munities**

The above figure shows the munities of the applied fingerprint which shows detection of munities points and also the thinning of the image which makes the processing of the image easy.

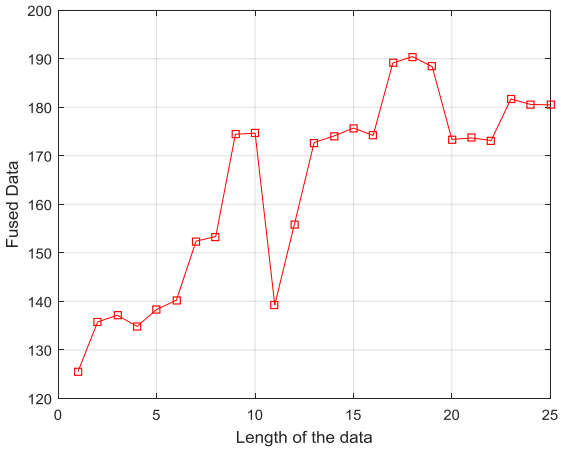


**Fig. 11: Fusion Bits**

The above figure shows the fusion of the processing of the iris and fingerprint feature vector which will be fed further for the recognition during the testing phase.

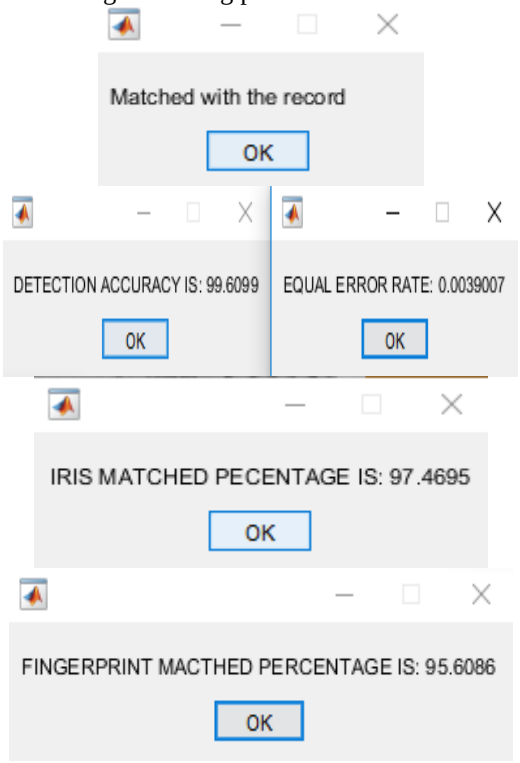


**Fig. 12: Performance Evaluation**

The above figure shows the performance evaluations in terms of the recognition and percentage of correct matching with high recognition rate. From the above performance, it can be noticed that proposed approach is able to achieve low error rates and high recognition rates which shows the robustness of our proposed approach for the high true positive rates and true negative rates.

## 6. CONCLUSION

Multi-biometric systems deal with many limits of biometric systems by uniting the evidence attained from different causes using effective fusion arrangement. In this paper, the description about the multi-biometric scheme, fusion process and classification is taken place with low error rate probabilities. From the proposed implementation, it shows that the performance of multi-biometric schemes can be of additional better-quality if a more reduction of the false negative rates will take place. So our proposed approach shows that the biometric approach is having high classification rates with true positive rates.

 

## 7. REFERENCES


[1] A.K. Jain, A. Ross, and S. Prabhakar, "An Introduction To Biometric Recognition", in IEEE Transactions on Circuits and Systems for Video Technology, Vol. 14, No.1, 2004, pp. 4–20.

[2] Haryati Jaafar, Dzati Athiar Ramli, "A Review of Multibiometric System with Fusion Strategies and Weighting Factor", International Journal of Computer Science Engineering (IJCSE), Vol. 2 No.04 July 2013, pp.158-165.

[3] J. Ortega-Garcia, J. Bigun, D. Reynolds, and J. Gonzalez-Rodriguez, "Authentication Gets Personal With Biometrics", in IEEE Signal Processing Magazine, Vol. 21, 2004, pp. 50–62.

[4] M.X. He, S.J. Horng, P.Z. Fan, R.S. Run, R.J. Chen, J.L. Lai, M.K. Khan and K.O. Sentosa, "Performance Evaluation of Score Level Fusion in Multimodal Biometric Systems", Journal of Pattern Recognition, Vol. 43, No. 5, 2010, pp. 1789-1800.

[5] J.P. Campbell, D.A. Reynolds, and R.B. Dunn, "Fusing High And Low-Level Features for Speaker Recognition", in Proceeding of EUROSPEECH, 2003, pp. 2665-2668.

[6] A. Jaina, K. Nandakumar, A. Ross, and A. Jain, "Score Normalization in Multimodal Biometric Systems", Journal of Pattern Recognition, Vol. 38, 2005, pp. 2270.

[7] Arun Ross and Anil K. Jain, "Multimodal Biometrics: An Overview", Appeared in Proc. of 12th European Signal Processing Conference (EUSIPCO), (Vienna, Austria), pp. 1221-1224, September 2004.

[8] K. I. Chang, K. W. Bowyer, and P. J. Flynn, "Face recognition using 2D and 3D facial data," in Proc. Of Workshop on Multimodal User Authentication, (Santa Barbara, CA), pp. 25–32, Dec 2003.

[9] Roy, K., and Bhattacharya, P. (2006), Iris recognition with support vector machines, Springer Lecture Notes in Computer Science ICB 2006, Zhang, D., and Jain, A. K. (Eds.), vol. 3832, pp. 486-492.

[10] Chaudhary, Sheetal, and Rajender Nath. "A Robust Multimodal Biometric System Integrating Iris, Face and Fingerprint using Multiple SVMs." *International Journal of Advanced Research in Computer Science* 7, no. 2 (2016).

[11] Meva, Divyakant T., and C. K. Kumbha Rana. "Design and evaluation of multimodal biometric system with fingerprint and face recognition." International Journal of Scientific and Research Publications 5, no. 4 (2015): 1-4.

[12] Hassan, Norsalina, Dzati Athiar Ramli, and Shahrel Azmin Suandi. "Fusion of Face and Fingerprint for Robust Personal Verification System." International Journal of Machine Learning and Computing 4, no. 4 (2014): 371

[13] Dandawate, Yogesh H., and Sajeeda R. Inamdar. "Fusion-based multimodal biometric cryptosystem." In Industrial Instrumentation and Control (ICIC), 2015 International Conference on, pp. 1484-1489. IEEE, 2015.

[14] Kihal, Nassima, Salim Chitroub, and Jean Meunier. "Fusion of iris and palmprint for multimodal biometric authentication." In Image Processing Theory, Tools and Applications (IPTA), 2014 4th International Conference on, pp. 1-6. IEEE, 2014.

[15] Aizi, Kamel, Mohamed Muslim, and Ahmed Sabri. "Remote multimodal biometric identification based on the fusion of the iris and the fingerprint." In Electrical Engineering (ICEE), 2015 4th International Conference on, pp. 1-6. IEEE, 2015.

[16] Shohel Sayeed, Ilham Nasir and Thian Song Ong, "An Efficient Multimodal Biometric Authentication Integrating Fingerprint and Face Features", American journal of applied sciences, science publications, pp. 1221-1227, 2016.


 