

factor $k=0.1$ the average correct match score is 22 and average incorrect score is 40 but in the case of factor $k=0.5$ the red curve peaks are mainly located at the left part so the average incorrect score is 27 which is much lower than the previous one and according to the green curve the average correct score is 42. This indicates that the system is capable of differentiate fingerprints at a good correct rate by setting an appropriate value of factor 'k'. The system is capable of easily differentiate vague minutia pairs from genuine minutia pairs that leads to high verification rate and accuracy.

VII. CONCLUSION

This paper introduces the efficient automatic attendance system, by using minutiae based fingerprint technique. We use the methods which are simple, effective and accurate to do the faster execution of enhancement and thinning algorithm of fingerprint image.

In addition, we examine the experimentally determined constant "K" during the enhancement of image with using Fourier Transform, by which we able to differentiate the enhanced quality of image that can lead to the best verification of extracted minutiae of image. The performance evaluation of proposed system is done by using FVC 2000 database (500 images) [21] and the used time taken for verification was very less and verification rate is higher and accuracy is near about 92%.

REFERENCES

- [1] Fakhreddine Karray, Jamil Abou Saleh, Mo Nours Arab and Milad Alemzadeh, "Multi Modal Biometric Systems: A State of the Art Survey," Pattern Analysis and Machine Intelligence Laboratory, University of Waterloo, Waterloo, Canada.
- [2] Anil K. Jain, Arun Ross and Salil Prabhakar, "An introduction to biometric recognition," Circuits and Systems for Video Technology, IEEE Transactions on Volume 14, Issue 1, Jan. 2004 Page(s):4 – 20.
- [3] D. Maltoni, D. Maio, A. K. Jain, S. Prabhakar, "Handbook of Fingerprint Recognition," Springer, New York, 2003.
- [4] Manvjeet Kaur, Mukhwinder Singh, Akshay Girdhar, and Parvinder S. Sandhu, "Fingerprint Verification System using Minutiae Extraction Technique," World Academy of Science, Engineering and Technology 46 2008.
- [5] H. C. Lee and R. E. Gaensslen, "Advances in Fingerprint Technology," Elsevier Science, New York, ISBN 0-444-01579-5.
- [6] "Guide to Fingerprint Recognition" DigitalPersona, Inc. 720 Bay Road Redwood City, CA 94063 USA, <http://www.digitalpersona.com>
- [7] L. O'Gorman, "Overview of fingerprint verification technologies," Elsevier Information Security Technical Report, Vol. 3, No. 1, 1998.
- [8] B.G. Sherlock. D.M. Monro. K. Millard., "Fingerprint enhancement by directional Fourier filtering," IEE Proc.-Vis. Image Signal Processing, Vol. 141, No. 2, April 1994.
- [9] Lin Hong., "Automatic Personal Identification Using Fingerprints," Ph.D. Thesis, ISBN: 0-599-07596-1, 1998.
- [10] E. Hastings, "A Survey of Thinning Methodologies," Pattern analysis and Machine Intelligence, IEEE Transactions, vol. 4, Issue 9, pp. 869 885, 1992.

- [11] U. Halici, L. C. Jain, A. Erol, "Introduction to Fingerprint Recognition," Intelligent Biometric Techniques in Fingerprint and Face Recognition, L.C. Jain, U. Halici, I.Hayashi, S.B. Lee, S. Tsutsui (editors), CRC Press, 1999.
- [12] S. Pal, "Some Low Level Image Segmentation Methods, Algorithms and their Analysis," Ph.D. Thesis, Department of Computer Science & Engineering, Indian Institute of Technology, Kharagpur 1991.
- [13] Ying Jie, Yuan Yi fang, Zhang Renjie, Song Qifa. "Fingerprint minutiae matching algorithm for real time system." Pattern Recognition 39 (2006) 143 – 146.
- [14] Feng Zhao, Xiaou Tang, "Preprocessing and postprocessing for skeleton-based fingerprint minutiae extraction," Pattern Recognition 40(4): 1270-1281 (2007).
- [15] Henry Selvaraj, S. Arivazhagan and L. Ganesan, "Fingerprint Verification Using Wavelet Transform," International Conference on Computational Intelligence and Multimedia Applications, 2003.
- [16] Cheong Hee Park and Haesun Park, "Fingerprint classification using fast Fourier transform and nonlinear discriminant analysis," Pattern Recognition 38 (2005) 495 – 503.
- [17] Asker M. Bazen and Sabih H. Gerez, "Segmentation of Fingerprint Images," Workshop on Circuits, Systems and Signal Processing, Veldhoven, 2001.
- [18] Chaur-Chin Chen and Yaw-Yi Wang, "An AFIS Using Fingerprint Classification," Image and Vision Computing, 2003.
- [19] Virginia Espinosa-Dur6, "Fingerprints Thinning Algorithm," IEEE AES Systems Magazine, 2003.
- [20] Pradeep M. Patil, Shekar R. Suralkar and Faiyaz B. Sheikh, "Rotation Invariant Thinning Algorithm to Detect Ridge Bifurcations for Fingerprint Identification," IEEE International Conference on Tools with Artificial Intelligence, 2005.
- [21] Fingerprint Database (FVC2002). <http://bias.csr.unibo.it/fvc2002/>

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