Finger Vein Verification System using Repeated Line Tracking and Dimensionality Reduction using PCA Algorithms with SURF Matching

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Abstract. Human security becomes important in this spoofing attack world. The traditional ways that used to protect privacy such as Personal Identification Number (PIN) and smart card are getting replaced by the biometric methods due to its high risk for being forgotten and exposure. Examples of human biometrics are iris, face, voice and finger print. However, these biometric traits are not are not completely reliable and secure. Hence, finger vein has been studied. This paper will compare the performance of finger vein verification system with PCA and without PCA. There is no acquisition process in this paper as we used an open source finger-vein database called SDMULA-HMT. In preprocessing stage, finger image from database will undergo process such as Contrast-limited Adaptive Histogram Equalization (CLAHE) and noise filtering image for contrast improvement. Then, the vein pattern was extracted using Repeated Line Tracking (RLT). The feature vector of the vein pattern was then dimensionality reduction by Principal Component Analysis (PCA). The Speeded-Up Robust Features (SURF) Algorithms is used to determine the interest points. Lastly, the Euclidean Distance (ED) between the points of these two feature vectors was figured out to estimate their similarity. The result shows that PCA can improve the accuracy of the verification system by reduce the data down into its basic component without much loss of the information.

Keywords: Repeated Line Tracking, Principal Component Analysis, Speeded-Up Robust Features