

Fusion of Finger Inner Knuckle Print and Hand Geometry Features to Enhance the Performance of Biometric Verification System

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Abstract : With the advent of modern computing technology, there is an increased demand for developing recognition systems that have the capability of verifying the identity of individuals. Recognition systems are required by several civilian and commercial applications for providing access to secured resources. Traditional recognition systems which are based on physical identities are not sufficiently reliable to satisfy the security requirements due to the use of several advances of forgery and identity impersonation methods. Recognizing individuals based on his/her unique physiological characteristics known as biometric traits is a reliable technique, since these traits are not transferable and they cannot be stolen or lost. Since the performance of biometric based recognition system depends on the particular trait that is utilized, the present work proposes a fusion approach which combines Inner knuckle print (IKP) trait of the middle, ring and index fingers with the geometrical features of hand. The hand image captured from a digital camera is preprocessed to find finger IKP as region of interest (ROI) and hand geometry features. Geometrical features are represented as the distances between different key points and IKP features are extracted by applying local binary pattern descriptor on the IKP ROI. The decision level AND fusion was adopted, which has shown improvement in performance of the combined scheme. The proposed approach is tested on the database collected at our institute. Proposed approach is of significance since both hand geometry and IKP features can be extracted from the palm region of the hand. The fusion of these features yields a false acceptance rate of 0.75%, false rejection rate of 0.86% for verification tests conducted, which is less when compared to the results obtained using individual traits. The results obtained confirm the usefulness of proposed approach and suitability of the selected features for developing biometric based recognition system based on features from palmar region of hand.

Keywords : biometrics, hand geometry features, inner knuckle print, recognition

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