***EEC-521/CIS 634- SOFTWARE ENGINEERING***

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**ABSTRACT**

The set of minutia points is considered to be the most distinctive feature for fingerprint representation and is widely used in fingerprint matching. It was believed that the minutiae set does not contain sufficient information to reconstruct the original fingerprint image from which minutiae were extracted. However, recent studies have shown that it is indeed possible to reconstruct fingerprint images from their minutiae representations. Reconstruction techniques demonstrate the need for securing fingerprint templates, improving the template interoperability, and improving fingerprint synthesis. But, there is still a large gap between the matching performance obtained from original fingerprint images and their corresponding reconstructed fingerprint images. In this paper, the prior knowledge about fingerprint ridge structures is encoded in terms of orientation patch and continuous phase patch dictionaries to improve the fingerprint reconstruction. The orientation patch dictionary is used to reconstruct the orientation field from minutiae, while the continuous phase patch dictionary is used to reconstruct the ridge pattern. Experimental results on three public domain databases (FVC2002 DB1\_A, FVC2002 DB2\_A, and NIST SD4) demonstrate that the proposed reconstruction algorithm outperforms the state-of-the-art reconstruction algorithms in terms of both: 1) spurious minutiae and 2) matching performance with respect to type-I attack (matching the reconstructed fingerprint against the same impression from which minutiae set was extracted) and type-II attack (matching the reconstructed fingerprint against a different impression of the same finger).