**CONCLUSION**

The goal of fingerprint reconstruction is to reproduce the original fingerprint image from an input minutiae set. There are essentially three main reasons for studying the problem of fingerprint image reconstruction from a given minutiae set: (i) to demonstrate the need for securing minutiae template, (ii) to improve the interoperability of fingerprint templates generated by different combinations of sensors and algorithms, (iii) to improve fingerprint synthesis. Despite a significant improvement in the performance of reconstruction algorithms over the past ten years, there is still a discrepancy between the reconstructed fingerprint image and original fingerprint image (from which the minutiae template was extracted) in terms of matching performance. In this paper, we propose a reconstruction algorithm that utilizes prior knowledge of fingerprint ridge structure to improve the reconstructed fingerprint image. The prior knowledge is represented in terms of two kinds of dictionaries, orientation patch and continuous phase patch dictionaries. The orientation patch dictionary is used to reconstruct the orientation field from the given minutiae set, while the continuous phase patch dictionary is used to reconstruct the ridge pattern. Experimental results on three public domain fingerprint databases (FVC2002 DB1\_A, FVC2002 DB2\_A and NIST SD4) show that the proposed reconstruction algorithm outperforms two state-of-the-art reconstruction algorithms in terms of reconstructed minutiae accuracy and matching performance for both type-I and type-II attacks.

Although the reconstructed fingerprints are very close to the original fingerprints from which the minutiae were extracted in terms of orientation field, ridge frequency field and minutiae distribution, it is still difficult to fool a human expert because the reconstructed fingerprints are ideal fingerprints (without any noise) and have the synthetic appearance. Future work will investigate to make the reconstructed fingerprints more realistic. The proposed method for orientation field reconstruction only considers the local orientation pattern. The use of global orientation prior knowledge as well as singular points may further improve the ridge orientation reconstruction. The ridge frequency field used in this paper can be either a fixed priori or reconstructed from the ridge frequency around minutiae. Future work will investigate frequency field reconstruction directly from the minutiae position and direction.