Fingerprint Template Protection with Minutiae based Bit String

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Abstract: Recently, biometric security has become the major study to address biometric template security and user privacy. In this research, we focus on minutiae based fingerprint template protection. At the local level, two most prominent ridge characteristics of fingerprint, namely ridge termination and ridge bifurcation are detected to form minutia point (minutiae). In this context, a ridge ending is defined as the ridge point where a ridge ends abruptly while a ridge bifurcation is defined as the ridge point where a ridge forks or diverges into branch ridges. Minutiae in fingerprints are generally stable and robust to different fingerprint impression conditions. Fingerprint features are constructed from minutiae triplets that are invariant to ration, translation and distortion. Multiply invariants can be associated with minutiae triangles e.g., the length of the sides, the angles between the sides and the minutiae, the ridge count between the sides, triangle handedness, triangle height etc. Subsequently, the fingerprint features are discretized to generate fingerprint template of bit-string such that the template cannot be revealed without successful biometric authentication. In other word, the proposed solution is designed based on the notion of cancelable biometrics and biometric encryption to transform fingerprint data into irreversibly transformed representation of the user template (bit-string) to preserve the privacy and security of user biometric data. In addition, the proposed solution also resolve biometric template reissue problem.