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**A CNN-based Framework for Comparison of Contactless to Contact-based Fingerprints**

**Abstract**

Accurate comparison of contactless 2-D fingerprint images with contact-based fingerprints is critical for the success of emerging contactless 2-D fingerprint technologies, which offer more hygienic and deformation-free acquisition of fingerprint features. Convolutional neural networks (CNNs) have shown remarkable capabilities in biometrics recognition. However, there has been almost nil attempt to match fingerprint images using CNN-based approaches. This paper develops a CNN-based framework to accurately match contactless and contact-based fingerprint images. Our framework first trains a multi-Siamese CNN using fingerprint minutiae, respective ridge map and specific region of ridge map. This network is used to generate deep fingerprint representation using a distance-aware loss function. Deep fingerprint representations generated in such multi-Siamese network are concatenated for more accurate cross comparison. The proposed approach for cross-fingerprint comparison is evaluated on two publicly available databases containing contactless 2-D fingerprints and respective contact-based fingerprints. Our experiments presented in this paper consistently achieve outperforming results over several popular deep learning architectures and over contactless to contact-based fingerprints comparison methods in the literature.