

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

## **Abstract—**

Accurate comparison of contactless 2D fingerprint images with contact-based fingerprints is critical for the success of emerging contactless 2D fingerprint technologies, which offer more hygienic and deformation-free acquisition of fingerprint features. Convolutional neural networks (CNN) have shown remarkable capabilities in biometrics recognition. However, there has been almost nil attempt to match fingerprint images using CNNbased approaches. This paper develops a CNN-based framework to accurately match contactless and contact-based fingerprint images. Our framework firstly 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 2D 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.

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