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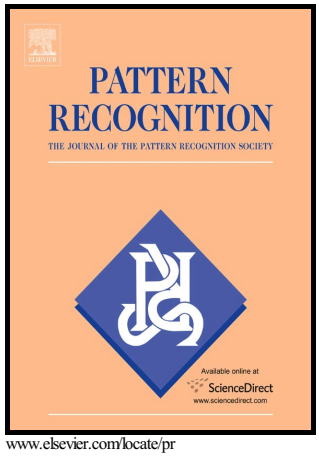

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Dense Registration of Fingerprints

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Abstract

Dense registration of different impressions of the same finger is beneficial to various fingerprint matching methods. This is a challenging problem due to elastic distortion of finger skin and sparsity of distinctive features (namely minutiae) in fingerprints. Most existing fingerprint registration algorithms produce only correspondences between minutiae, which are not sufficient for dense registration of fingerprints. In this paper, we proposed a novel dense fingerprint registration algorithm, which consists of a composite initial registration step and a dual-resolution block-based registration step. The dual-resolution block-based registration is approached in an energy minimization framework which consists of local search, energy function construction and global optimization. In local search step, a candidate set of transformations of every input image block are found using image correlation w.r.t. the corresponding reference image block. In energy function construction, two factors are considered: 1) the similarity between the transformed input block and the corresponding reference block, and 2) the compatibility between transformations of neighboring input blocks. In global optimization, a region growing style algorithm is proposed to minimize the energy function. Experimental results on three databases containing many distorted fingerprints, namely FVC2004 DB1, Tsinghua Distorted Fingerprint database and NIST SD27 latent fingerprint database, show that the proposed algorithm not only produces more accurate registration results but also improves the matching performance by fusion of minutiae

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