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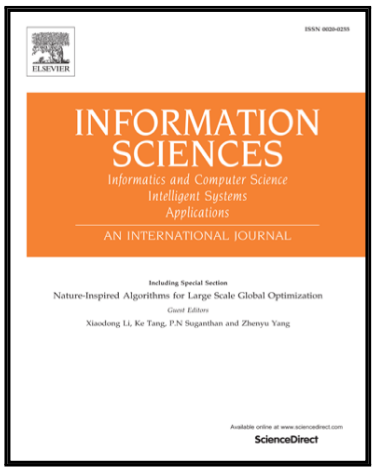

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Dynamic Dictionary Optimization for Sparse-representation-based Face Classification using Local Difference Images

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Abstract

In this study, we present a new sparse-representation-based face-classification algorithm that exploits dynamic dictionary optimization on an extended dictionary using synthesized faces. More specifically, given a dictionary consisting of face examples, we first augment the dictionary with a set of virtual faces generated by calculating the image difference of a pair of faces. This results in an extended dictionary with hybrid training samples, which enhances the capacity of the dictionary to represent new samples. Second, to reduce the redundancy of the extended dictionary and improve the classification accuracy, we use a dictionary-optimization method. We truncate the extended dictionary with a more compact structure by discarding the original samples with small contributions to represent a test sample. Finally, we perform sparse-representation-based face classification using the optimized dictionary. Experimental results obtained using the AR and FERRET face datasets demonstrate the superiority of the proposed method in terms of accuracy, especially for small-sample-size problems.

Keywords: Sparse representation, face classification, data augmentation, dictionary optimization

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