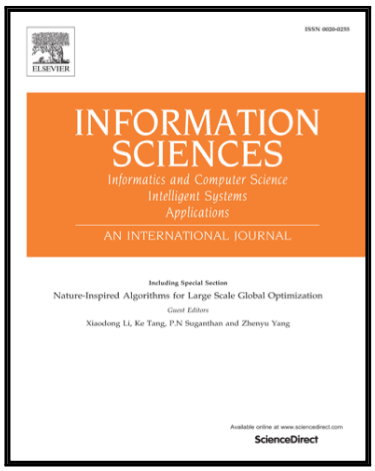

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Robust Face Recognition via Hierarchical Collaborative Representation

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Abstract

Collaborative representation-based classification (CRC) is currently attracting the attention of researchers because it is more effective than conventional representation-based classifiers in recognition tasks. CRC has shown high face recognition accuracy; however, its accuracy is degraded significantly if the number of training faces in each class is small. This is because the accuracy of CRC is only dependent on the results of minimizing the Euclidean distance between a testing face and its approximator in the collaborative subspace of training faces. In this research, we proved that the accuracy of CRC can be improved substantially by minimizing not only the Euclidean distance between a testing face and its approximator but also the Euclidean distances from the approximator to training faces in each class. Consequently, we presented a hierarchical collaborative representation-based classification (HCRC) in which a two-stage classifier is applied for training faces, and the recognition accuracy of the second-stage classifier is significantly improved in comparison to that of the first-stage classifier. Moreover, the recognition rate of our classifier can be considerably increased by using models of discriminative feature extraction. Since noise and illumination are the main factors that cause CRC to be less accurate, we pro-

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