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Weighted group sparse representation for Undersampled Face Recognition

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Abstract

Recently, sparse representation has become a popular data representation method and sparse representation based classification (SRC) has been proposed. However, the ℓ_1 -norm regularized sparse representation is not stable and fails to incorporate the label information of training samples. On the other hand, the training samples are grouped into a column-based matrix, which has a group structure. In this paper, we propose a new classification method called weighted group sparse representation classification(WGSRC) to classify a query image by minimizing the weighted mixed-norm ($\ell_{2,1}$ -norm) regularized reconstruction error with respect to training images. Unlike SRC, the group sparse regularization is utilized to incorporate the label information and it promotes sparsity at the group level. According to the similarity between a test sample and training samples of each group, WGSRC gives each group a weight. Our method integrates the locality structure of the data and similarity information between the query sample and distinct classes into $\ell_{2,1}$ -norm regularization to form a unified formulation. We try to represent a test sample by training samples not only from the neighbors of it, but also from the highly relevant classes. The sparse solution of WGSRC encodes more structure information and discriminative information than other sparse representation methods. Experimental results on five face data sets have shown that the proposed method outperforms state-of-the-art sparse repre-

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