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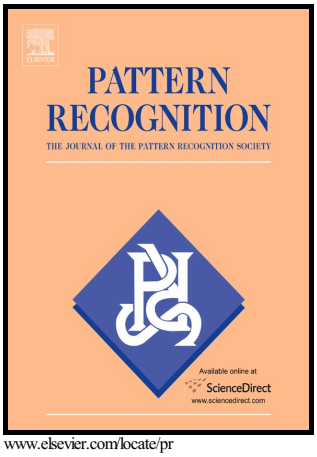

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Abstract

Many classification approaches first represent a test sample using the training samples of all the classes. This collaborative representation is then used to label the test sample. It is a common belief that sparseness of the representation is the key to success for this classification scheme. However, more recently, it has been claimed that it is the collaboration and not the sparseness that makes the scheme effective. This claim is attractive as it allows to relinquish the computationally expensive sparsity constraint over the representation. In this paper, we first extend the analysis supporting this claim and then show that sparseness explicitly contributes to improved classification, hence it should not be completely ignored for computational gains. Inspired by this result, we augment a dense collaborative representation with a sparse representation and propose an efficient classification method that capitalizes on the resulting representation. The augmented representation and the classification method work together meticulously to achieve higher accuracy and lower computational time compared to state-of-the-art collaborative representation based classification approaches. Experiments on benchmark face, object, action and scene databases show the efficacy of our approach.

Keywords: Multi-class classification, Sparse representation, Collaborative

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