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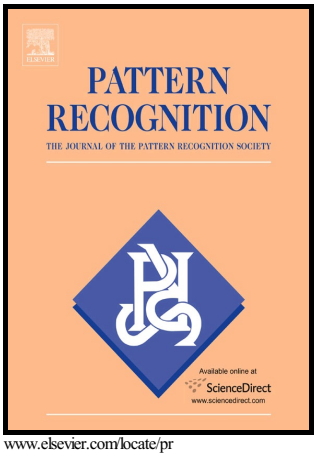

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Multi-instance dictionary learning via multivariate performance measure optimization

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Abstract

The multi-instance dictionary plays a critical role in multi-instance data representation. Meanwhile, different multi-instance learning applications are evaluated by specific multivariate performance measures. For example, multi-instance ranking reports the precision and recall. It is not difficult to see that to obtain different optimal performance measures, different dictionaries are needed. This observation motives us to learn performance-optimal dictionaries for this problem. In this paper, we propose a novel joint framework for learning the multi-instance dictionary and the classifier to optimize a given multivariate performance measure, such as the F_1 score and precision at rank k. We propose to represent the bags as bag-level features via the bag-instance similarity, and learn a classifier in the bag-level feature space to optimize the given performance measure. We propose to minimize the upper bound of a multivariate loss corresponding to the performance measure, the complexity of the classifier, and the complexity of the dictionary, simultaneously, with regard to both the dictionary and the classifier parameters. In this way, the dictionary learning is regularized by the performance optimization, and a performance-optimal dictionary is ob-

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