

Beam search algorithms for multilabel learning

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Abstract Multilabel learning is a machine learning task that is important for applications, but challenging. A recent method for multilabel learning called probabilistic classifier chains (PCCs) has several appealing properties. However, PCCs suffer from the computational issue that inference (i.e., predicting the label of an example) requires time exponential in the number of tags. Also, PCC accuracy is sensitive to the ordering of the tags while training. In this paper, we show how to use the classical technique of beam search to solve both these problems. Specifically, we show how to apply beam search to make inference tractable, and how to integrate beam search with training to determine a suitable tag ordering. Experimental results on a range of datasets show that the proposed improvements yield a state-of-the-art method for multilabel learning.

Keywords Multilabel classification · Probabilistic models · Beam search · Structured prediction

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