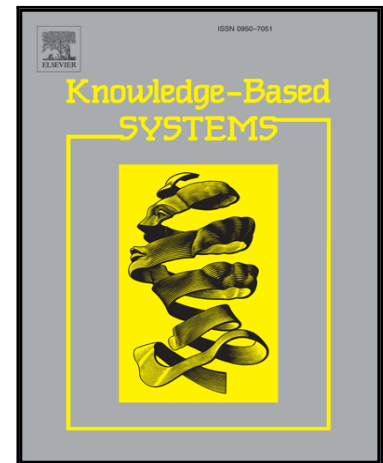


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A heuristic in A* for inference in nonlinear Probabilistic Classifier Chains

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Abstract

Probabilistic Classifier Chains (PCC) is a very interesting method to cope with multi-label classification, since it is able to obtain the entire joint probability distribution of the labels. However, such probability distribution is obtained at the expense of a high computational cost. Several efforts have been made to overcome this pitfall, proposing different inference methods for estimating the probability distribution. Beam search and the ϵ - approximate algorithms are two methods of this kind. A more recently approach is based on the A* algorithm with an admissible heuristic, but it is limited to be used just for linear classifiers as base methods for PCC. This paper goes in that direction presenting an alternative admissible heuristic for the A* algorithm with two promising advantages in comparison to the above-mentioned heuristic, namely, i) it is more dominant for the same depth and, hence, it explores fewer nodes and ii) it is suitable for nonlinear classifiers. Additionally, the paper proposes an efficient implementation for the computation of the heuristic that reduces the number of models that must be evaluated by half. The experiments show, as theoretically expected, that this new algorithm reaches Bayes-optimal predictions in terms of subset 0/1 loss and explores fewer nodes than other state-of-the-art methods

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