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An Evolutionary Scheme for Decision Tree Construction

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Abstract

Classification is a central task in machine learning and data mining. Decision tree (DT) is one of the most popular learning models in data mining. The performance of a DT in a complex decision problem depends on the efficiency of its construction. However, obtaining the optimal DT is not a straightforward process. In this paper, we propose a new evolutionary meta-heuristic optimization based approach for identifying the best settings during the construction of a DT. We designed a genetic algorithm coupled with a multi-task objective function to pull out the optimal DT with the best parameters. This objective function is based on three main factors: (1) *Precision* over the test samples, (2) *Trust* in the construction and validation of a DT using the smallest possible training set and the largest possible testing set, and (3) *Simplicity* in terms of the size of the generated candidate DT, and the used set of attributes. We extensively evaluate our approach on 13 benchmark datasets and a fault diagnosis dataset. The results show that

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