Chapter 9 [1]

RULE INDUCTION THROUGH DISCRETE SUPPORT VECTOR DECISION TREES

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Abstract: We present a rule induction method based on decision trees for classification and prediction problems. Our approach to tree construction relies on a discrete variant of support vector machines, in which the error is expressed by the number of misclassified instances, in place of the misclassification distance considered by traditional SVMs, and an additional term is included to reduce the complexity of the generated rule. This leads to the formulation of a mixed integer programming problem, whose approximate solution is obtained via a sequential LP-based algorithm. The decision tree is then built by means of a multivariate split derived at each node from the approximate solution of the discrete SVM. Computational tests on well-known benchmark datasets indicate that our classifier achieves a superior trade-off between accuracy and complexity of the induced rules, outperforming other competing approaches.

Key Words: Classification, Decision Trees, Support Vector Machines, Rule Induction.

[1] Triantaphyllou, E. and G. Felici (Eds.), **Data Mining and Knowledge Discovery Approaches Based on Rule Induction Techniques**, Massive Computing Series, Springer, Heidelberg, Germany, pp. 305-326, 2006.

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