

Learning Multicriteria Classification Models from Examples: Decision Rules in Continuous Space

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Abstract

The classification problem statement of multicriteria decision analysis (MCDA) is to model the classification of the alternatives/actions according to the decision maker's preferences. These models are based on outranking relations, utility functions or (linear) discriminant functions. Model parameters can be given explicitly or learnt from a preclassified set of alternatives/actions.

In this paper we propose a novel approach, the Continuous Decision (CD) method, to learn parameters of a discriminant function, and we also introduce its extension, the Continuous Decision Tree (CDT) method, which describes the classification more accurately.

The proposed methods are results of integration of Machine Learning methods in Decision Analysis. From a Machine Learning point of view, the CDT method can be considered as an extension of the C4.5 decision tree building algorithm that handles only numeric criteria but applies more complex tests in the inner nodes of the tree. For the sake of easier interpretation, the decision trees are transformed to rules.

Key words: Multiple criteria analysis, Classification, Artificial intelligence, Decision trees, Fuzzy sets

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