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Integrating large positive and negative performance differences into multicriteria majority-rule sorting models

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Abstract

This paper considers the issue of how to include large positive and negative differences in multicriteria sorting models, based on the outranking paradigm. We show that various outranking relations can be constructed to take into account these out- and under-performances, before presenting mathematical programs to learn the preferential parameters of these models.

Keywords: multi-criteria decision aiding, sorting, outranking relation, veto, dictator, mixed-integer programming

1. Introduction

We consider in this article a decision situation, called multicriteria sorting or classification, in which a finite set of decision alternatives is evaluated on a finite set of criteria, and where the goal of a decision maker (DM) is to assign each of these alternatives into predefined preference-ordered categories or classes. To achieve this assignment task, one generally uses a preference model, which aggregates the criteria, and which can be based on either one of the following paradigms: Multi-attribute Value Theory (MAVT) [10], the outranking approach [19], or decision rules using “if-then” statements, which can, for example be inferred using a dominance-based rough set approach [9].

We suppose here that, when comparing two alternatives, the decision maker uses the *outranking paradigm*. In other words, (s)he considers that an alternative a outranks an alternative b when a weighted majority of criteria validates the fact that a is performing at least as good as b and there is no criterion where b seriously outperforms a . The majority-related condition is usually called

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