A PROGRESSIVE MULTIPLE CRITERIA SORTING APPROACH BASED ON ADDITIVE UTILITY FUNCTIONS CONSIDERING IMPRECISE INFORMATION

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ABSTRACT. *This paper presents a progressive approach for assigning alternatives that are defined by multiple criteria into a set of ordered categories. It extends the UTADIS method to take into account two types of imprecise assignment information and allow the DM to provide preference information in an interactive way. In this approach, a heuristic algorithm is given to build and update the DM's global utility function and then a mixed integer linear programming model is developed to identify the inconsistency of the DM's assignment information in the iterative process. When inconsistency occurs, the conflicting assignment results are presented to the DM to help him modify his previous information. However, when the information is consistent, the fittest category and the range of possible categories on each alternative are obtained for the DM. The fittest category is computed through the previous mixed integer linear programming model, and the range of possible categories is inferred by another two mixed integer linear programming models. Meanwhile, the rationality of the latter two mixed integer linear programming models is also justified theoretically. Finally, an example of MBA programs is given as an illustration of the proposed approach.*
Keywords: Multiple criteria sorting, UTADIS method, Interaction, Imprecise information

1. **Introduction.** The main task of multiple criteria decision aid (MCDA) is to assist the decision maker (DM) to choose, rank or sort a finite set of alternatives according to two or more criteria [1]. Over the past half-century or so, many methods have been proposed for choice and ranking problems. However, sorting problems have not been systematically explored until recently [2]. At present, multiple criteria sorting (MCS) problem has become an important research field. The MCS problem refers to the assignment of a set of alternatives evaluated on several criteria into the predefined ordered categories. Typical sorting examples arise in situations such as classifying countries into different risk levels [3] and evaluating credit applications of bank customers [4]. By now, various MCS methods can be identified in a lot of literatures [3-16].

On the whole, every sorting methodology involves the specification of two issues, namely, the preference model and the way in which values of the parameters used in the model are specified [2]. The most widely used preference models in the MCS context