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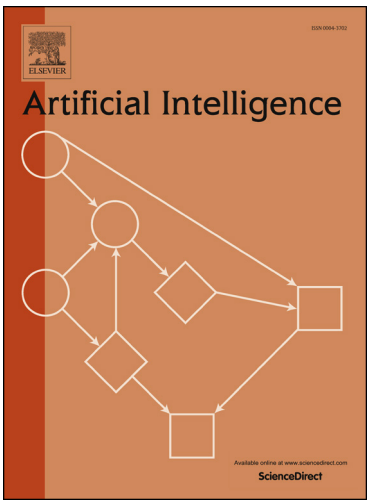

Incremental elicitation of choquet capacities for multicriteria choice, ranking and sorting problems

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Incremental Elicitation of Choquet Capacities for Multicriteria Choice, Ranking and Sorting Problems[☆]

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Abstract

This paper proposes incremental preference elicitation methods for multicriteria decision making with a Choquet integral. The Choquet integral is an evaluation function that performs a weighted aggregation of criterion values using a capacity function assigning a weight to any coalition of criteria, thus enabling positive and/or negative interactions among them and covering an important range of possible decision behaviors. However, the specification of the capacity involves many parameters which raises challenging questions, both in terms of elicitation burden and guarantee on the quality of the final recommendation.

In this paper, we investigate the incremental elicitation of the capacity through a sequence of preference queries (questions) selected one-by-one using a minimax regret strategy so as to progressively reduce the set of possible capacities until the regret (the worst-case "loss" due to reasoning with only partially specified capacities) is low enough. We propose a new approach designed to efficiently compute minimax regret for the Choquet model and we show how this approach can be used in different settings: 1) the problem of recommending a single alternative, 2) the problem of ranking alternatives from best to worst, and 3) sorting several alternatives into ordered categories. Numerical experiments are provided to demonstrate the practical efficiency of our approach for each of these situations.

Keywords: multicriteria decision making, Choquet integral, capacity, incremental elicitation, minimax regret, choice, ranking, sorting.

[☆]This paper is an extension of work published at ECAI 2014 [1].

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