Multi-criteria decision making based on relative measures.

Summary: According to regret theory, decision makers may care more about the relative values than the absolute values of alternatives. Generally, the relative values of two alternatives can be reflected from different views. Based on Abelian linearly ordered group, the relative measure is firstly proposed to calculate the relative values from different views. Then two methods are developed to calculate the relative values of alternatives, and are proved to obtain the same result under some conditions on the aggregation operator and the relative measure. Furthermore, based on the relative values of each pair of alternatives, several models are established to identify four types of optimal alternatives. The relationship of these four types of optimal alternatives is also discussed. The proposed methods can be considered as a general framework of the existing ones and can be further extended to identify the most inferior alternatives. Several examples are given to illustrate the proposed methods.

Keywords: multi-criteria decision making; abelian linearly ordered group; relative measure; regret theory
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