

New Ways for Solving a Choice Problem with Inconsistencies

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ABSTRACT

Binary Relations and Choice Functions define two different tools for describing the Decision Maker's (DM's) preferences over a finite set of alternatives. Often these tools present inconsistencies due to the different criteria that the DM has on her/his subconscious mind when choosing between alternatives, and which are normally in conflict with each other. For example, sometimes the revealed choice function is not associated with a binary relation, or the associated binary relation presents intransitivities.

Based on decompositions of binary relations and choice functions, we propose a methodology for addressing incoherences in preference modelling by using group decision-making techniques.

Our objective is to obtain a ranking of alternatives from the information given by the DM.

The process consists in the following steps:

1. Decompose the choice function in a family of normal choice functions, i.e., with an associated binary relation.
2. Decompose each obtained binary relation in a family of X -orders, where X -order could be quasiorder, partial order, partial interval order or partial semiorder, in the sense used by González-Pachón *et al.* (1999).
3. Aggregate the binary relation of each family using a valued net flow rule. Thus, we obtain a weak order associated with each choice function of the initial decomposition.
4. Aggregate the weak orders using a method of Social Choice, since a problem of Multicriteria Decision can be viewed as a problem of Social Choice (Arrow and Raynaud, 1986).

References

Arrow, K.J. and Raynaud, H. (1986) *Social Choice and Multicriterion Decision-Making*. The Massachusetts Institute of Technology.

González-Pachón, J. and Ríos-Insua, S. (1999) 'Mixture of Maximal Quasi Orders: A new Approach to Preference Modelling'. *Theory and Decision*, 47, pp. 73-88.

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