Multiagent decisions under fuzziness: getting out of the status quo bias towards innovative solutions

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Abstract

We are concerned with a very general problem of multiagent group decision making under fuzzy preferences and fuzzy majority. Basically, we assume a (finite, relatively small) set of options and a set of agents, human beings or software entities, who present their testimonies as fuzzy preference relations which are quite general and can encompass many different forms. We seek and option or a set options that is somehow best acceptable to the whole group of agents, with respect to their preferences. The relatively small number of options and agents is characteristic for many real world situations like human decisions in committees, decision making bodies, group pf experts, etc. We also assume that a fuzzy majority is employed. It is meant in Kacprzyk's sense as equated with a fuzzy linguistic quantifier exemplified by "most", "almost all", "much more than a half", etc. dealt with using, for instance, Zadeh's calculus of linguistically quantified propositions, Yager's OWA operators, etc. We consider some group decision solution concepts in such a setting, concentrating of Kacprzyk's fuzzy Q-cores which is a fuzzy set of options which are not (strongly) defeated in pairwise comparisons (in the sense that other options are preferred over them) by the required fuzzy majority Q, e.g. "most", of (important) agents. In this setting, we take into account all preference relations of the particular agents, just adding some relevance of options and importance of agents which are assumed to be given, for instance by domain experts. This can be viewed as a reflection of a so called status quo bias which, well known from psychology, which is an emotional bias with a preference for the current state of affairs, the principle of minimal change, etc. A natural question is whether some additional setting can be devised that could explicitly or implicitly make it possible to allow innovative group decisions to be derived, with the innovation considered to be an opposite to the status quo. We develop a simple yet effective and efficient approach in which – in addition to the relevance of options and importance of agents – there is another aspect taken into account. Namely, we derive first a social fuzzy preference relation, derived by some aggregation of the individual fuzzy preference relations, that represents the group testimony, which can be viewed as representing some "consensus". Then, we calculate for each agent's individual fuzzy preference relations its distance to that group (consensory) preference relation. Then, we assign additional weights to the particular individual preference relations, in addition to the weights corresponding to the relevance of options and importance of individuals. One can then argue that, from the

innovation point of view, a solution that is best acceptable by, for instance, most agents whose preferences are close to the consensory group fuzzy preference relation, would rather reflect a conservative attitude, we reformulate the concept of the fuzzy Q-core that would more take into account the agents' individual fuzzy preference relations that are farer from the consensory social fuzzy preference relation. We show some properties, and an exampleof application for a real world problem of real estate decision making.