Aggregation rules in fuzzy framework: remarks on impossibility and possibility results

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Extended abstract

We present some initial results of a study project on aggregation rules for societies where the preferences of individuals are known with vagueness; in particular, we consider fuzzy preference relations. A fuzzy preference on a set of alternatives $X$ is given by means of a function $f : X \times X \rightarrow [0, 1]$, called membership function, where $f(x, y)$ is the degree to which the alternative $x$ is preferred to $y$. Any exact preference is a fuzzy one with $\{0, 1\}$ as range of the membership function.

As preliminary steps of our research agenda, we retrace some of the classics. We give a fuzzy version of Kirman and Sondermann’s Theorem [6]: with respect to fuzzy extensions of asymmetry, transitivity and negative transitivity, we prove that, for any rule which aggregates profiles of fuzzy preferences into fuzzy preferences and which obeys to fuzzy Arrow’s axiom of unanimity and independence, the society (either finite or infinite) can be organized in coalitions with an own degree of decisiveness. This means that if all members of a decisive coalition look $x$ better than $y$ with a degree greater than $\alpha \in [0, 1]$, then the same happens for the social preference. As a consequence, we obtain new versions of Arrow’s Impossibility Theorem [1] and Fishburn’s Possibility Theorem [4].

Finally, we also present a study of properties of aggregation rules under uncertainty on the states of worlds and private information of individuals.

Keywords
References


