Aggregation of Non-binary Evaluations: towards a characterization of impossibility domains

Elad Dokow and Ron Holzman

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Abstract

We study a general aggregation problem in which a society has to determine its position (a/b/c...) on each of several issues, based on the positions of the members of the society on those issues. There is a prescribed set of feasible evaluations, i.e., permissible combinations of positions on the issues. The binary case (the position on each issue is yes or no) was introduced for the first time by Wilson (1975) and further developed by Rubinstein and Fishburn. Later, in the last decade, many papers were published. One of the main results for the binary case was a characterization of 'impossibility domains', the sets of feasible evaluations for which the natural analogue of Arrow's impossibility theorem holds true. In this paper we study the general non-binary case (on each issue there can be more than two positions), and take some steps towards a characterization of impossibility domains as in the binary case. We give a necessary condition for an impossibility domain, which, in the presence of another mild condition, is also sufficient for impossibility. In the ternary case (three positions on each issue) we do obtain a full characterization of impossibility domains.