

A Dimensional Analysis of Social Choice Functions

Todd Davies and Raja Shah¹
Symbolic Systems Program
Stanford University
Stanford, CA 94305-2150 USA
tdavies@csl.stanford.edu

Categories: Social Choice and Welfare Theory, Voting and Elections

A number of social choice procedures have been developed, some of which are reasonably obscure and/or difficult to understand. Even for well-known and relatively simple rules, the different assumptions embodied in each are numerous and seemingly beyond full formal characterization. We report the results of a statistical study of 21 social choice functions (SCFs), using randomly generated, strict-preference profiles drawn from both "impartial" and "clustered" cultures of different profile sizes. Building on work using hierarchical clustering by Slinko and Leung (2003), we apply multidimensional scaling (MDS) to map the distances between SCFs, and look at the effects of variations in the number of alternatives and voters. A procrustes analysis allows the different plots to be combined and a general set of dimensions to be analyzed. By regressing the percentages with which SCFs correspond with other SCFs and social choice principles on dimensions identified using MDS, we can begin to identify the primary differences between SCFs. We will discuss the dimensions in relation to principles of Condorcet efficiency, recursive branching, positional scoring, and the amount and portion of the profile to which an SCF attends. The analysis suggests procedures for deriving an optimal SCF for a population of individuals who act as preference aggregators for hypothetical profiles.

¹Raja Shah is now at Google Labs (rajashah@gmail.com)