

Additive and multiplicative properties of scoring methods for preference aggregation

László Csató*

Department of Operations Research and Actuarial Sciences
MTA-BCE "Lendület" Strategic Interactions Research Group
Corvinus University of Budapest

Abstract

We review some properties of ranking procedures used for generalized tournaments with missing values and multiple comparisons. Several scoring methods have been proposed for this problem, some of them were also characterized by a set of axioms. Nevertheless, the selection of the appropriate method is still challenging. An axiomatic approach is taken with a focus on additive and multiplicative properties based on our extended framework applying results and matches matrices. We discuss three methods, the score, generalised row sum [Chebotarev, 1994] and least squares.

Two multiplicative and three additive axioms are investigated, in both areas one of them is entirely new. We prove a proposition of González-Díaz et al. [2014] about homogeneity to be false. Additivity is able to differentiate among the three methods analysed. Based on Nitzan and Rubinstein [1981], we also show that the most general property of consistency has strong links to the independence of irrelevant matches, an axiom judged to be unfavourable by González-Díaz et al. [2014] when players have different opponents (or face opponents with different intensities). Therefore known characterizations of the score method, whose validity should be checked in our model, have limited relevance in this general framework.

Keywords: Preference aggregation, Tournament ranking, Paired comparison, Axiomatic approach

References

- P. Yu. Chebotarev. Aggregation of preferences by the generalized row sum method. *Mathematical Social Sciences*, 27(3):293–320, 1994.
- J. González-Díaz, R. Hendrickx, and E. Lohmann. Paired comparisons analysis: an axiomatic approach to ranking methods. *Social Choice and Welfare*, 42(1):139–169, 2014.
- S. Nitzan and A. Rubinstein. A further characterization of Borda ranking method. *Public Choice*, 36(1):153–158, 1981.

*e-mail: laszlo.csato@uni-corvinus.hu