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Special issue on blockmodels: Introduction

This special issue presents current research in the theory and method of blockmodeling. The first paper, by Faust and Wasserman, provides an introduction to traditional blockmodeling as developed by Breiger, *et al.* (1975), White *et al.* (1976) and others in the 1970s. Focusing on interpretation and evaluation, the paper by Faust and Wasserman reviews the history of blockmodeling and presents an overview of the basic steps in a blockmodel analysis.

The second paper, by Batagelj, Ferligoj and Doreian, introduces a new approach to computing traditional blockmodels based on structural equivalence. Their method differs from Burt's (1976) in that it does not require a measure of the degree of structural equivalence between pairs of actors. It differs from Arabie *et al.* 's (1990) method in that it produces partitions rather than permutations of actors. Finally, it differs from Beiger *et al.* (1975) method in that it directly maximizes an explicit measure of fit.

The third paper, by Borgatti and Everett, extends the method of blockmodels to the analysis of multiway, multimode matrices. This enables the analysis of such data as actor-by-organization-by-year matrices using network methods. Borgatti and Everett also generalize these multiway blockmodels to incorporate regular equivalence instead of structural equivalence. Applied to, say, actor-by-organization matrices, these "regular blockmodels" can be used to locate classes of actors who make equivalent (but not identical) organizational choices.

The fourth paper, by Batagelj, Doreian and Ferligoj, provides a direct method of computing regular blockmodels, using an approach similar to that in the second paper of the series. The method improves on the standard REGE algorithm (White 1984) in that it optimizes a well-defined measure of fit. In addition, the method applies equally well to directed and undirected graphs. Their approach is likely to make regular blockmodels much more accessible to network analysts.

The fifth paper, by Anderson, Wasserman and Faust, presents yet another generalization of blockmodels, incorporating the notion of

"stochastic equivalence" (Holland *et al.* 1983; Wasserman and Anderson 1987). Based on the Holland and Leinhardt (1981) P_1 model, stochastic blockmodels offer the promise (yet to be realized) of a statistical test of goodness of fit.

The final paper, by J. Boyd, serves as a kind of mathematical summary of the papers in this issue, and, in fact, of all papers on blockmodeling. Following Pattison (1982; 1988), Boyd organizes and unifies the various kinds of network homomorphisms (read: blockmodels) suggested in the literature. He shows that several exemplars have counterparts in other branches of mathematics, and suggests a general algebraic definition that includes them all as special cases.

This collection of papers indicates a renewed interest in blockmodels. Two themes in particular seem to be shared by many of the papers. One theme is the generalization of blockmodels to incorporate node equivalences other than structural equivalence. For example, both Batagelj, Doreian and Ferligoj, and Everett and Borgatti describe blockmodels based on regular equivalence, while Anderson *et al.* discuss blockmodels based on stochastic equivalence. Boyd discusses homomorphisms based on several different notions of equivalence, including some that are generalizations of regular equivalence. Another common theme is a concern for evaluating the degree to which a blockmodel fits the data. One paper (Faust and Wasserman) provides a general discussion of methods and issues. Another paper (Everett and Borgatti) provides theorems which serve as bases for evaluating goodness of fit. Finally, three papers (Batagelj, Ferligoj and Doreian; Batagelj, Doreian and Ferligoj; Anderson, Wasserman and Faust) present methods of constructing blockmodels which maximize an explicit measure of fit.

Stephen P. Borgatti
Guest editor
Department of Sociology,
University of South Carolina,
Columbia, SC 29208, USA

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