

Statistical Analysis of Evolving Socio-Political Networks

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ABSTRACT

Keywords

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Recent developments in social network analysis are nicely suited to illuminating the workings of legislatures and other representative institutions. They can shed light, for instance, on power as an evolving rather than a static attribute. In return, the availability of longitudinal data on such institutions, the United States Congress in particular, provides social network analysts with a laboratory for testing various tools and constructing a rigorous system of statistical inference for networks more generally.

The application of social network analysis to the study of the U.S. House and Senate is not entirely novel. Notable recent contributions include work focusing on connectedness via links of legislation cosponsorship [1, 2] and an information theoretic analysis of roll call votes of senators [3]. Given the dearth of panel data on large networks, it is nonetheless surprising that more analysts have not chosen to turn their attention to the good folks on Capitol Hill. Although we do not have comprehensive data explicitly detailing legislators' own perceptions of the networks they inhabit, we have various proxies in the form of caucus memberships, committee roles, roll call voting records, cosponsorship patterns and, of course, documented connections to numerous contributors.

Our initial research will focus on cosponsorship networks through time. The requirement that proposed bills have a single primary sponsor, plus optional cosponsors, means that such a network may be represented by a directed graph. Thus, we may analyze cosponsorship data for indications of reciprocity and transitivity, both of which have received plenty of attention in the social network literature, although more often than not in a cross-sectional setting. (For an example of these themes presented in the longitudinal setting, see Doreian, et al., 1996 [4].)

Another area for investigation is the changing composition of committees and subcommittees over time and what this may tell us about inter-party (and intra-party) cooperation and conflict at different moments in the history of Congress. The manner in which new assignments are made by party leadership, and the subsequent impact on legislation flowing through these bodies, may yield new insights when viewed from a network perspective [5].

The very nature of Congress, with its composition in flux—mostly at regular intervals (elections), but also along a continuum (death, retirement, resignation upon indictment)—demands a flexible modeling scheme. The stochastic actor-oriented models proposed by Tom Snijders handle such dynamics, and, in taking actors to be maximizers of random utility functions, are particularly well-suited to the handling the sorts of questions political scientists frequently ask [6, 7, 8].

Legislative politics provide fertile ground for deepening our understanding of network evolution, the processes that generate networks, and the potential for statistical inference on networks through time. In exploring these themes, we may find ourselves working at the confluence of network analysis, statistics, game theory, and political science.

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