Social Networks and Analytics

Yuehua Zhao
https://orcid.org/0000-0002-8412-2878
Nanjing University, China

Jin Zhang
https://orcid.org/0000-0002-6665-6606
University of Wisconsin-Milwaukee, USA

INTRODUCTION

Social Network

The notion of social network can be as old as the human species (Knoke & Yang, 2019). In social science, the theory of networks has been adopted to explain social phenomena in a wide variety of disciplines ranging from psychology to economics (Borgatti, Mehra, Brass, & Labianca, 2009). Researchers have realized that the network perspective provides new leverage for answering standard social and behavioral science research questions by defining the political, economic, or social structural environment (Wasserman & Faust, 1994).

With the age of Big Data upon us, power is located in the networks that structure society (Serrat, 2017). Borgatti et al. (2009) regarded social network theory as a gold mine that "provides an answer to a question that has preoccupied social philosophy since the time of Plato, namely, the problem of social order: how autonomous individuals can combine to create enduring, functioning societies" (p. 892).

Social Network Analysis

Of vital significance for the development of methods for the analysis of social network is the fact that the unit of analysis is not the individual, but rather an entity made up of a set of individuals and the linkages among them (Wasserman & Faust, 1994). Special network methods are necessary since the focuses of the analysis are dyads (two actors and their ties), triads (three actors and their ties), or larger systems (subgroups of individuals, or entire networks) (Wasserman & Faust, 1994).

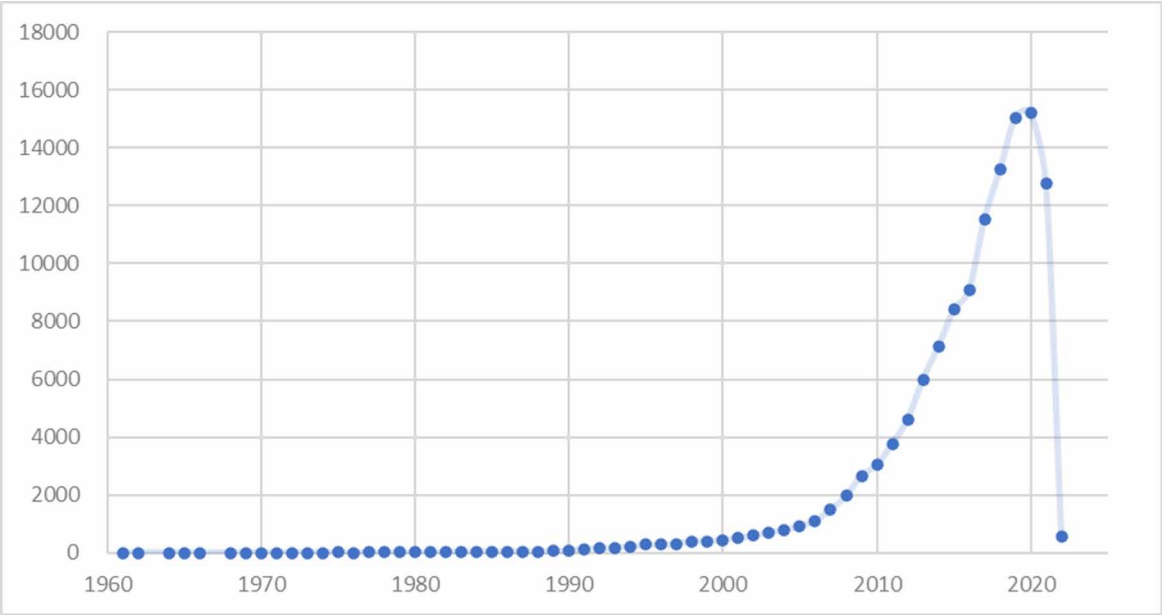
The history of social network analysis can be traced back to the 1930s. By the 1980s, social network analysis had become an established field within the social sciences (Borgatti et al., 2009). About ten years later, social network analysis was applied to a wide range of fields such as physics and biology (Borgatti et al., 2009). To date, social network analysis has been widely employed by a great number of disciplines and has become a multidisciplinary methodology.

To explore the study on social network analysis, we conducted a search using the Web of Science databases on 20 January 2022.The search term "social network analysis" was restricted to the topic field. It resulted in 124,694 publications from 1961 to 2022. The temporal distribution of the retrieved publications is displayed in Figure 1 where the X-axis is the publishing year and the Y-axis is the number of

DOI: 10.4018/978-1-7998-9220-5.ch152

publications related to social network analysis. As we can see from Figure 1, the number of publications regarding social network analysis experienced an apparent surge between 2010 and 2020.

Figure 1. Number of publications in Web of Science Core Collection related to social network analysis



Mission of Social Network Analysis

Social network analysis has been defined as a strategy for investigating social structures through the use of network and graph theories (Otte & Rousseau, 2002). The axiom on which social network analysis rests is that structure matters (Borgatti et al., 2009). Social network analysis provides a framework that measures structural relations between members of a network. While social network analysis has many applications, the ultimate purpose underlying all applications of this method is to reveal useful insights occurring in the behind-the-scenes development and interactions in a network.

Most of the major structural measures derive from insights into empirical phenomena and are motivated by central concepts in social theory (Wasserman & Faust, 1994). One of the main purposes of social network analysis is to identify the core actors in a network. Over the past years, a number of centrality measures have been proposed by sociologists to detect the structural characteristics of entities in a network. The centrality indicators are designed to identify the "core" authors from different perspectives. The degree centrality can be seen as an index of its potential communication activity. Freeman's betweenness centrality is based upon the frequency with which a point falls between pairs of other points on the shortest paths connecting them (Freeman, 1978). Betweenness centrality can be used to assess the potential of an actor for control of communication in the knowledge flow network.

Social network analysis covers a group of methods that reveal the structures of the relational data that are present in different social contexts. It facilitates the delineation of roles within the organizational networks and the evaluation of the relation between organizational structures (Valeri & Baggio, 2021). Disciplines such as sociology, anthropology, and social psychology have concentrated on networks of