

Non-Response in Social Networks: The Impact of Different Non-Response Treatments on the Stability of Blockmodels

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A social network consists of a finite set (or sets) of actors and a relation (or relations) defined on them. One purpose of social network analyses is to detect from large and seemingly incoherent networks simple and useful descriptions of the fundamental structures of relationships. One widely used technique for finding such structural patterns is generalized blockmodeling. The results of a blockmodeling procedure is a simultaneous partition (of actors) determining positions of actors and the ties into blocks. The result is one (or more) image matrix (or matrices) that represents the relationship among the obtained positions.

Social network data are gathered by using different techniques. Among them, one of the most used data collection method is a survey. Social networks measured by surveys have errors which can be roughly classified into three categories: errors introduced by miss-specified boundaries of a network, errors introduced by the questionnaire format and errors created by actors when they respond. In this presentation, non-response of actor(s) (errors from the last category) will be discussed and its impact on obtained blockmodel(s) will be studied.

In the case of actor non-response, there are several ways of treating networks whose data have response errors. If there is a non-respondent in a network, no outgoing ties from that actor are recorded and, in a matrix representation, there is a row of missing ties. In most cases, described in the literature, the complete case approach is used in which case all ingoing ties of an actor are deleted also (the row and column of the non-respondent are deleted and the result is a smaller network). We consider also approaches that take observed incoming ties of a non-respondent actor into consideration. The first approach is an available case approach, also called reconstruction, where a row of missing ties is replaced by the corresponding column. A second option is to impute network ties based on the distribution of received ties for actors. In practice, the mode value of ties for each actor is imputed. The problem we study is the impact of alternative treatments for non-response on the blockmodel structures identified. We start with a total (or known) network, impose different regimes of non-response on it, adopt the responses to the introduced missing data and compare the blockmodel structures — of the networks resulting from using the different strategies for treating missing data — to the blockmodel structure of the total network. To do this we use two indices for comparing two blockmodels. One is the Adjusted Rand Index which measures the differences between pairs of partitions

and the second index compares block types in the image matrix to compute the proportion of incorrect blocks.

The impact of different non-respondent treatments on the results of blockmodeling will be presented through simulations and through real networks. The results will help us to determine which treatment of non-responses in a network is the most appropriate when a blockmodeling procedure is used.