

In medical research, economics, and the social sciences data frequently appear as subsets of a set of objects. Over the past century a number of descriptive statistics have been developed to construct network structure from such data. However, these measures lack a generating mechanism that links the inferred network structure to the observed groups. To address this issue, we propose a model-based approach called the Hub Model which assumes that every observed group has a leader and that the leader has brought together the other members of the group. The performance of Hub Models is demonstrated by simulation studies. We apply this model to infer the relationships among Senators serving in the 110th United States Congress, the characters in a famous 18th century Chinese novel, and the distribution of flora in North America.