Chapter 48 Outline

Network-Analysis: Estimation and Inference

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Overview

In the first section we will give an overview of the most common models used for estimation in network analysis and the underlying inference framework for each model. In the second section we will discuss the advantages and disadvantages of each model to give practitioners guidance in selecting a model given their data and inference goals. In the last section we will conduct simulation studies with the goal of evaluating the effectiveness of out of sample predictions to assist practitioners selecting among these models.

Models and Variations

- MRQAP, LSM (Bilinear and Euclidean), ERGM (including TERGM and GERGM), Mixed Membership Stochastic Blockmodel (MMSBM), SAOM/Siena

Inference Frameworks

- ML, pseudo-ML, and Bayesian estimation

Model Selection

- Directed vs Undirected
- Edge Types: Binary, Ordinal ,Count, Continuous
- Parameters
- Network vs Actor Inference

- Longitudinal variations
  - Discrete time, Autoregressive
  - Continuous time, process based
- Missingness

Simulation Study

- Using a set of common parameters from publications in political science network applications, we simulate networks for common edge types and evaluate performance in out of sample predictions for the models discussed above.
- In addition to the types of edges, we can vary levels of missingness and sparsity.