Psychological Networks

Should Probabilistic Graphical Models Be Analyzed as Networks?
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Why?
- Macroscopic psychological behavior not due to latent common causes
- Emergent behavior in a network of psychological, biological and sociological components\(^1,2\)

How?
- Networks need to be estimated from data!
- Current state-of-the-art: LASSO regularization or multi-level modeling
  - Markov random fields\(^3\) and vector auto-regression\(^4\)

Examples
- Personality\(^6\)
- Clinical Practice\(^5\)
- Psychopathology\(^6\)
- Psychiatry\(^7\)

Analyses
- Shortest paths\(^8\)
- Centrality\(^9\)
  - Networks show potential causal pathways\(^4\)
  - Directly applicable in exploratory data analysis
  - Hypothesis-generating
  - Subsequent analysis of network structures via graph theory
    - Centrality
    - Connectivity
    - Clustering

Challenges
- Networks are estimated from data, and thus subject to sampling variation
  - A network estimated on a new dataset might lead to different results
  - Current best solution: bootstrapping\(^10\)
- These models are probabilistic graphical models, not networks!
  - \("(...) this piece is not about networks; rather, it is about independence graphs, long a topic for statistics and statistical journals, not network science journals. There is nothing new here about networks.\)\) — Editor of Network Science
- Should these models be analyzed as networks?
  - Instead of shortest path length, one can use mutual information
  - Instead of centrality, one can use information between one node and all other nodes

Should I be at this conference?
References


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