Statistical Models of Collective Social Network Behavior

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Motivation

- Social networks are heterogeneous and dynamic
- Social computation techniques provide controlled experiments on social networks
- **Goal 1**: Cluster actors in a social network by identifying similar behavior
- **Goal 2**: Predict collective network behavior based on network structure

Relational Approach

- Participants' actions are dependent on their neighbors in the network
- Start by designing a model template for individual behavior
- Create relational skeleton from the experiment's network structure and location of individuals within the network
- Combine model and skeleton to build a dynamic Bayesian network
- Model participants' action strategies as a latent variable
- Detect "signaling" strategy by frequency of changes
- Compare behavior based on person to behavior based on network neighborhood

Exploratory Analysis

- Participants' actions are dependent on their neighbors in the network
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Summary

- Data from social computation experiments provides a unique opportunity to model social network behavior
- Individuals within a social network exhibit different behavioral strategies
- We can attempt to account for interactions within a social network using a relational approach

Continuing Work

- Identify more subtle differences between behaviors using individual or network neighborhood distributions:
  - Consider other extracted features, such as whether or not individuals choose to change to majority color
  - Consider other characterizations of strategies, such as individuals' conflict tolerance
  - Design evaluation criteria for prediction of collective and individual behavior

Selected References


Social Computation Data

- Experiments at UPenn challenge participants to perform graph computations
- Participants can only see their immediate neighbors
- Tasks are either to color the graph, or to come to a consensus in limited time
- 36 participants in varied network structures
- Static network structure for each experiment
- Both tasks are usually successful, with some consensus experiments failing

Selected References