Abstract

Microsimulation and agent-based models are increasingly being used to simulate complex social systems and to understand everyday interaction networks. However, accurate microsimulation models require comprehensive network data sets that combine large-scale network structures with detailed individual-level behavioral characteristics. Integrating diverse network data sources to produce accurate simulation models of complex social phenomena is a challenging task with limited research. Our project focuses on two main objectives:

1. Generate synthetic networks that are statistically and structurally equivalent to an existing sociocentric network dataset from Portland, Oregon. We used the Iterative Local Expansion method to achieve a scalable machine learning model for graph generation.

2. Perform network fusion by combining the synthetically generated dataset with egocentric network survey data to create a comprehensive social network. To achieve this goal, we developed a mathematical algorithm that accounts for egocentric node features and models the time-dependent behavior of the sociocentric network through node interactions.

The ultimate aim of this project is to further researcher's ability to generative complex and comprehensive graph network datasets for populations of interest for the purpose of improving social simulations like those in disease transmission.