

SocANet 1.0

Social Animal Networks

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SocANet calculates various network metrics from a list of dyadic interactions. With the aid of SocANet researchers can further explore the effects of sampling and group size on metrics for a particular research design. Researchers may want to generate data while varying parameters such as number of actors, number of recorded interactions and percentage of gatekeepers according to their research design. Dramatic changes (increase/decrease) of a metric would suggest a strong sensitivity to certain aspects and indicate whether it is a good choice for particular behavioral questions.

SocANet is divided into two pieces of software. The first part written in Java (c) simulates animal interactions under certain conditions. To begin each run of the simulation, the user should provide the list of individual animals (i.e., actors) in a text file (*.txt). The second part of the software written in R (c) calculates network metrics of all the files at a given location.

SocANet tutorial

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Java simulator

Introduction

This part of the software simulates random interactions among individuals. Given a list of individuals, a number of desired interactions and a number of simulations this software will create a list of random interactions.

When all the individuals are non-gatekeepers, dyadic interactions are formed randomly. However, when gatekeepers are included in the list of individuals interactions are created as follows. For each dyadic interaction, we chose two individuals from among the available actors at random with replacement. If the interaction is between two gatekeepers, it is included in our set of observed interactions. If the interaction is between a gatekeeper and a non- gatekeeper, it is included as an observation half of the time (probability = 0.5). If the interaction is between two non- gatekeepers, it is discarded entirely and the program now chooses two new individuals at random. We continued this process until we had generated a specified number of interactions, representing the number of dyadic interactions recorded by a human observer (n_T = number of observed interactions).

The Java simulator will then return a list of interactions saved in a text file. The default option will generate 1,000 files with different interaction lists, however this option is might be changed.

Installing the Java simulator

Before installing the software you will need to install Java Virtual machine if your computer doesn't currently have it

This software requires Java, you can download it from <http://java.com/en/>

To install the Java simulator go to <http://www.indiana.edu/~martinsl/software/SocANet> and click on *Java simulator* link.

Note: Since this is an open source program you will need to compile (type ‘javac Simulator.java’ in the command prompt) after compiling the programs, then you can proceed with the following steps (Using java simulator)

Using the Java simulator

1. Open the “command prompt” and run the simulator by going to the location where you installed it.
2. Once you are in the folder where the simulator is saved Run the command line type: ‘ java Simulator’ and hit enter
3. After the program asks you the name of the input file type the name of the text file and hit enter. The input file should be saved in the same folder as the Simulator.java file
4. Next the program will ask you the name of the output file (do not include the extension, the program will do that). The program will generate 100 files, it will use the name you gave and append the file number and the txt extension.
5. Next the program will ask you the number of interactions that you wish to have simulated.

Input

The java simulator takes a list of individuals from a text file (*.txt) with each individual in a list.

i.e.
ind1
ind2
ind 3

Furthermore, individuals can be marked as gatekeepers by putting a g in front of each individual name

i.e.
ind1
gind2
gind3

R calculator

Introduction

The Calculator script is written in R. This script takes all the files stored in a folder and calculates centrality and cohesion network metrics for each file and then returns an excel file with all the centrality and cohesion metrics as well as its respective standard errors.

Each of the input files contains a frequency matrix. This matrix should be in a square form with 'tabs' between each column and a new line for each row. This matrix should also be a full symmetrical matrix with the top half equal to the lower half. The program will check that indeed is symmetrical and that is a full matrix (instead of a lower/upper half only).

The output file called 'out.xls' will contain the centrality (Betweenness, Closeness, Degree and Information Centrality) along with its standard error values and cohesion (Diameter, Density, Average Degree) metrics for each file. The user can calculate averages if desired.

Most centrality (Betweenness, Closeness and Degree) and cohesion (Distance, Density, and Diameter) metrics are calculated from the absence/presence matrix (which is calculated by the program). Information Centrality and average degree however, are calculated directly from the frequency matrix.

How to install it

- To Install R go to www.r-project.org and download
- To download libraries sna & igraph
 - Start R and type
 - `install.packages('sna')`
 - `install.packages('igraph')`

To run R script

1. Save the R script into a *'folder1'*
2. Save interaction files in a separate empty *'folder2'* and save its path (i.e. `c:/tempMyDir`)
3. Open the R script and modify the path `'c:/tempMyDir'` (in line 23, 34 and 85) for your own path
4. Open R
5. Run the following line in R
 - a. `source("c:/folder1/script.R")`
 - i. where *'folder1'* is the folder and path where the R script is saved and `'script.R'` is the script name
6. Open the NetStatsOut.xls file at the interactions folder