**Lab 3 - Emergence of Network Dynamics (Stochastic Actor-Oriented Models)**

***CompSci 396-0: Social Networking Analysis* *Win 2022***

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* **Responses to Question**
  + **Part I: Constructing Hypotheses**

**Relational Hypotheses:**

1. **Low Outdegree Density/ outdegree**

Hypothesis 1: The probability of having friendship relation between students will be lower

over time than expected by random chance

1. **Reciprocity/reciprocity**

Hypothesis 2:

1. **Transitivity/gwespFF**

Hypothesis 3:

1. **Ego’s drug behavior/ egoX**

Hypothesis 4:

1. **Alter’s drug behavior/ altX**

Hypothesis 5:

1. **Homophily on the basis of drug behavior/sameX**

Hypothesis 6:

**Drug Behavior Hypothesis**

1. **Homophily on the basis of drug behavior/sameX**

Hypothesis 7:

* + **Part II: Hypothesis Testing**

1. **(10 points) A visual inspection of the adjacency matrices may help in highlighting how friendship changes at the three time. Include the sociometric plots in your report. Discuss what you observe from the plots (e.g., How does friendship change over time? Are the plots becoming denser over time? Is friendship between students mutual? Is there anyone who is nominated a lot by others? Is there anyone who nominates a lot of friends?)**
2. **(4 points) Create a Siena data object including the longitudinal friendship networks and the drug behavioral variable. Then run print01report function which creates an output file in your working directory. Using your text editor, open the output file (if you use the provided script, s50\_3\_init.out) where you can see data descriptions. In the output file, how many friendship relations were created and dissolved between period 1 and 2? How many students increased their use of drug or decreased the use of drug between the same periods?**
3. **(7 points) Using your hypotheses, you can begin to construct a list of parameters (effects) to test using your Siena model. Create a data frame of effects using the getEffects function. The created data frame will include a number of extra properties for use with RSiena. Include the effects of triadic closure, the effects of drug use on friendship formation (i.e. the effects of the ego drug behavior, the alter drug behavior, and if ego and alter are the same in their drug behavior –both drug user or non-drug user).**
4. **(14 points) Include the effects of all of a node’s friends’ drug behavior on the node’s own drug behavior, the specified model and effects to the data using the function siena07. A new window labeled “Siena07” with a picture of an old building should pop up, showing the iterations of simulations R goes through. The window should close after the simulations complete.**
5. **(46 points) Type ans1 to view your results.**
   1. **Include a table including convergence t-ratios and overall maximum convergence ratio in your report.**
   2. **Explain whether your variables and model are converged based on your convergence ratios and overall maximum convergence ratio. See the hint (\*)**
   3. **Include another table including the estimates, standard errors and p-values (or estimate/standard error) in your report.**
   4. **Use the estimates and p-value (or estimate/standard error) to explain whether your hypotheses (7 hypotheses in total) are supported or not. Provide interpretations of the estimates and discuss if the results make sense. When you interpret the results, you should convert log-odds ratios (estimates) into either log-odds or probabilities.**
6. **(10 points) Report the goodness of fit for your model regarding in-degree and out-degree distributions. Include the plots and interpret the results of each plot.**