

Social Network Analysis
Stats on Networks Assignment
Due Nov. 19th

Instructions: Please type your answers and include an Rscript with your homework. If you do this analysis in another program please indicate which program you used and what commands you used to answer each question.

A shell of an R-script that sets the data up for you and includes the commands you'll need to complete this assignment in R is on ICON. The commands are not complete! You'll need to add information to the script for it to run, but the script should get you started.

1. Conditional Uniform Graphs: Using data on search and rescue networks (the nodes are first-responders, e.g. fire departments; the links are whether or not they worked together) during Hurricane Frederic, conduct some conditional uniform graph tests.
 - a. First, conduct a CUG to test if the amount of transitivity seen in this network is significantly higher (or lower) than would be expected at random. Do this for each of the 3 possible conditional assumptions (size, edges, dyad.census).
 - i. Report the results of each test as a plot.
 - ii. Discuss what you see. Is the amount of transitivity in this network different from what you would expect at random?
 - iii. How does your answer to part ii change across the 3 conditional assumptions? Discuss briefly.
 - b. Pick a statistic other than transitivity that you think is interesting. Conduct a CUG test using that statistic and whichever conditional assumption you believe to be most appropriate (so you only need to run one test for part b).
 - i. Briefly explain your choice of test and conditional assumption.
 - ii. Present a plot of the results and discuss what that plot tells you.

2. Dyadic Hypotheses: Explore the correlation among relationships for 10th grade math students taking trig. The studentnets.mrqap173 data includes information on a variety of relationships between students in the same classroom. In particular, you want to try to understand patterns of social interaction in the 2nd semester as a function of social interaction in the first semester as well as homophily in terms of race and gender. Your data gives you 3 matrices of particular interest: first, it gives you who the students socialized with in the first semester (m173_sem1_SSL). Second, a homophily matrix for race (m173_sem1_RCEL: coded as 1 if the students are the same race and 0 otherwise). Finally, a homophily matrix for gender (m173_sem1_GND: coded 1 if the students are the same gender and 0 otherwise).
 - a. Using this data, run a QAP to see the effect of these relationships on social relationships in the second semester (m173_sem2_SSL).
 - b. What do these results tell you? Interpret the model output.

- c. Run the analysis again using the “classical” null hypothesis. How do your results differ between the two models?
- d. Explain the difference between the model you ran in part a and the model you ran in part c to a friend who has not taken this course.