Network Analysis: Homework

Jeff Ziegler

Due: August 23, 2018

1 Nigeria Data Processing

a) Process the data: turn this event dataset into a matrix.

b) Specifically, summarize the interactions across all time periods into an adjacency matrix where:

1. "1" indicates that i and j had a conflictual interaction sometime during the temporal span of the original dataset and zero otherwise.
2. Make sure all actors that existed at any point during the temporal span are included in the adjacency matrix.

2 Measurements & Community Detection

a) Which actor is the most "influential" in the network? Justify your response and the measure you choose to estimate "influence."

b) Employ the blockmodel function from the sna package to explore potential group level structure in the data (see slides 61-63 from day 2 for details):

- Run blockmodel with varying levels of k.
- Save the node classifications from each run.
- Now how do we choose k?
  - You will do so through an out-of-sample cross-validation exercise (at least 10 folds).
  - Report the AUC (ROC) and AUC (PR) statistics from each model.

c) After having determined the k that gives the best out of sample performance, visualize your results as shown in slide 67 from the day 2 lecture

3 ERGMs

a) Run a cross-sectional ERGM on the Nigerian conflict network, develop at least one or two network level hypotheses.

b) Briefly discuss the results.

c) Make sure to show that you checked for convergence.