Social Network Analysis
Assignment 1

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DEADLINE: Sept 15^{th}, 2017

1 Introduction

In this assignment you will be asked to perform some social network analysis on a dataset that is provided to you. You will load the dataset provided, manipulate the csv file to display a table that is easily understandable, and perform other computations and display/visualize results.

2 Description of Dataset

In the 1990s New York City police investigated a cocaine crime ring by tapping phone conversations between suspected members of a gang. We have in this dataset, 28 individuals who either placed and/or received a call from one of the others in the circle of dealers. The left most column indicates the person who placed the call, and the column names indicate the person who was called. Hence, Lorena did not make any calls, however she received 2 calls from just one person - Kay.

More about this dataset can be found in this paper: "Understanding the structure of a drug trafficking organization: a conversational analysis" by M Natarajan. The dataset was downloaded from UCINET. You are welcome to read more about this dataset, however for this mini-project no more knowledge of this dataset is required.

3 Objectives

You will perform the following tasks for this assignments:

1. Title of app should be "Name_SNA"
2. Load the dataset: COCAINE_DEALING.csv
3. Manipulate the dataset to make it a tall table as shown below. Display this tall table.

4. How many calls were placed in total?

5. Who received the most calls?

6. Who placed the most calls?

7. Assume that each call is, just a connection. Compute the degree centrality of each person. Display in a visual graph. The degree centrality of a node(person) i, can be defined as the total number of nodes connected to node n_i.

8. Assume that each call is just a connection. Compute the betweenness centrality of each person. Display in a visual graph. Betweenness centrality, C_B for a node i, can be defined as:

$$C_B(i) = \sum_{j \neq k} \frac{g_{jk}(i)}{g_{jk}} \tag{1}$$

9. Using the calling/called information, and ignoring the number of calls placed, compute the indegree and outdegree centrality per person. Display in a visual graph. Indegree and outdegree centrality are simply the count of inwards and outwards directed connections to or from a node.

10. Assume that a call is just an indication of a connection between two people and it does not matter who placed or received the call. Can you visualize this network?

11. Assume that you are interested in only outbound calls (a directed arrow showing who called whom). Can you visualize this network?

12. Assume that you are interested in only inbound calls (a directed arrow showing who received the call from whom). Can you visualize this network?

13. Compare the three networks you have visualized. What are your observations?

You can overlay the computations of 7, 8, 9 and 10 in the visualizations in 10, 11 and 12. I also encourage you to put the information for 7, 8, 9 and 10 in an easily accessible tabular format as well.

4 Grading

Requirements of your shiny app:

- All computation should be performed as part of the R script and displayed in your shiny app.
- You can assume that I have a copy of COCAINE_DEALING.csv . Do not send me a copy when you submit your assignment.

networkanalysis.R* | NetWorkMelt | NetWork

Filter

	calling	called	times
1	Bill	Bill	0
2	Blacky	Bill	0
3	Bruce	Bill	0
4	Charles	Bill	0
5	Dante	Bill	0
6	David	Bill	0
7	Donald	Bill	0
8	Doug	Bill	0
9	Fabio	Bill	0
10	Frank	Bill	0
11	Gabriel	Bill	0
12	Howard	Bill	0
13	Jenny	Bill	0
14	Kay	Bill	2

- I will be modifying the COCAINE_DEALING.csv file to reflect a different calling/called scenario. Your shiny app should still be able to provide results to the questions/tasks.
- Do not load your jpg/png/pdf/csv or any other type of files. I just want the R scripts to create your shiny app. I will not download anything other than R scripts to run on my computer.
- If submitting multiple R scripts, please zip it up and upload zipped file.
- Be creative.

5 Expectations of student

The student is:

- Expected to complete all tasks listed above.
- Expected to submit this mini-project by 11:59pm on day of deadline mentioned at the start.
- Expected to submit original work