Exercise

Intro to R and networks

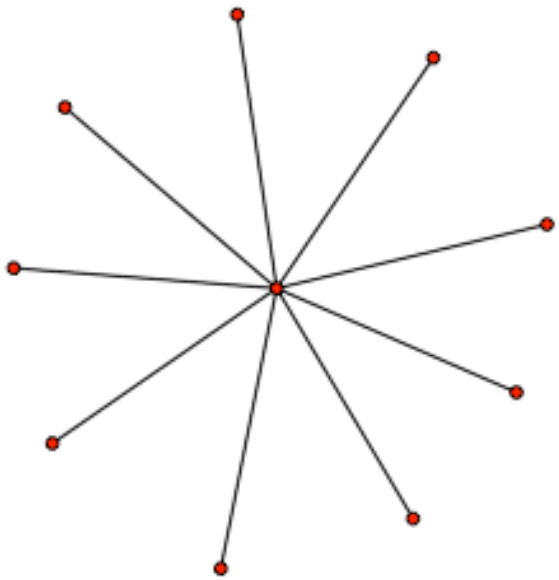
Advanced Social Network Analysis

Background

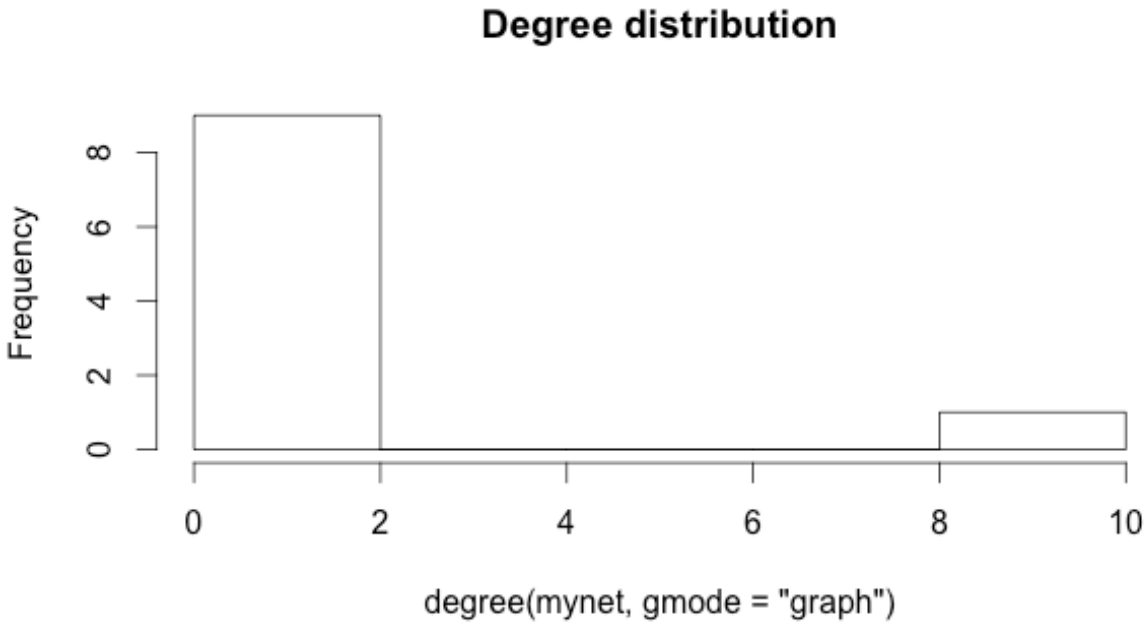
In these exercises, I want you to familiarize yourself with some of the basics in R. After that, you will do some exercises where you conduct some basic network analysis.

Exercise 1

- Generate an undirected “star”-network with 10 nodes. In this network, there is one node in the middle who is connected with all of the other nine nodes. These other nine nodes are only connected to the node in the middle.
- Call this network “mynet1”.
- Plot the network (as below).

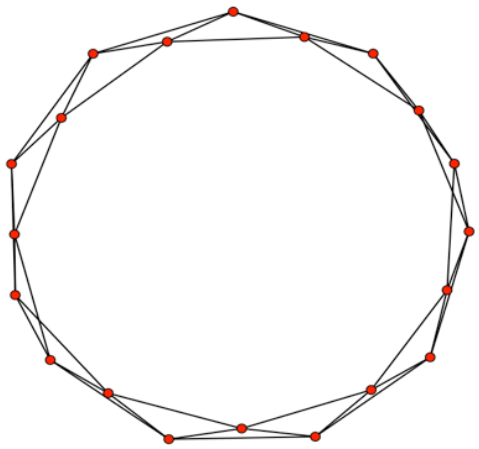


- Calculate the degree centrality for all nodes in this network.
- Make a histogram of the degree distribution



- Calculate degree centralization of the “star” network.

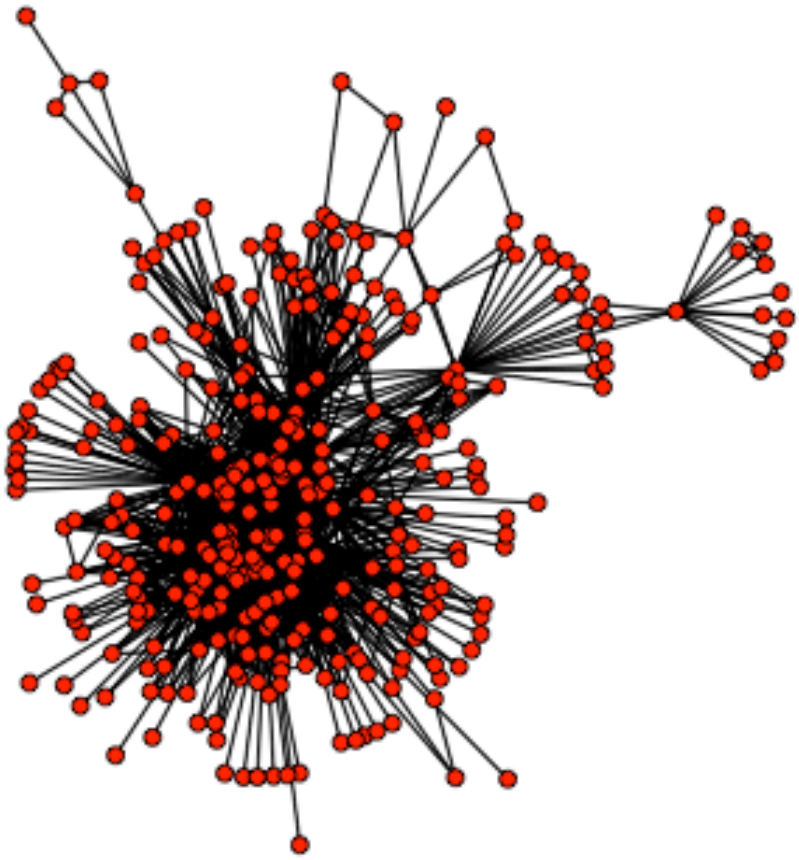
- Now, generate another highly regular network - a undirected “ring” network with 10 nodes, where each node is connected to two neighbors on each side.
- Call this network “mynet2”.



- Calculate degree centralization of the “ring” network.
- Compare the two centralization scores. What do they tell you?

Exercise 2

- In this exercise I want you to import network data that is in Pajek-format. Pajek has a widely used network file-format.
  - We only mentioned importing Pajek data before. Check out `?read.paj` for help.
- This is a dataset of US cities connected by airlines
  http://vlado.fmf.uni-lj.si/pub/networks/data/mix/USAir97.net
- Call this network “usair”.
- Plot the network (as below).



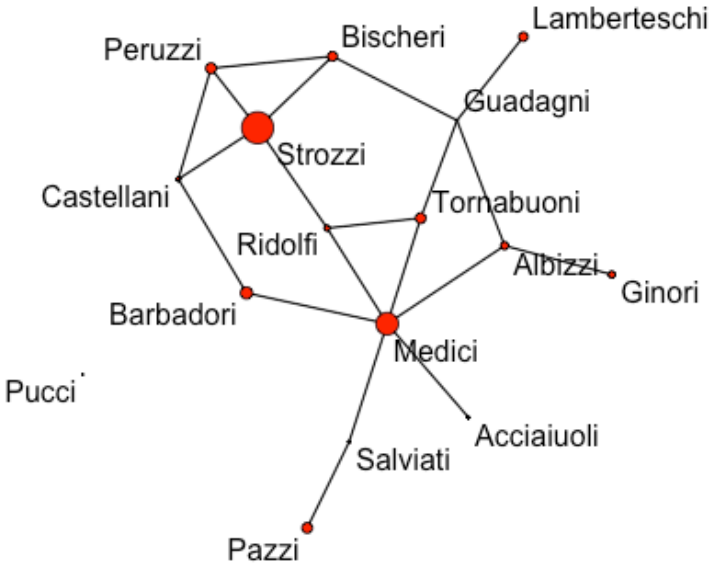
Exercise 3

- Calculate degree and betweenness centrality for the “usair” network that you just imported.
- What is the highest degree centrality score?
- What is the highest betweenness centrality score?

- What is the name of the city with the highest degree centrality?
  - You can get hold of the vertex names of the network with `network.vertex.names`
- What is the name of the city with the highest betweenness centrality?
- What is the differences between degree and betweenness centrality again in terms of their meaning?

Exercise 4

- Load the in-built data “flo”
- Plot the network “flomarriage”
- Plot the network again with the node labels attached
- Plot the network again, but now also change the size of the nodes to correspond to the vertex attribute “wealth”
  - You will notice that you have to resize the wealth variable for this plot.
  - You can extract node attributes with `get.vertex.attribute`


Lamberteschi
Peruzzi
Bischeri
Guadagni
Strozzi
Castellani
Tornabuoni
Ridolfi
Albizzi
Ginori
Barbadori
Medici
Pucci
Acciaiuoli
Salviati
Pazzi