Complex Social Networks: Lab 1

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September 2020

1 Introduction

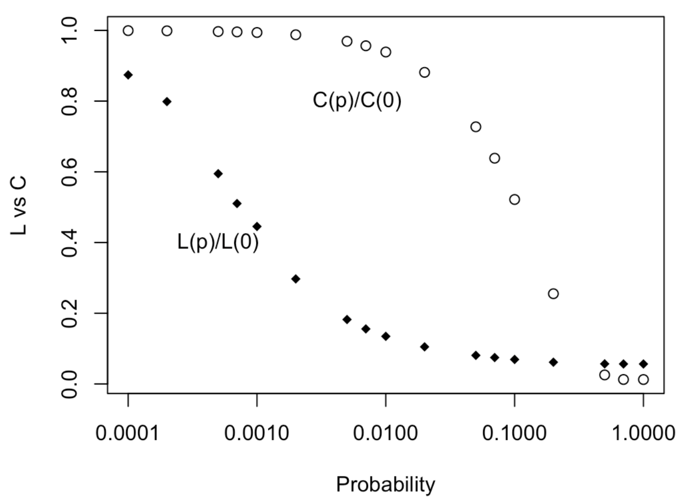
In this project we are going to model one fictitious network using the Watts Strogatz model and another one using the Erdös-Rényi model. Then we are going to analyze some of its topological properties.

For the WS network we are going to plot the clustering coefficient and the average shortest-path (both normalized) as a function of the parameter p.

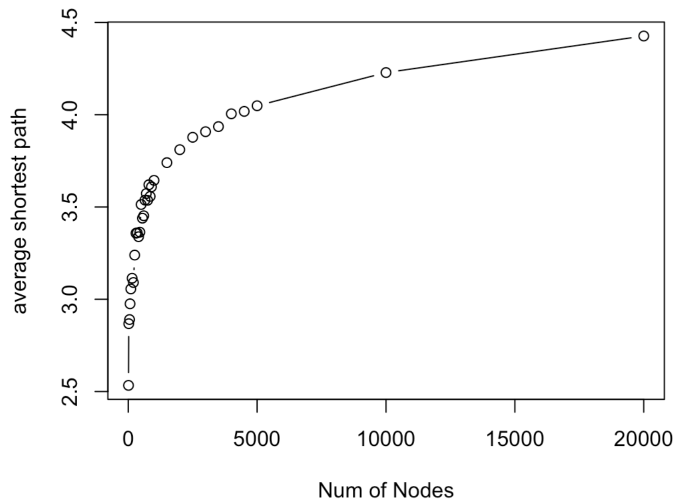
For the ER network we are going to plot the average shortest-path length as a function of the network size.

2 Implementation and results

<u>WS Network:</u> The implementation was done repeating the same experiment one hundred times and averaging.



<u>ER Network:</u>



3 Conclusions

WS Network: As we can see in table 1, as p (rewiring prob.) increases, the clustering coefficient decreases as well as average shortest path, even though they do this with different rate.

The p that we would use to model a real network is something around 0.01 because is in that moment where the network still exhibit a high clustering coefficient but a low average shortest path.

However we now that WS doesn't have a power-law degree distribution and this is also a property found in real networks.

ER Network: As we can see in table 2, as the number of nodes increase, the avarage shortest path increase but with smaller growth rate as we go up. And even it seems that it is stabilized as the number of nodes reaches 2000. For p (prob. that node i and j are connected), we used:

$$p = \frac{(1 + 0.1) * ln\ n}{n}$$

because we want connected graphs.