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Lehrstuhl Informatik VIII
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Assignment 6

Task 1 Graphs and Graph Generators

In this task you will generate 4 connected Graphs with each 1000 nodes and about 3000 edges.

1. Barabasi-Albert graph (nx.barabasi_albert_graph(...)) (Power Law)
2. Erdos Renyie graph (nx.erdoz_renyi_graph(...)) (Random Graph)
3. Watts Strogatz graph (nx.connected_watts_strogatz_graph(...)) (Clustering)
4. a highly clustered graph you generated yourself

a) Generate the four graphs and verify that they are all connected.

b) Plot their degree distributions in a log-log plot. Does plot for the Barabasi-Albert graph show a linear line?

c) Print basic graph statistics for each graph.

- Number of Edges
- Diameter
- Radius
- Average Shortest Path Length
- Average Clustering Coefficient
- Assortativity Coefficient (degree)
- Degree Pearson Correlaton Coefficient

d) Write a function to increase assortativity that keeps the graph connected. Plot the related graph statistics again. Plot again the degree distributions in a log-log plot.

e) Write a function to decrease assortativity that keeps the graph connected. Plot the related graph statistics again. Plot again the degree distributions in a log-log plot.

f) Compute the betweenness centrality and eigenvector centrality for each graph. This results in a dictionary with node as index and centrality as value. Print the maximum values for each centrality. Check if the corresponding node is in the center of the graph (nx.center(..)) and print two example values for nodes in the center and nodes in the periphery (nx.periphery(...)).