Exercises for centrality measures

1. Write a function that takes as arguments a graph G and a subset of nodes $V' \subseteq V(G)$ and returns the induced graph $G[V']$.
    a. Consider the possibility of returning the index of the nodes in the original graph G.
    b. Use the function for visualizing a subgraph from last exercise to plot $G[V']$.

2. Write a function that takes as arguments either a graph G or a graph G and a node u. Depending on the arguments provided, return the clustering coefficient of the graph or the node. Test the function on your function for random graph generation as well as with Erdos-Renyi and Barabasi-Albert graphs generated on a given number of nodes and edges with built-in functions in igraph.

3. Write a function that takes as arguments a graph G and determines its assortativity. Inspect the average assortativity of Erdos-Renyi and Barabasi-Albert graphs generated on a given number of nodes and edges with built-in functions in igraph. Is there a difference?

Homework

4. Write a function that determines the number of all triangles in a given graph G. Write a function that determines the number of all paths of length two in a given graph G. Use the two functions to determine the transitivity of G.

5. Write a function that takes as arguments a graph G or a graph G and a pair of nodes u and v. Determine the number of shortest paths and number of walks of specified length k between the nodes *u* and *v*.