Assignment #6: Cohesion and Community

# This assignment examines Cross and Parker’s advice network from an international consulting firm.

We have an igraph object stored as a .rds file in the homework data folder. The data consist of an advice seeking network within a consulting firm: (“Please indicate how often you have turned to this person for information or advice on work-related topics in the past three months”). 0: I Do Not Know This Person; 1: Never; 2: Seldom; 3: Sometimes; 4: Often; and 5:Very Often.) Not knowing and never seeking advice edges have been dropped. The \*\*igraph\*\* objects include two attributes - gender (1: male; 2: female), region (1: Europe; 2: USA). You can learn more about the data: (<https://toreopsahl.com/datasets/#Cross_Parker>).

Cross, R., Parker, A., 2004. The Hidden Power of Social Networks. Harvard Business School Press, Boston, MA.

# 1. Introductory Inspection

As always, begin by reporting basic statistics about the network, especially number of nodes and edges. Plot the network.

# 2. Components, Cliques, Cores, Cutpoints

Use igraph to identify each of the following:

1. The size of the largest bicomponent (hint: one way to select the largest bicomponent looks like this: bicomponent$components[[max(length(bicomponent$components))]]
2. The distribution of the largest k-cores for the nodes in the network.
3. The size of the largest clique.
4. Are there any cutpoints in the graph? If so, which nodes?

Interpret each of these characteristics of the advice network.

# 3. Extracting sub-graphs

Plot of the sub-graph of the advice network’s largest clique. Make node color the attribute that appears to be most related to this large clique. What does it say that about the network – and the organization – that this clique is composed predominantly of people with this attribute.

# 4. Communities

1. Between Louvain, Walktrap, and Leiden with low and high resolution, which community detection algorithm seems to perform best over the advice network’s largest bicomponent? Use modularity.
2. Plot and interpret the largest bicomponent including the community solution and one of the two attributes attribute.