

# 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](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:

- i. The size of the largest bicomponent (hint: one way to select the largest bicomponent looks like this: `bicomponent$components[[max(length(bicomponent$components))]]`)
- ii. The distribution of the largest k-cores for the nodes in the network.
- iii. The size of the largest clique.
- iv. 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

- a. 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.
- b. Plot and interpret the largest bicomponent including the community solution and one of the two attributes attribute.