Problem Set 1

POLI 100F - Social Networks

August 8, 2022

Consider the social network in Figure 1 below, and answer the following questions:

1. How many nodes are in this network?
2. How many directed edges are in this network?
3. Which node has the most neighbors?
4. How many components does the network have?
5. How many connected dyads are there in the network?
6. List all pendant nodes.
7. What is the diameter of the network?
8. How many connected triads are there in the network?
9. Identify all cliques in the network.
10. Identify all cycles.
11. Which node has the highest in-degree?
12. Which node has the lowest out-degree?
13. Give the adjacency matrix of the network ($A_{ij} = ...$)
14. Can we characterize any of these nodes as a bridge (or broker)? If so, which ones?
15. List the nodes that make up the geodesic between h and e.
16. What is the in-degree centrality of the smallest component in the network?
17. What is the closeness centrality of node d?
18. What is the betweenness centrality of node b?
19. What is the clustering coefficient of node b?
20. If the entire network were fully transitive, how many links would we expect it to have?
21. (Extra Credit) What is the average path length of the network?

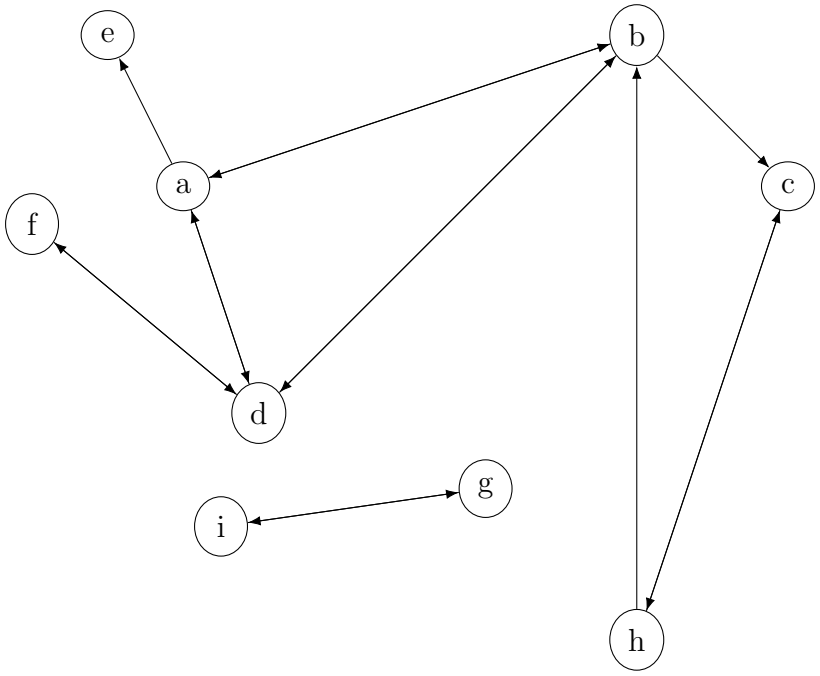

Figure 1: A social network.