Social Network Analysis

Centrality

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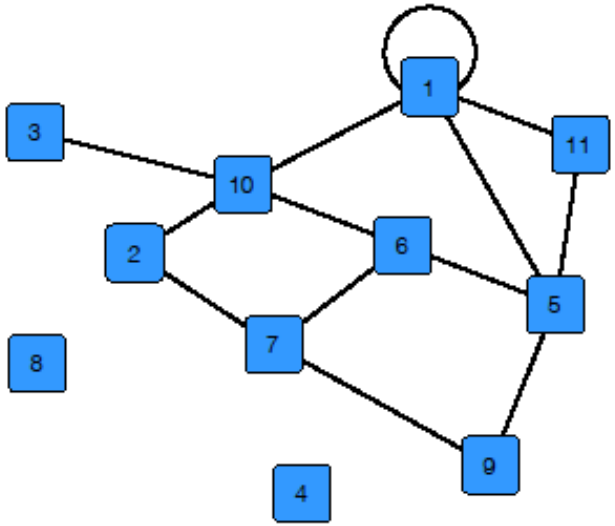
Eigenvector centrality

$e_i = \lambda \sum_j x_{ij} e_j$

- $\sum_j x_{ij} e_j$: eigenvector
- λ: eigenvalue (constant)
- each node's centrality is proportional to the sum of centralities of the nodes it is adjacent to
- a node is as eigenvector central as its ego-network

Walks, chains, paths



- *Walk* (or *chain*): a sequence of incident vertices and edges
- *Trail*: a walk which does not revisit any edges
- *Path*: a walk which does not revisit any vertices

Betweenness centrality

$$b_j = \sum_{i<k} \frac{g_{ijk}}{g_{ik}}$$

- How often a focal vertex falls along the shortest path between two other nodes
- For each pair of nodes other than the focal node, what proportion of all the shortest paths from one to the other pass through the focal node

Closeness centrality

- Sum of the geodesic distances from a vertex to all others
- the smaller the value, the more central the node
- *geodesic distance*: length of the shortest path connecting two vertices
- not suited for disconnected graphs (directed networks)

Reading

Borgatti, Everett, and Johnson (2013), Ch. 10

References

Borgatti, Stephen P., Martin G. Everett, and Jeffrey C. Johnson. 2013. *Analyzing Social Networks*. London: Sage.