Centrality
Social and Technological Networks

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Centrality

- How 'central' is a node in a network?
  - A notion of importance of the node

- E.g. degree, pagerank, beweenness..

- **Degree centrality**
  - Degree of a vertex

- **Closeness centrality**
  - Average distance to all other nodes $\ell_x = \dfrac{1}{n} \sum\limits_{y} d(x,y)$
    - Decreases with centrality
    - Inverse is an increasing measure of centrality

$$C_x = \frac{1}{\ell_x} = \frac{n}{\sum d(x,y)}$$

- Betweenness centrality
  - The number of shortest paths passing through a node
    - (see slides from strong and weak ties)
- Pagerank
  - See slides on web graphs and ranking pages
  - Pagerank is a type of Eigenvector centrality
  - Another eigen centrality is Katz centrality, which we will not discuss

k-core of a graph G

- A maximal connected subgraph where each vertex has a degree at least k
  - *Inside that subgraph.*
- Obtained by repeatedly deleting vertices of degree less than k