Social Network Analysis

* SNA has gained importance in recent years due to the popularity of social networks.

* It is root in sociology.

① Representing social Networks.

undirected

weighted

② Basic Properties of Nodes.

* Network properties derived from the relevant " of its nodes.

→ Degree

* Capture the number of connections of the node

* Degree of a node is the sum of the corresponding row or the corresponding column in the adjacency matrix.

→ Distance

→ closeness

* How accessible a node is the network.

$$\text{closeness}(v) = \frac{1}{\sum_{u \neq v} \text{distance}(u,v)}$$

→ betweenness

measure is used to assess how important the position of a node v is the network

$$\text{betweenness}(v) = \sum_{u \neq v \neq t} \frac{nsp_v(u,t)}{nsp(u,t)}$$

→ clustering coefficient

$$\text{clust\_coef}(v) = \frac{\sum_{u \neq v \neq t} \text{triangle}(u,v,t)}{\sum_{u \neq v \neq t} \text{triple}(u,v,t)}$$

② Basic & structural Properties of Networks

→ node centrality scores.

– Power & position

* Diameter

It is defined as the longest of all the distance between its nodes.

* Centralization.

$$C(N) = \sum_{v} (\max_{u} C(u) - C(v))$$

* cliques
  * subset of nodes
  * Every two nodes in the subset are connected.

* clustering coefficient

* Modularity.
  * display cluster structures.