Glossary of Network Terminology

Actor In an *affiliation network*, the people or other entities tied by *events*

Asymmetrical tie An *edge* or relationship in a *directed network* that is not *reciprocated*; for example Bob cites Jane but Jane does not cite Bob

Affiliation network A network where the *edges* consisted of a shared characteristic, such as attending a class together, rather than a direct relationship, such as friendship, and the *nodes* are the *actors* and *events*; actors cannot be directly tied to other actors, nor events to other events

Attribute A characteristic of a *node* or *edge*; can be used to select nodes and edges or as an analytic variable; can also be represented visually through size, color, etc.

Bipartite network A network where ties occur only between (and not within) two distinct *subgroups*; *affiliation networks* are a type of bipartite networks

Betweenness centrality A type of *node centrality* measuring the importance of each node in *geodesic paths* between other nodes

Centralization A *network statistic* measuring how unevenly spread the edges in a network are; a network with high centralization has relatively few key *nodes* connecting a large number of other nodes

Clique A subgroup of *nodes* where each node shares an edge with every other node; the most restrictive subgroup definition

Closeness centrality A type of *node centrality* determined by the *geodesic distance* to all other *nodes* in a *component*; high closeness indicates that most other nodes can be reached in relatively few steps

Clustering A *network statistic* measuring how strongly *nodes* are grouped; high clustering indicates that most nodes are part of distinctive subgroups that are more highly connected to each other than to other nodes in the network

Component A *set of nodes* that are all reachable from each other tracing *edges*; a *network* with only one component is called a connected network

Cutpoint A *node* whose removal from the network would cause two subgroups to become disconnected *components*

Degree The total number of *nodes* a node is directly connected to via all *edges*; for example, if Fred, George and Martha each claim Julie as a friend and Julie claims Fred and Jane as a friend, Julie's degree is 4

Density The proportion of possible *edges* that exist

Directed network A *network* with *asymmetric ties*

Disconnected subgroup Group of nodes with no edges reaching past the subgroup

Edges The relationships or shared characteristics that connect *nodes* in a *network*

Edge attribute Additional characteristics of an *edge*, such as the type or frequency of the tie

Events In an *affiliation network*, the shared characteristics or associations that form the ties between *actors*

Geodesic distance The number of *edges* in the *geodesic path* between two nodes

Geodesic path The shortest path (least number of edges) connecting two *nodes* in a *network component*; in a *directed network*, geodesic path must follow direction of ties

Graph An entire *network*; does not refer to visualization but to the network itself

In-degree For *directed networks*, the total number of *nodes* selecting a given node; for example, if Fred, George, and Martha each claim Julie is their friend, Julie's in-degree is 3

Isolate A *node* that has no *edges* connecting it to other nodes in the *network*

Multirelational network A network that include more than one type of edge or tie between nodes; for example including both co-authorship and citation relationships

Network A set of *nodes* (entities) and *edges* (relationships); can be further differentiated into empirical and observed networks

Network connectivity Whether all *nodes* in a *network* are reachable from all others; a fully connected network has only 1 *component*; can also refer to measure of the number of nodes that would need to be removed to split the network into multiple components

Network statistics Measures that summarize characteristics of an entire *network*

Nodes The entities in a *network that* are connected to each other through *edges*; can be any individual, collective, or in the case of affiliation networks, shared characteristics or activities

Node attribute Additional characteristic of a *node*, such as name, type, or quantity

Node centrality A large family of measures of how important a *node* is within a network based on the number and/or characteristics of *edges* connecting it to other nodes

Out-degree For *directed networks*, the total number of *nodes* selected by a given node; for example, if Julie claims that Fred and Jane are her friends, her out-degree is 2

Power-law (exponential) distribution A distribution where most *nodes* have low *degree* and the proportion of nodes with degree of at least X shrinks rapidly as X increases; corresponds to *scale-free networks* and frequently fits well with rank-order distributions (such as sales rankings)

Prestige centrality Measures that summarize the prominence or prestige of a *node* based on *in-degree* and the prestige of the nodes selecting the node

Random network A *network* where every possible *edge* (e.g. pair of nodes) has equal probability of existing; empirically rare but often used for simulations and baseline models; also called an Erdos-Renyi random graph

Reciprocated tie A *directed edge* where both nodes select the other, such as two classmates that identify each other as close friends

Scale-free network A *network* where degree is distributed roughly according to a *power-law*

Sign An *edge attribute* denoting whether a tie is positive (such as friendship) or negative (such as dislike); many types of edges can only take a positive sign

Sparse graph A *network* where only a small proportion of possible *edges* exist; most large empirical networks are sparse

Subgroup A group of *nodes* which are more closely connected via *edges* to each other than to nodes outside the subgroup

Symmetrical tie An *edge* that is either non-*directed*, such as belonging to the same group, or are *reciprocated*

Tie More general term for an *edge* or relationship

Topic More general term for a *node* or *actor*

Weight An *edge attribute* indicating the strength, volume, frequency or recency of the tie; *networks* with edge strength are call *valued networks*; color intensity or line width of edges often represent edge strength in visualizations

Valued network A network where edges are assigned different *weights*