

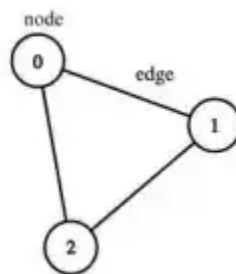
## Analyzing the social web

The Social Networks are well grounded in mathematics, and understanding how to represent, describe, and measure properties of networks will be the foundations of quantitative network analysis.

The basic units of a social network are the nodes, which usually represent people, and the edges, which represent relationships. A collection of nodes and edges forms a network or graph. In this we introduces the fundamental concepts of nodes and edges, how to represent networks, and network features such as cliques, clusters, bridges, and hubs.

### Nodes, Edges and Network Measures

Network Analysis is a method for finding patterns under the structure of the network. It relies on graph theory. The network consists of nodes that represent individuals, people, or things, and edges represent the connection or relationship between nodes. Social Network Analysis (SNA) is interested in relationships among social entities such as individuals or organizations.



Nodes and edges have different meanings in different networks. For example 2.1, for a bank, the nodes represent bank accounts, while the edges represent the transaction between these accounts. For social media applications such as Facebook and Twitter, nodes represent individuals, while edges represent there is a connection between these people.

Nodes and edges create a graph together and edges may have direction. If the way of the relationship between nodes is insignificant then edges have no direction and the graph becomes undirected. In the social media application example, if the edge exists between two nodes (or in other words two people), it means that they are both friends of each other. Therefore this relationship is undirected. In the bank example, the relationship is directed because transaction happens from one account to another. Therefore, we design our network with directed graphs.

The size of the network is defined as the number of nodes or edges. The density of the network is calculated as the total number of existing edges divided by the number of all possible edges. It takes a value between 0 and 1. The degree of a node represents the number of edges connected to that node. If the edges have direction in the network, then each node has in-degree and out-degree values. In-degree represents the incoming edges to the node while out-degree represents the

outgoing edges from the node. The probability distribution of these degrees of all nodes creates degree distribution and social networks can be characterized by using this statistic.