# Graph Theory for Machine Learning

## Graph Data Types

### Transaction

### Relationship

### Sparsification

### [Glossary](https://en.wikipedia.org/wiki/Glossary_of_graph_theory)

basic terms

[REVIEW NEEDED]

|  |  |
| --- | --- |
| **term** | **description** |
| acyclic | a graph is acyclic if it has no cycles |
| adjacency | binary indicator: given vertices are / are not endpoints of a common edge |
| connected component | a maximal connected subgraph |
| connected graph | a graph is connected if each pair of vertices is connected |
| connected vertices | a pair of vertices that co-occur in some path |
| cycle | a finite path whose first and last vertex are the same |
| degree | number of incident edges of a vertex |
| directed edge | an ordered pair of vertices (called endpoints of the edge) |
| edge | a specified pair of vertices (in a hypergraph, more than two vertices) |
| edge weight | a numerical value assigned to an edge |
| graph | a system of vertices (nodes) and edges |
| incidence | if a vertex is an endpoint of an edge, the (vertex, edge) pair is said to be incident |
| neighborhood, 1-hop | the subgraph induced by a vertex and its adjacent vertices |
| neighborhood, 1.5-hop |  |
| neighborhood, 2-hop | the subgraph induced by a vertex, its adjacent vertices, and their adjacent vertices |
| path | a sequence of adjacent vertices |
| simple path | a path in which no vertex is repeated |
| subgraph | a subset of edges along with their endpoints and possibly additional vertices |
| subgraph, induced | a subset of vertices along with the edges having both endpoints in the subset |
| tree, directed | a directed graph having a distinguished root vertex R such that there is exactly one path from R to any other vertex V |
| tree, undirected | a connected, acyclic graph |

## PageRank

## Floyd-Marshall, Dijkstra

## Centrality and Girvan-Newman

[cluster\_edge\_betweenness()]

## Disjoint Set Forest

## Spectral Clustering

## Modularity-Based Clustering

### Clauset-Newman-Moore

[cluster\_fast\_greedy()]

### Louvain

[cluster\_louvain()]

### Leiden

[cluster\_leiden()]