

1 Graph analytic tasks:

1.1 node classification:

aims at determining the **label of nodes** based on other labeled nodes and the topology(拓扑) of the network.

methods: random walks to propagate the labels; extracts feature from nodes and apply classifier on them.

1.2 link prediction:

refers to the task of predicting missing links or links that are likely to occur in the future.

methods: similarity based methods, maximum likelihood models, probability models.

1.3 clustering

find subsets of similar nodes and group them together.

methods: attribute based models and methods which directly maximize the inter-cluster distances.

1.4 visualization

helps in providing insights into the structure of the network.

2 definitions

definition 1: (graph) A graph $G(V, E)$ is a collection of $V = \{v_1, \dots, v_n\}$ vertices and $E = \{e_{ij}\}_{i,j=1}^n$ edges. The adjacency matrix S of graph G contains non-negative weights associated with each edge: $s_{ij} \geq 0$.

The edge weight s_{ij} is generally treated as a measure of similarity between the nodes v_i and v_j . **The higher the edge weight, the more similar the two nodes are expected to be.**

definition 1:(Graph)