Graphs

1 Basics

A graph is a collection of **nodes** connected by **vertices** which may or may not have direction and weight. A **cut** of a graph is a partition of the set of vertices V into non-empty sets A and B. When discussing cuts, a **crossing edge** is an edge with a tail in one set and head in the other.

2 Representation

A graph is considered **sparse** if the number of edges m is $O(n^2)$. A **dense** graph has m on the scale of $O(n)$. In most applications, m is $\Omega(n)$ and $O(n^2)$.

A graph can be represented with an **adjacency matrix**, an $n \times n$ matrix A in which $A_{ij} \neq 0$ means G has an ij edge. A_{ij} can also represent the number of ij edges, the weight of the ij edge, or the direction of the edge.

A more popular way of representing graphs is by an **adjacency list**. In this case, the graph is represented as an array of vertices and an array of edges. Often, each vertex has an array of other incident vertices which represents connections.