

What is a graph?

A data structure to represent link between objects. A graph is defined by a set of nodes V and a set of edges E .

We can summarize this definition by the following formula:

$$G = (E, V)$$

What's the difference between a graph and a tree?

A graph can contain cycles (a node can be visited twice).

Different type of graphs

- ▶ Acyclic Graph A graph that has no cycle.
- ▶ Cyclic Graph A graph that has at least one cycle.
- ▶ Directed Graph A graph in which edge has direction. That is the nodes are ordered pairs in the definition of every edge.
- ▶ Undirected Graph A graph in which edge are not directed. Meaning, the edges are defined by an unordered pair of nodes.
- ▶ Directed Acyclic Graph A graph that is both directed and acyclic.

Different way to represent a graph

There are 2 ways to represent a graph:

- ▶ adjacency list For each node, provide a list of other nodes that are adjacent to it.
- ▶ adjacency matrix A matrix construct by aligning the nodes in the row and the columns and putting a value if the nodes are linked by an edge.

Graph traversal algorithms

DFS (Depth-First Search)

A graph traversal algorithm in which one start with a root node (arbitrarily chosen) then explore as far as possible along each branch before backtracking.

BFS (Breadth-First Search)

A graph traversal algorithm in which one explore every possible node in the current depth level before going to the next.

Path finding algorithms

A* algorithm

Dijkstra algorithm