Lesson 2: Depth and Breadth First Searches

Notes

Book acknowledgment:

Goals

- Breadth First Search

- Depth First Search

1   Try it on your own

Given some graph $G = (V, E)$, how would you systematically go about exploring all the connected nodes in V?

2   Breadth First Search

Given s as the source node, the bread-first-search (BFS) systematically explores the edges of G to *discover* every node that is reachable from s. It also calculates the small number of edges from s to each reachable node in G

To simplify this algorithm, the BFS signifies each node as *nil*, *discovered*, and *explored*. All nodes start as nil and may later be discovered or explored. A node is discovered the first time it is encountered during the search.

The BFS constructs a breadth-first tree, initially containing only its root node s. Whenever the search encounters a nil node v in the course of scanning the adjacency list of an already encountered node u, the node v and the edge (u, v) are added to the tree. Thus, we refer to the node u as the *parent* of v. Since a node is discovered at most once, then each node has at most one parent.

3   Depth First Search

Given the name of the Depth First Search (DFS), how do you think it differs from the BFS?