50.021 – Artificial Intelligence

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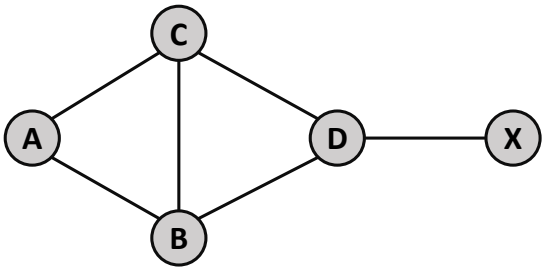
Week 02: Search

[The following notes are compiled from various sources such as textbooks, lecture materials, Web resources and are shared for academic purposes only, intended for use by students registered for a specific course. In the interest of brevity, every source is not cited. The compiler of these notes gratefully acknowledges all such sources.]

Due: 9th Feb, 11:59pm
Submission: via eDimension

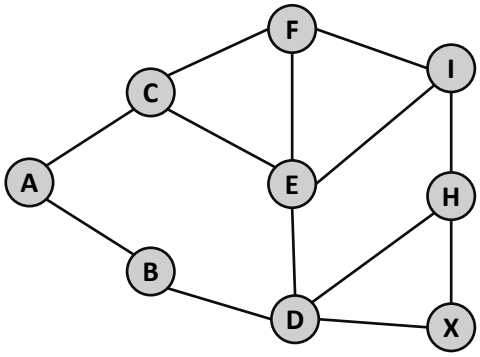
1 Breadth-First Search (BFS) and Depth-First Search (DFS)



For the above graph, A is the initial state and X is the goal state. Assuming that we insert nodes in terms of lowest alphabatical order first.

TASK: Answer the following questions:
a.) Run BFS as a graph search, and list down the following: (i) the frontier/queue at every step; and (iii) the solution (if any).
b.) Run DFS as a graph search, and list down the following: (i) the frontier/queue at every step; and (iii) the solution (if any).
c.) If BFS is run as a tree search (instead of a graph search), what additional nodes will be inserted? List down 3 such nodes.
d.) If DFS is run as a tree search (instead of a graph search), what additional nodes will be inserted? List down 3 such nodes.

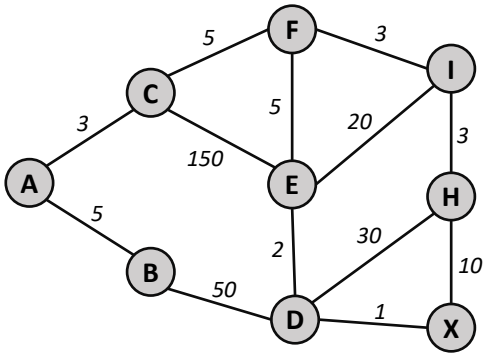
2 More BFS/DFS



For the above graph, A is the initial state and X is the goal state. Assuming that we insert nodes in terms of lowest alphabatical order first.

TASK: Answer the following questions:
a.) Run BFS as a graph search, and list down the following: (i) the frontier/queue at every step; and (iii) the solution (if any).
b.) Run DFS as a graph search, and list down the following: (i) the frontier/queue at every step; (iii) the solution (if any).

3 Uniform Cost Search (UCS)



For the above graph, A is the initial state and X is the goal state. The path cost is written on the edges of the graph.

TASK: Run UCS as a graph search, and list down the following: (i) the frontier/queue at every step (including the path cost of each node); and (iii) the solution (if any).