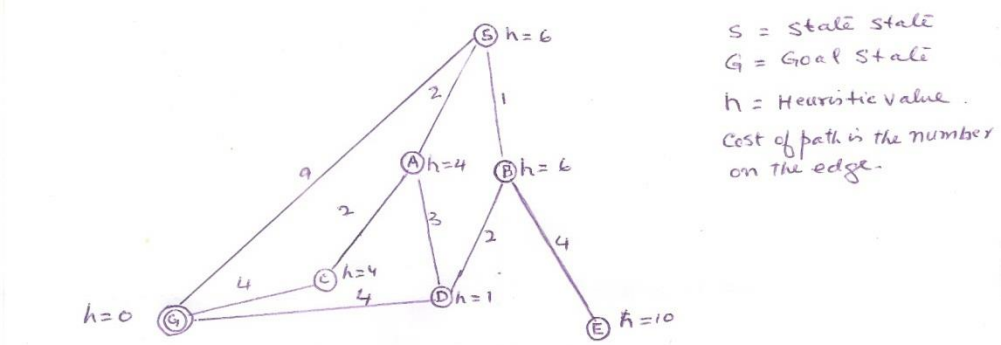
AI Assignment -2
Due date: 9th Nov 2021

Instruction:

In order for you understand the search algorithms properly I am giving you a solved example. Look it carefully and then try to solve the assignment-2.

Solved Example



When node is expanded its children are put in an "open-List" in alphabetical order. Show contents of open List (order in which nodes are expanded), and Solution path and cost. For the following:

BFS: S A B G C D E
Sol Path: S $\xrightarrow{9}$ G
Cost of Sol: 9

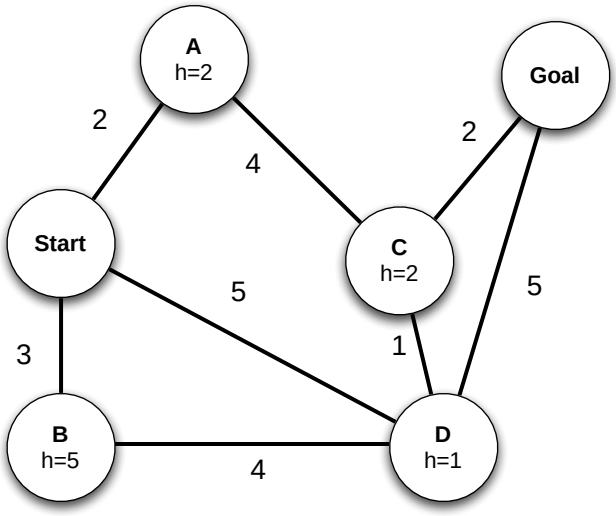
DFS S A C D B G
Sol Path: S $\xrightarrow{2}$ A $\xrightarrow{2}$ C $\xrightarrow{4}$ G
Sol Cost: 8

UCS S B1 A2 D3 C4 E5 G9
Sol Path: S $\xrightarrow{1}$ B $\xrightarrow{2}$ D $\xrightarrow{4}$ G
Sol Cost: 8

Greedy Best First: S G0 A4 B6
Sol Path S $\xrightarrow{9}$ G
Sol Cost 9

A* Algo S A(2+4) B(1+6) G(9+0)
S A6 D(5+1) B(1+6) C(8+4) G9
S A6 D6 B7 C8 G9
S A6 D6 D(3+1) G(7+0) C8 G9 Goal found
Path: S $\xrightarrow{1}$ B $\xrightarrow{2}$ D $\xrightarrow{4}$ G
Sol Cost = 7 (optimal)

Question 1



For each of the following graph search strategies, work out the order in which states are expanded, as well as the path returned by graph search. In all cases, assume ties resolve in such a way that states with earlier alphabetical order are expanded first. The start and goal state are S and G, respectively. Remember that in graph search, a state is expanded only once.

a) Depth-first search.

b) Breadth-first search.

c) Uniform cost search.

d) Greedy search with the heuristic h shown on the graph.

e) $A^{\vee}$ search with the same heuristic.

Question-2

1. What are the elements of the state space representation of a problem?
2. What are blind and informed search strategies? What is the difference between them?
3. What is the phenomenon of repeating states in search algorithms? What are its possible consequences?
4. In a search technique start node is obtained from a list called open and if it is not a goal state then applicable operator are applied that generate new nodes (exploration) and these nodes are added to open list for later exploration. What happens if the new nodes generated have already been checked or exist in the list? Also it may create a cycle. How to avoid such scenario? Explain
5. What problem is solved by the iterative deepening technique? In which cases it is necessary to use it?

THE END