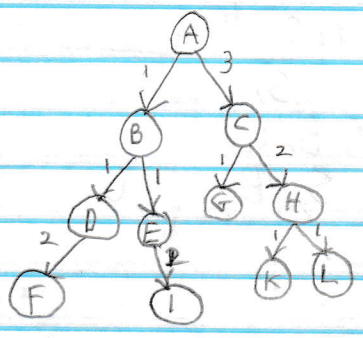
Mark Garrett
CSCI 431
HW1

1.



Depth first search:
A, B, D, F, E, I, C, G

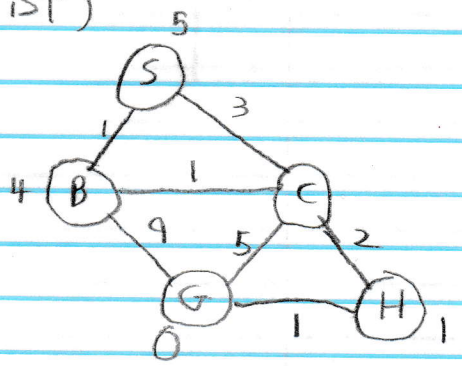
Breadth first search:
A, B, C, D, E, G

Iterative-deepening depth first search:
A, A, B, C, A, B, D, E, C, G

Uniform cost search:
A, B, D, E, E, C, I, G

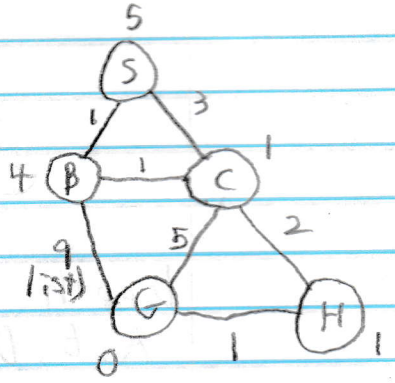
2. Depth first (without visited list)

n	Q
1	(S)
2	(BS)(CS)
3	(GBS)(CBS)
4	(GBS)(G(BS)(H(BS)



Depth first (with visited list)

n	Q	visited
1	(S)	S,
2	(BS)(CS)	S, B, C
3	(GBS)(CS)	S, B, C, G
4		
5		



Breadth first search (without visited list)

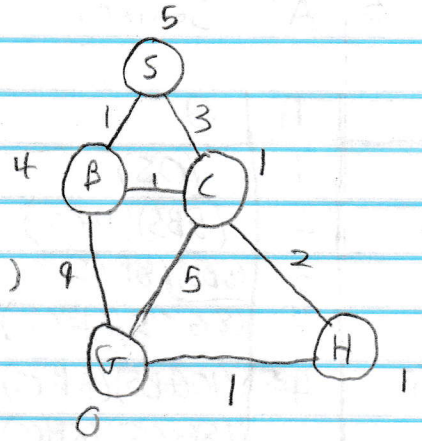
n	Q
1	(S)
2	(BS)(CS)
3	(GBS)(CBS)(CS)
4	(GBS)((BS)(BCS)(GCS)(HCS)
5	

Breadth first search (with visited list)

n	Q	visited
1	(S)	S
2	(BS)(CS)	S, B, C
3	(GBS)(CS)	S, B, C, G
4	(GBS)(GCS)(HCS)	
5		

Uniform cost Search

n	Q
1	(0 S)
2	(1 B S) (3 C S)
3	(10 G B S) (2 C B S) (3 C S)
4	(8 G C B S) (4 H C B S) (10 G B S) (3 C S)
5	(4 B C S) (8 G C S) (5 H C S) (8 G C B S) (4 H C B S) (10 G B S)
6	(13 G C B S) (8 G C S) (5 H C S) (8 G C B S) (4 H C B S) (10 G B S)
7	(6 G H C S) (13 G C B S) (8 G C S) (5 H C S) (8 G C B S) (4 H C B S) (10 G B S)

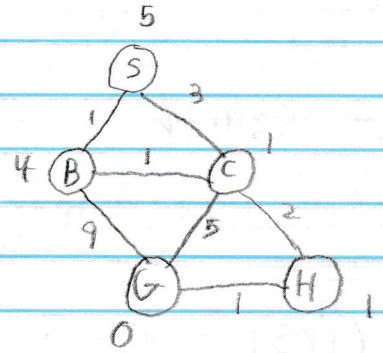


Best first search

n	Q
1	(5 S)
2	(4 B S) (1 C S)
3	(4 B S) (0 G C S) (1 H C S)

3. A* Search

Path to state	n	Q	Lengths of Paths	Total estimated cost	expanded list
S	1	(0S)	0	5	
CS	2	(5BS)(4CS)	3	4	S
BS	3	(5BS)(8BCS)	1	5	C,S
	4	(8GCS)(6HCS)			
HCS	4	(10GBS)(8BCS)	5	6	C,B,S
		(8GCS)(6HCS)			
GHCS	5	(10GBS)(8BCS)	6	6	H,C,B,S
		(8GCS)(6GHCS)			



The values of h(x) are admissible, because they are all less than the true path distance to the goal.

The values of h(x) are consistent because they are less than or equal to the path to the goal, going through the adjacent nodes, for all values of h(x) with expanded list

A* search did find the optimal path because h(x) was admissible and consistent (without an expanded list it would have only need h(x) to be admisible)

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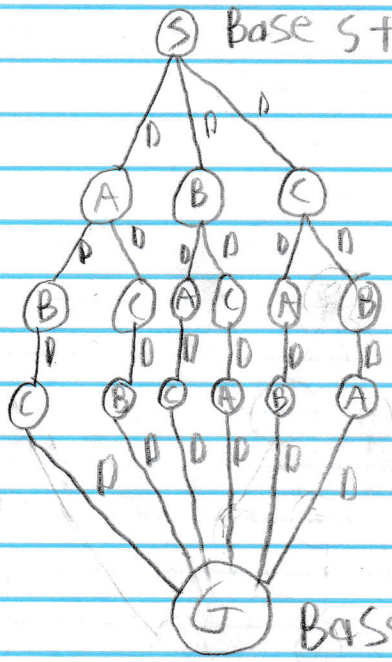

without the ability to define a heuristic function Uniform cost search would be the search algorithm to choose, because it returns an optimal solution and does not require a heuristic function. If we can have a heuristic function A* is the search algorithm to choose

$h(X)$ = minimum path distance to Gc