

Tree Search

Search type	List of states
Breadth First	A, B, C, D, E, F, G, H, I, J
Depth First	A, B, E, F, G, C, H, D, I, J
Iterative Deepening	A, B, C, D, A, B, E, F, G, C, H, D, I, J
Best-First (greedy)	A, B, E, F, G, D, I, J
A*	A, B, C, H, D, E, I, G, F, J

Search Algorithms

A: We cannot pick A* or Best-First as they need heuristic to function. We want to avoid depth first since it would have to follow along the possibly infinite paths and would therefore never reach our goal. That leaves us with either Breadth First or Iterative Deepening. We think you should pick iterative deepening as it might allow for finding the goal node without having to go through every one of the nodes of the previous level first.

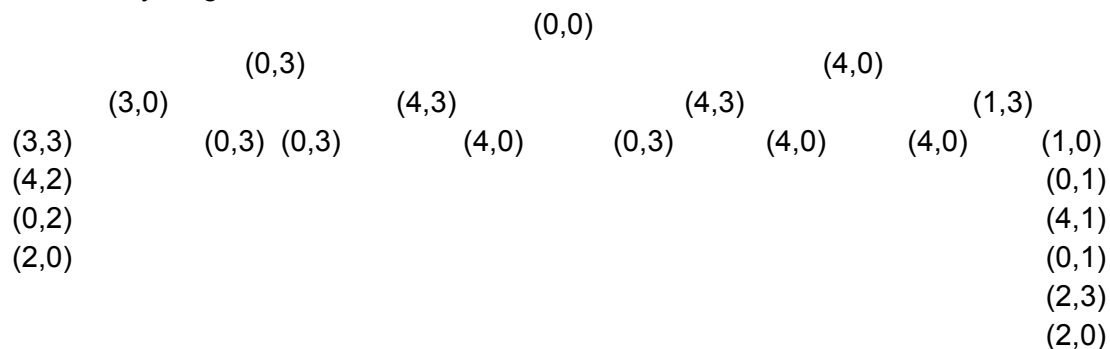
B: We cannot pick A* or Best-First as they need heuristic to function. None of the other ones used in the first task take the path cost into account, so all of them are out of the question. We would pick Uniform-Cost Search (USC) as it takes these costs into account but do not need heuristics.

C: We would pick Greedy Best-First Search as it picks the cheapest and fastest path (according to heuristics) to move forward and would therefore get to the leaves the fastest with the least cost.

D: We would pick A* as it takes both costs and heuristics into account while also being good when we have a *manageable* number of states. If we had a very large amount of states we would have otherwise chosen IDA*.

Search Problem Formulation

A: All paths have the same cost and there are no heuristics. The goal state is (2,X) where X can be anything.



B: Breadth first search would be appropriate since it goes through all possible solutions without re-visiting old nodes again and with less risk of going down an infinitely long path.

Breadth-First

Expanded node	Frontier list
-	A
A (not goal)	B, C, D (expanded)
B (not goal)	C, D, E, F, G (expanded)
C (not goal)	D, E, F, G, H (expanded)
D (not goal)	E, F, G, H, I, J (expanded)
E (not goal)	F, G, H, I, J
F (not goal)	G, H, I, J
G (not goal)	H, I, J
H (not goal)	I, J
I (not goal)	J
J (goal)	

Depth-First

Expanded node	Frontier list
-	A
A (not goal)	B, C, D (Expanded)
B (not goal)	E, F, G, C, D (Expanded)
E (not goal)	F, G, C, D
F (not goal)	G, C, D
G (not goal)	C, D
C (not goal)	H, D (Expanded)
H (not goal)	D
D (not goal)	I, J (Expanded)
I (not goal)	J
J (goal)	

Iterative Deepening Search

Expanded node	Frontier list
-	A
A (not goal)	B, C, D (Expanded)
B (not goal)	C, D
C (not goal)	D
D (not goal)	no expand-FAIL
A (no test)	B, C, D (Expanded)
B (no test)	E, F, G, C, D (Expanded)
E (not goal)	F, G, C, D
F (not goal)	G, C, D
G (not goal)	C, D
C (no test)	H, D (Expanded)
H (not goal)	D
D (no test)	I, J (Expanded)
I (not goal)	J
J (goal)	

Greedy Best-First Search

Expanded node	Frontier list
-	A:0
A (not goal)	B:1, D:3, C:6 (Expanded)
B (not goal)	E:0, F:0, G:0, D:3, C:6 (Expanded)
E (not goal)	F:0, G:0, D:3, C:6
F (not goal)	G:0, D:3, C:6
G (not goal)	D:3, C:6
D (not goal)	I:0, J:0, C:6 (Expanded)
I (not goal)	J:0, C:6
J (goal)	C:6

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A* - Search

Expanded node	Frontier list
-	A:0+0
A (not goal)	B: 5+1, C: 2+6, D: 4+3 (Expanded)
B (not goal)	C:8, D:7, E:6, G:4, F:3 (Expanded)
C (not goal)	H:9, D:7, E:6, G:4, F:3 (Expanded)
H (not goal)	D:7, E:6, G:4, F:3
D (not goal)	E:6, I:6, G:4, F:3, J:3 (Expanded)
E (not goal)	I:6, G:4, F:3, J:3
I (not goal)	G:4, F:3, J:3
G (not goal)	F:3, J:3
F (not goal)	J:3
J (goal)	