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Project T Final

State Spaces and Search Quiz Questions

1. Why is DFS not complete?
    a. It can get stuck at the loop
2. When can UCS fail to find the optimal solution?
    a. When the graph contains negative edge weights
3. How can you still apply UCS to a graph containing negative edge weights?
    a. Add a constant value to each edge weight so that all edges would be positive
4. You are playing a game of checkers on a 5*5 board. 7 pieces in total have already been played by you and the opponent on the board. How many successor states are possible?
    a. 18 spaces left on board to play, so 18 states are possible
5. The fringe of Uniform Cost Search is usually implemented with which type of data structure?
    a. Priority queue, ranked by backward cost
6. For A* Search to be optimal and complete, the heuristic needs to be underestimate or overestimate of the actual distance to the goal node?
    a. Underestimate
7. When all of the edge weights in the state space graph are equal, which search algorithm would perform best?
    a. BFS will have fastest runtime while being complete and optimal
8. At worst case, would BFS or DFS have more nodes in its fringe, leading to worse space complexity?
    a. BFS will have more nodes in the fringe since it can contain all nodes in a level
9. Admissibility of the heuristic is important for which property of the A* Search?

    a. Choices - completeness, optimality, runtime, space complexity
    b. Answer - optimality
10. Unlike the graph search algorithms you may have seen in a class like CS 61B, the search algorithms here generate the graph "on demand". Why would this be beneficial? Hint: State space are computed combinatorially and can get exponentially large
    a. Entire state space graph might not fit on the memory state
11. Remember in your coding assignment, the robot could only move one joint at a time, at a specific amount, let's say 30 degrees. If the angle you could move at one time is changed to 15 degrees, would the state space get bigger or smaller?
    a. The state space will get strictly bigger since all states possible before are still possible but now there are new states that are possible from more degree of freedom
12. One of the heuristics commonly used in the pacman game is Manhattan distance. Why does it work in the context of pacman when it is a clear overestimate of linear distance to goal?
    a. Pacman can only move in 4 orthogonal directions, making Manhattan distance a lower bound. Manhattan distance is also ignoring the walls of the maze.