Assignment 1 / HY-487

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Exercise 1.

The main difference between performance measures and utility functions is their focus

- Performance measures aim to quantify how effectively an agent performs specific tasks based on predefined goals.
- Utility functions reflect an agent's preferences and help guide decision-making in a more general manner.

Exercise 2.

- A* search uses a heuristic function that estimates the cost in order to reach the goal.Worst case, A* explores all possible paths to find the optimal solution.(it uses “brain”)
- DFS explores as deeply as possible along each branch before backtracking. It does not use any information about the goal or the cost to reach it !! (most of the times it will explore large number o nodes)

So if we use the correct heuristic function it is not possible to find a graph where A* extends more nodes than DFS.

Exercise 3.

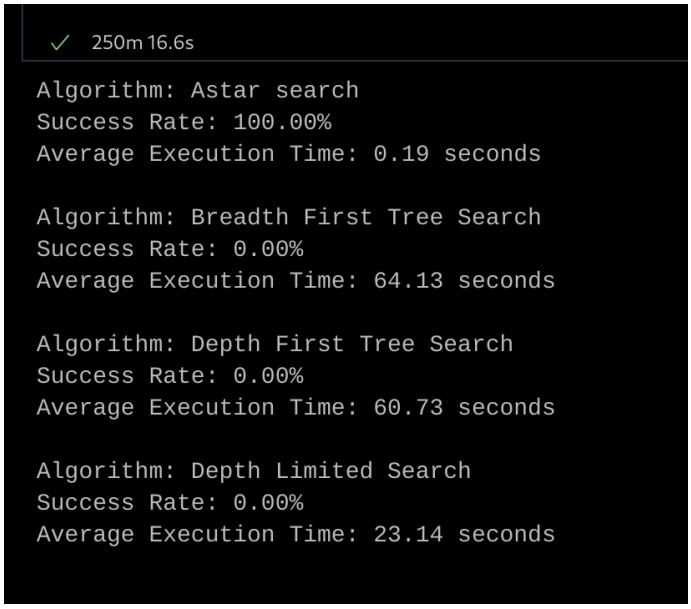
1. The greedy search with h(n) = g(n) will prioritize expanding nodes that have the lowest path cost from the starting node. It wont consider the total estimated cost to reach the goal like A*. Instead, it focuses on minimizing the path cost itself. Like BFS.
2. Here some properties we give up
    - Optimal (it may not find the most optimal solution since it relies on comparisons and it may not explore everything)
    - Correct (it may not even find the solution if one exists)
    - Efficiency (it may lost efficiency while exploring the nodes)

Exercise 4.

Expected Output based on theory :

1. A* -> optimal solution but high memory usage.
2. DF(tree)S -> fast solution but not high success rate.
3. BF(tree)S -> probably decent success rate ,high memory.
4. DLS -> low success rate better memory usage.

Output :



Well this is obviously not correct and i i probably messed up somewhere in the code but dont have time to rerun it so i will probably test it after this report.

Although we can see that the timing for BFS and DFS is 1min compare to DLS and A* being 23s and 0.2sec!

What algo would you choose ?

I would choose A* since memory is not a problem for 100 runs is probably the faster.

How does size of optional solution affect perfomance ?

The size of optional solution(moves need to make in order to reach the goal) mostly affect the execution time of the algorithm in order to find the goal.