Lab topic 3

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1 BFS, DFS, and A* Search

Based on what I observed running the test cases, A* Search performed the best and DFS performed the worst. All the given test cases had been solved by the A* Search with minimum path cost and least number of explored states (compared to BFS and DFS). BFS also solved the puzzle with the minimum path cost, but is definitely slower and has explored more states compare to A* Search. DFS, on the other hand, crashed my program almost every time. Out of all the test cases given, only one of those was solved by DFS without my program crashing.

Among the three, the most appropriate approach for solving the 8-puzzle game is the A* Search. Compare to the other two, it is an informed search strategy. It does not just explore states based on their position on the tree/graph. It uses a heuristic function that gives insight to the algorithm in choosing the option that would likely lead to a solution as early as possible.

Both BFS and DFS are brute force. I think DFS is faster if the initial state is far from the goal and BFS is faster if the initial state is closer to the goal. Given this, I still think that the least appropriate approach for solving the 8-puzzle is the DFS. BFS explores the adjacent nodes first, and since the graph of 8-puzzle is unweighted, this algorithm would result to finding the shortest path. This is not the case for DFS. DFS is depth-first search. It does not explore the adjacent nodes first. The path it would find is not necessarily the shortest.

2 Informed and Uninformed Search Strategies

The difference between informed and uninformed search strategies is that, as their names suggest, the former have additional information about the goal state while the latter only know the information given in the problem definition. Informed search strategies use heuristic function. This function provides a heuristic value that guides the algorithm to reach the goal as efficiently as possible. Thus, in terms of the time and space it takes to solve a problem, informed search is better.