Assignment 1: Search
CSE 4111: Artificial Intelligence Lab

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1 Introduction

Our problem was to solve N-Puzzle problem using different algorithms. We have to use informed and uninformed search. I have used total of 8 algorithms to solve N-Puzzle problem.

- BFS
- UCS
- DLS
- IDS
- A* (Using Misplaced Tiles)
- A* (Using Manhattan Distance)
- GBFS (Using Misplaced Tiles)
- GBFS (Using Manhattan Distance)

I have created my own Manhattan Distance function. Besides for IDS I've used DLS function. All of my algorithms are in a single file. I have generated the offline modes in other files.

2 Result Analysis With Graph

We had to create three graphs for 8-Puzzle Problem. For that I've used in total of 12 inputs for the graph. I didn't read those from file. But the outputs of the inputs are saved on a file. I've taken BFS as a model for depth.

2.1 Steps vs Time

For this graph 1 I've noticed when depth increases time complexity of heuristic algorithms doesn't change that much. But other algorithms time complexity increases rapidly.

2.2 Steps vs Paths

For this graph 2 I've noticed when depth increases the path taken by GBFS Manhattan Distance changed instantly at input 8. But it's zero in input 5 because for some reason there was no output of GBFS MD for input 5. Without both GBFS algo all other algos path increased in linear.

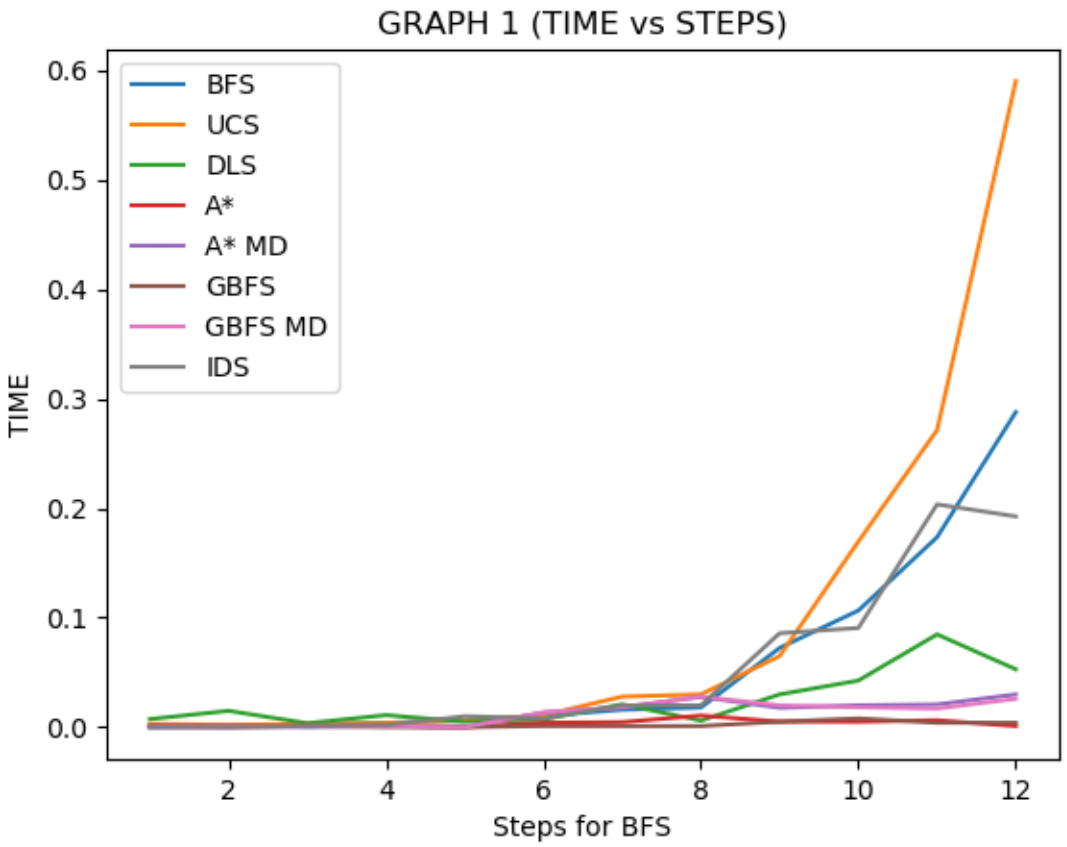

Figure 1: *Figure 1*

2.3 Steps vs Number of Nodes

For this graph 3 I've noticed when depth increases the number of nodes for BFS and DLS increased extremely high. For DLS I've set the depth limit 3. But for all other algos number of nodes is almost same over 12 depth.

3 Problems Faced

I've faced much problems for creating the movement options. But it was not known to me that python works call by reference. For that I thought there was problem in my code. So I used DEEPCOPY module. Besides I've faced much problems in DLS algo. For that I needed to take help from my friends. Besides I have not still able to solve the fifth input for GBFS.

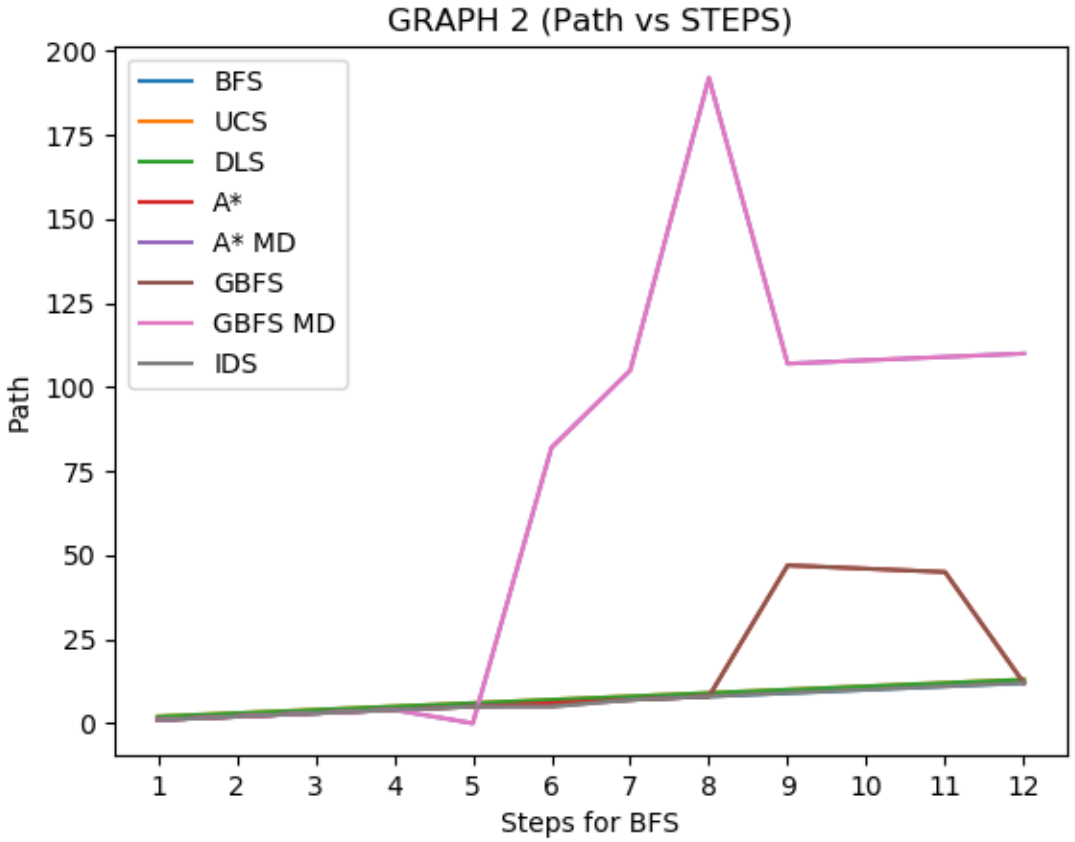

Figure 2: *Figure 2*

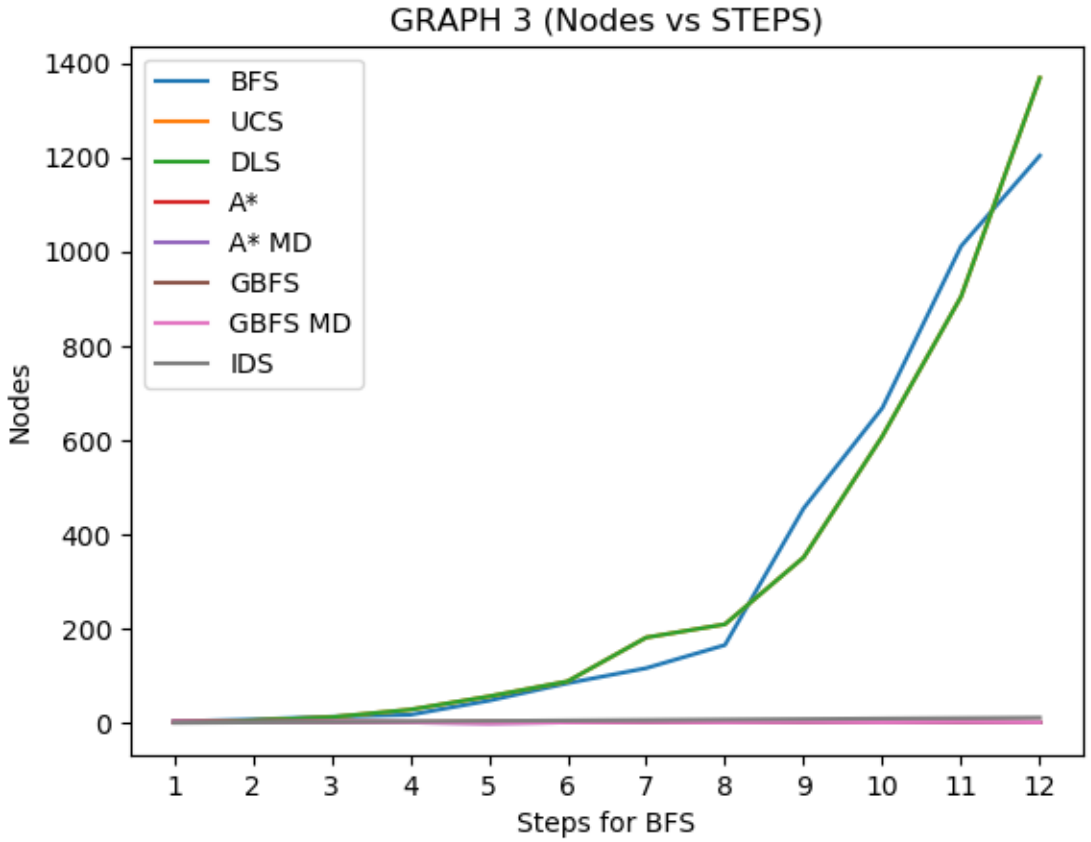

Figure 3: *Figure 3*