**CS4750-HW2**

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**References:** For *depth\_first\_graph\_search.py, interative\_deepening\_tree\_search.py, node.py, problem.py*, we implemented using the code from <https://github.com/aimacode/aima-python/blob/master/search.py> and modified it a bit to fit with the assignment requirement. For the A\* tree search using Manhattan distance heuristic (*a\_star-python.py*), we implemented our code based on the pseudo code from [https://en.wikipedia.org/wiki/A\*\_search\_algorithm](https://en.wikipedia.org/wiki/A*_search_algorithm).

**Description:** Our program used Python programming language to implement three search algorithms. We tested our program by

**Result:**

**Test case 1:**

1. Iterative deepening tree search (IDS)
2. First 5 search nodes that expanded:

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| 1 | 2 | 7 | 3 |
| 5 | 6 | 11 | 4 |
| 9 | 10 | 15 | 8 |
| 13 | 14 | 12 |  |

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1. Solution and total number of moves to reach the solution:
2. Number of node expanded:
3. CPU execution time:
4. Depth-first graph search (DFGS)
5. First 5 search nodes that expanded:
6. Solution and total number of moves to reach the solution:
7. Number of node expanded:
8. CPU execution time:
9. A\* tree search
10. First 5 search nodes that expanded:
11. Solution and total number of moves to reach the solution:
12. umber of node expanded:
13. CPU execution time:

**Test case 2:**

1. Iterative deepening tree search (IDS)
2. First 5 search nodes that expanded:

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| --- | --- | --- | --- |
| 5 | 1 | 7 | 3 |
| 9 | 2 | 11 | 4 |
| 13 | 6 | 15 | 8 |
|  | 10 | 14 | 12 |

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1. Solution and total number of moves to reach the solution:
2. Number of node expanded:
3. CPU execution time:
4. Depth-first graph search (DFGS)
5. First 5 search nodes that expanded:
6. Solution and total number of moves to reach the solution:
7. Number of node expanded:
8. CPU execution time:
9. A\* tree search
10. First 5 search nodes that expanded:
11. Solution and total number of moves to reach the solution:
12. umber of node expanded:
13. CPU execution time: