Artificial Intelligence Homework 1

Due date: 2/8 by 11:59pm

Fill in the following table with the total number of nodes expanded and the number of moves in the returned solution. The first puzzle has been filled in for you.

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| --- | --- | --- | --- | --- |
| **Puzzle Name** | **BFS** | **DFS** | **A\* - Number of misplaced tiles** | **A\* - Manhattan distance** |
| puzzle1.puzz\* | 175,313 nodes  (171,470 nodes) | 99,523 nodes  (132,209 nodes) | 52,193 nodes  (49,630 nodes) | 1,619 nodes  (1,486 nodes) |
| 27 moves  (27 moves) | 93,079 moves  (114,445 moves) | 27 moves  (27 moves) | 27 moves  (27 moves) |
| puzzle2.puzz | 139,641 nodes | 50,610 nodes | 17,754 nodes | 2,582 nodes |
| 24 moves | 48,990 moves | 24 moves | 24 moves |
| puzzle3.puzz | 165,233 nodes | 99,725 nodes | 42,362 nodes | 4,281 nodes |
| 26 moves | 93,240 moves | 26 moves | 26 moves |
| puzzle4.puzz | 158,853 nodes | 28,034 nodes | 28,822 nodes | 2,340 nodes |
| 26 moves | 27,336 moves | 26 moves | 26 moves |
| puzzle5.puzz | 51,562 nodes | 22,387 nodes | 3,148 nodes | 518 nodes |
| 20 moves | 21,842 moves | 20 moves | 20 moves |

\*My values for puzzle1 are in parentheses.

Given the information in the above table, what can you conclude about the performance of the different search algorithms?

All of the search algorithms are complete. DFS search does not return an optimal solution while BFS and both A\* algorithms do. Within the three optimal algorithms, A\* Manhattan finds the solution by exploring less nodes than BFS and A\* Misplaced. A\* Misplaced is worse than A\* Manhattan in terms the number of explored nodes, but better than BFS. DFS explores fewer nodes than BFS but returns a not optimal solution.