

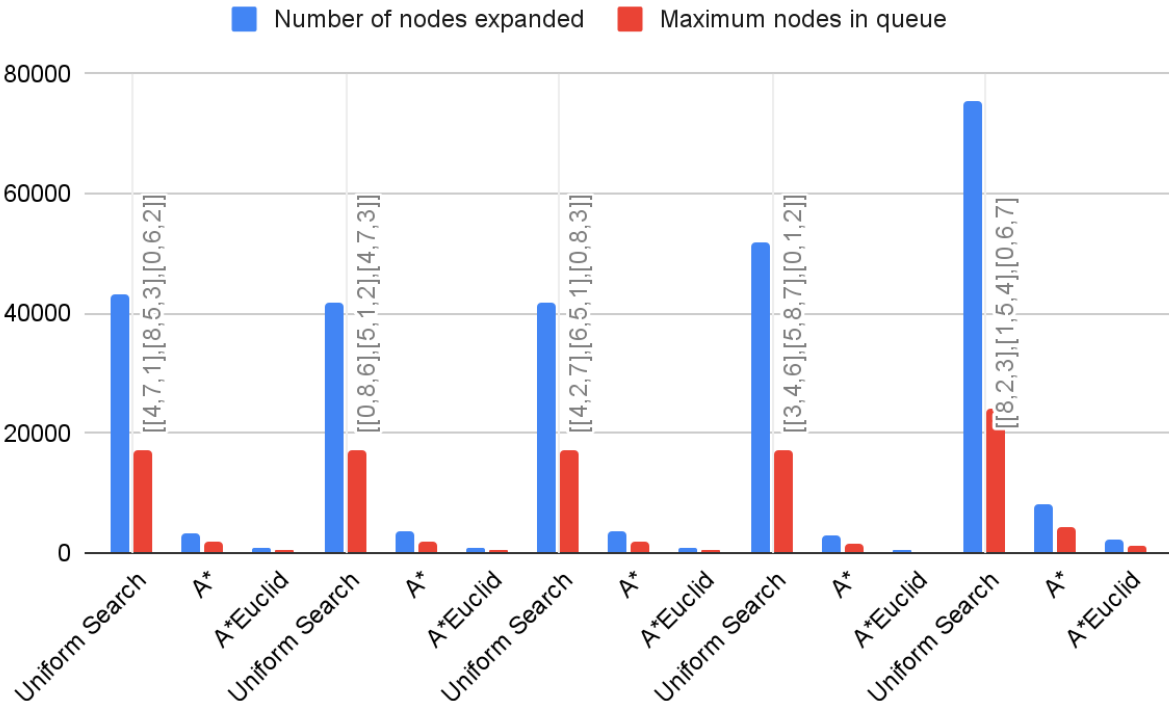
CS170 Project 1 Report

Test cases

The following test cases were used for all the functions listed below. For all of the test cases, the goal state was represented as [1,2,3],[4,5,6],[7,8,0]. The start for the following tests is as follows

1. [[4,7,1],[8,5,3],[0,6,2]]
2. [[0,8,6],[5,1,2],[4,7,3]]
3. [[4,2,7],[6,5,1],[0,8,3]]
4. [[1,0,3],[4,2,6],[7,5,8]]
5. [[2,4,3],[1,0,5],[7,8,6]]
- 6.

All of these tests were run on the same system and relatively within the same timeframe. The results that were obtained from the console output have been collected and displayed as a graph below.



Analysis:

In the graph above all three search algorithms have been run using the same starting states as listed above. The states have been displayed alongside each of the bars to represent which group the bars belong to. The numbers on the side represent the total number of nodes expanded and the maximum number of nodes in the queue.

The results from running the following test cases above have shown that the uniform search expands the most number of nodes along with the maximum number of nodes. A* algorithm with the heuristic of misplaced tiles has a total number of nodes expanded and maximum nodes in the queue of almost 10x less than the results from the uniform search. Finally, the A* search with the heuristic of the euclidian distance expands the least number of nodes and it has the least max number of nodes in the queue.

Challenges/ Implementation

One of the biggest challenges in this problem was how to represent the problem state. It was difficult to figure out what would be the best way of containing the information. Eventually, a node class was created to store all of the information relating to the problem.

Along with a node class, a search algorithms class was created in order to manipulate each of the nodes. Nodes were created dynamically and many variables were made class variables to avoid unnecessarily passing variables from one function to another

References

<https://docs.python.org/3/>

<https://www.w3schools.com/python/>