CS170 Artificial Intelligence

Individual Project

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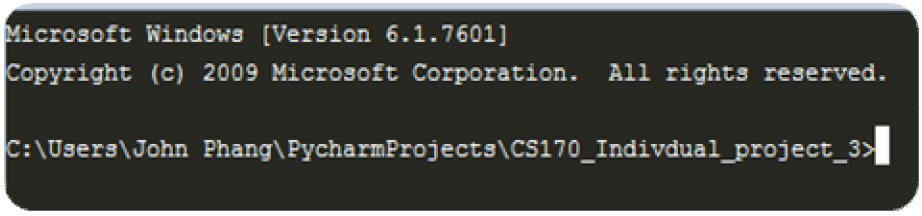
For this individual project we were ask on the prompt provided to us by the professor in order to solve an 8 Puzzle using three searches. We would then need to compare these searches after implementing them by whichever programming languages we choose to use. In this individual project I chose to use Python version 2 as my language in order to do this project. The three searches that we are eventually going to compare are, Uniform cost Search, A* search with misplaced tile heuristic, and A* search where the depth cost and h(n) is the distance to the goal heuristic. The Uniform cost Search was implemented by using the A* general algorithm, where h(n) was hardcoded to equal zero.

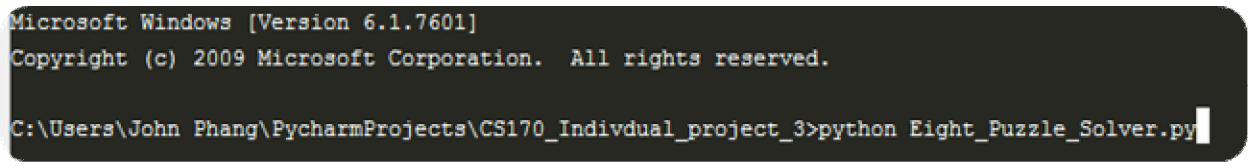
As I was trying to implement the algorithms and researching them. While also testing and trying to find good results, I eventually notice that the heuristic functions guides the search. By using random tests I found on Google, I compared and contrast the time and space it took each algorithm to finish.

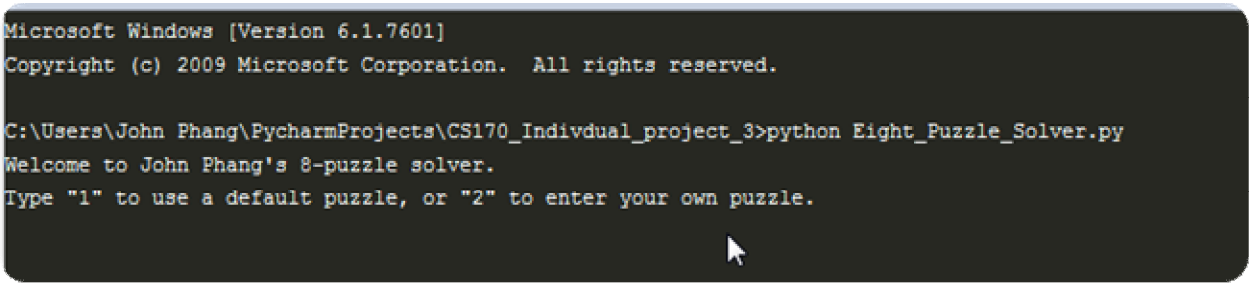
Also in order to keep the tests going or to test whether the puzzle was solvable or not, I researched method thanks to a group member about checking if the puzzle is solvable first. With this function, before even beginning the puzzle, it will determine whether or not the puzzle is even capable of solving. Otherwise it will not solve the puzzle at all. It was a quick way to test random puzzles that I found on Google.

Running the code

I implemented the project using Python version 2. DO NOT USE Python version 3 or the syntax will not work. You do not need to compile since it is Python. So to run the program, I used Python 2.7.3. That will mean you will need a Python version that is the same or higher, but not Python 3.*.*. If you choose Python 3 again it will not work. So in order to run my program. I also have Pycharm installed. So with both Pycharm and Python 2.7.3.. You would choose the version you have on Pycharm because Pycharm is your IDE and from there after choosing Python 2.7.3 extract the three .py files that I have included in the .zip. You can run the program through Pycharm however if you do not have Pycharm in order to run it through command prompt on Windows or the Terminal on Linux or MAC, you simply find the directory of the environment and from there you would type: python Eight_Puzzle_Solver.py. If all is correct it should end up looking like this.







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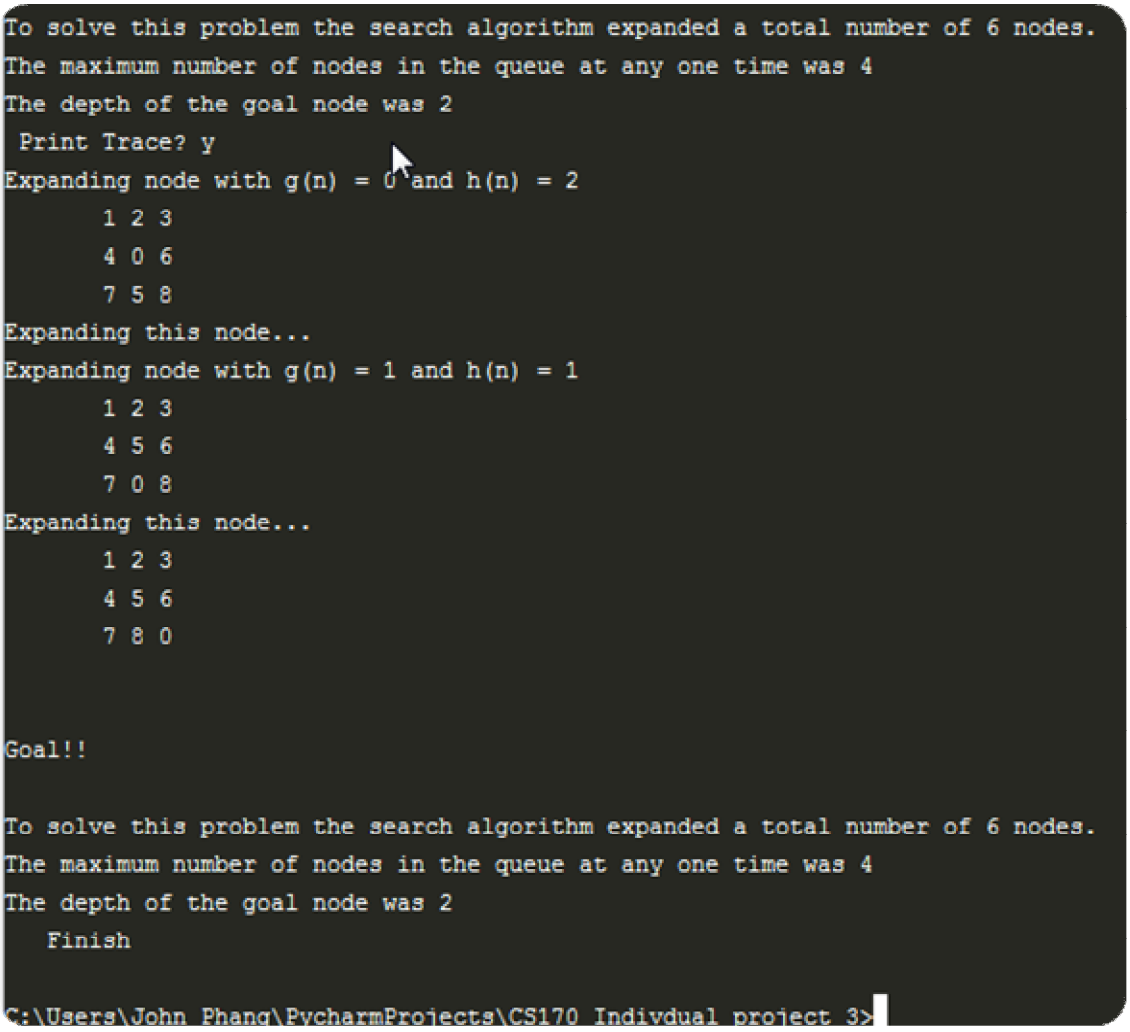
C:\Users\John Phang\PycharmProjects\CS170_Indivdual_project_3>python Eight_Puzzle_Solver.py
Welcome to John Phang's 8-puzzle solver.
Type "1" to use a default puzzle, or "2" to enter your own puzzle.
1
Here is the chosen puzzle:
       1 2 3
       4 0 6
       7 5 8
     Please choose one to execute:
         1. Uniform Cost Search
         2. A* with the Misplaced Tile heuristic.
         3. A* with the Manhattan distance heuristic.

         3
The best state to expand with a g(n) = 0 and h(n) = 2 is...
       1 2 3
       4 0 6
       7 5 8
     Expanding this node...
The best state to expand with a g(n) = 1 and h(n) = 1 is...
       1 2 3
       4 5 6
       7 0 8
     Expanding this node...


Goal!!
```



It also contains the trace if you choose either "y" or "Y" without the quotation. The trace will only work for the Manhattan algorithm. Be advised you will get an error if you try to trace with Uniform Cost Search and A* with misplaced tiles heuristics.