CS470/570 Artificial Intelligence Spring 2017
Project 1

Due: Friday, February 17th

For this project you will write a program to solve the sliding 8-puzzle using several different search algorithms:

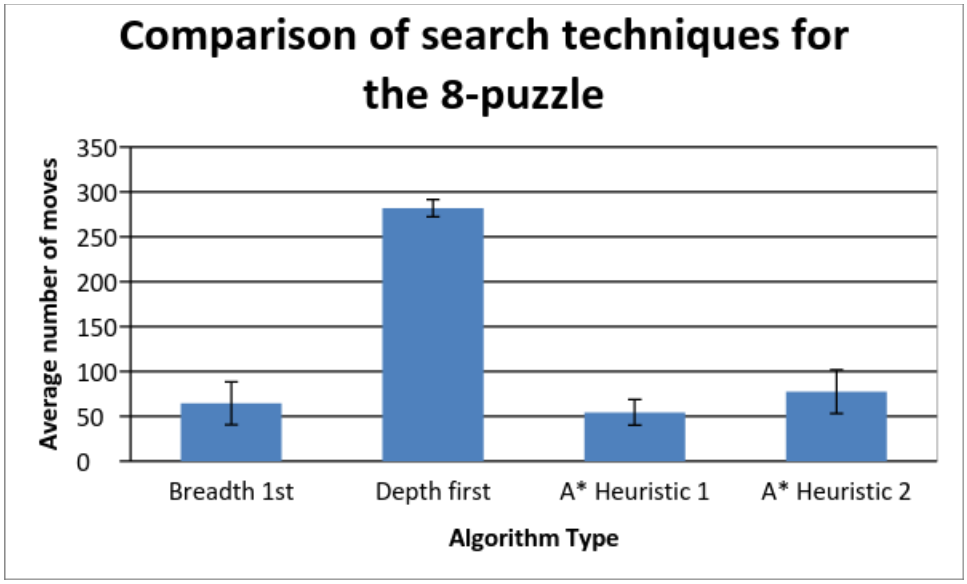
1. breadth first
2. breadth first with a closed list
3. depth first with a closed list
4. A* with a closed list
5. A* with a closed list and a different cost estimation function

For each algorithm you should run the algorithm at least 10 times and calculate the average number of moves required to solve the puzzle and the standard deviation of the number of moves required. For each of the tests the puzzle should start from a random starting position. *Note:* in half of the cases a random starting position will be unsolvable, so to randomize the starting position begin with a solved puzzle and apply a large number of random moves to reach a random starting configuration.

Write-up:

The write-up that you turn in should consist of 3 parts:

1) A short (~1/2 page) explanation of what you did. List the algorithms you used and describe the estimation functions used with the A* searches. If you did any extra work, or skipped one of the algorithms be sure to include it. If any of the algorithms failed, i.e. ran out of time or memory, include that information.
2) A *well labeled* graph showing your results:



   Note the use of error bars and clearly labeled algorithms.
3) The code that you used.

Extra Credit Options:

1) Collect and present the same data for a 4x4 puzzle and a 5x5 puzzle (as well as the traditional 3x3 puzzle).

2) Include on or more additional search algorithms, e.g. interative deepening or bi-directional.

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Sub Project 1a

Due: Friday, February 3rd

For this sub-project you will write a program that allows a player to play the sliding 8-puzzle. The interface can be extremely simple. For example, a text based puzzle where the user enters the tile they want to slide as an integer between 0 and 8.

Sample (simple) output:

```
Current position:
2 3 8
  5 9
1 6 4
Your move: 4
Current position:
2 3 8
5   9
1 6 4
Your move: _
```

The program should begin with a randomized board and should recognize and report when the puzzle is solved.

Write-up:

Turn in sample output showing a few moves of the game.

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Sub Project 1b

Due: Friday, February 10th

For this sub-project you will write a program that uses breadth first search with or without a closed list to solve a sliding 8-puzzle. You should test the algorithm at least 10 times starting from random configurations.

Write-up:

Turn in a paragraph describing your results, including the average and standard deviation of the number of moves required to solve the puzzle.