

Assignment A2r: Problem Solving: Search (Revisited)

CS 4300
Fall 2015

Assigned: 5 October 2015

Due: 29 October 2015

For this problem, handin a lab report pdf (include name, date, assignment and class number in pdf) which studies statistics comparing breadth-first, depth-first and A^* search on the Wumpus World problem. The measure of complexity is the total number of nodes generated during a search. For A^* search use the heuristic of Euclidean distance between the current state and the goal state. Run 2000 trials using random boards with Wumpus and 20% probability of a pit in each (non-start) cell. Test the hypothesis that A^* search is 10% better than BFS and DFS at the 95 % confidence level.

Do the following:

1. Pose specific questions in the Introduction (e.g., What is the mean number of search tree nodes produced by DFS, BFS and A^* on these problems).
2. Give specific details on the following aspects of each algorithm:
 - (a) Are the (new) children nodes added to the tree immediately when a node is expanded from the frontier?
 - (b) When is a node checked to see if it is a solution?
 - (c) Produce results even for boards with no solution to goal (i.e., include statistics of search trees that fail.
 - (d) Other issues which you deem important to understand the data taken.
3. Give a 4x4 table with the number of nodes in the search tree for each of DFS, BFS, and A^* when the goal is the $[x;y]$ location of the table entry.

4. For the verification section
 - (a) Pick 3 example boards, and show hand developed solutions for each of DFS, BFS and A*, and compare to the results of the matlab functions.
 - (b) Determine what the min and max tree sizes are for each method and report if the actual minima and maxima from the experiments are within that range.
5. Make sure that the data section contains both a plot the actual sizes of the individual trial results and a histogram of those.

You should handin the report pdf as well as the source code used in the study. The code should conform to the style requested in the class materials (no matter what the language).

In addition, please turn in a hardcopy of the report in class before the start of class on October 29, 2015.

Write a lab report in the format (please do not deviate from this format!) described in the course materials.

Discuss the statistical framework to establish a confidence interval on the means, and the hypothesis test.