

ROB 456: Homework Set 4

Code A*

1. Download world.csv.
2. Write a program to create a 4-connected graph and run an A* search from vertex (0,0) to vertex (19,19) across the obstacle map provided in world.csv.
 - a. The world is a 20×20 grid of cells
 - b. The world.csv file is an occupancy grid map: 1 means the grid cell is occupied and you can't move through it
 - c. Edge costs are 1
3. Your code should output the final path (either plot it or print out the vertex coordinates) and associated path cost.
4. Comment your code to demonstrate that you understand the algorithm.

What to turn in:

1. A zip file of your commented A* code including world.csv.
2. A cover sheet (PDF) listing:
 - a. Web sites you used
 - b. People you worked with
 - c. The final path
 - d. Your heuristic function (in English)
 - e. How you implemented the graph and priority queue
 - f. Any known bugs/issues

A few notes:

1. 4-connected means that you can travel from a cell to any of the cardinal neighbors (north, south, east, west).
2. Broadly speaking, there are two ways you can represent the graph
 - a. As an adjacency matrix with a function that returns valid neighbors for a given vertex when queried, or
 - b. As a list of vertices and a list of edges.
3. You need to demonstrate that you understand how the algorithm works and the best way to do this is to comment relevant lines of code. Marks will be awarded accordingly.
4. There are plenty of resources available to you online, you may take inspiration from existing implementations that you find, but see Note 3 above.