Assignment 2: Informed Search

Issue: September 13, Wednesday
Due: October 1, Sunday (11:59 PM)

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1. Objectives:

To gain an in-depth understanding of the 2 heuristic search algorithms: Greedy and A* search. To learn how to develop new solutions to tackle the same problem by extending the existing search agent and adding a knowledge attribute to it (towards acting intelligently).

2. Application and Requirements:

1) Solve the same problem defined in A1, but it is required to use domain knowledge of the problem to guide the searcher: implement 2 heuristic search algorithms. The required heuristic knowledge is the estimation function of the straight line distance between a node under examining and the goal position G.

2) Allow the user to completely define the grid problem including both the dimensions of the grid and the forbidden area as well from the user input.

3) Observe the behavior of each searcher and comment on the performance of heuristic search in comparing with the blind search methods:
   a. Provide a summary table of running three different tests which should include the number of visited nodes (Vnode#) and the number of nodes in a solution path (Snode#). The table should have the following format:

	Test1 Vnode#/Snode#	Test2 Vnode#/Snode#	Test3 Vnode#/Snode#
Breadth-first			
Depth-first			
Greedy			
A*			

Given a new setting of 15 x 15 grid and the same forbidden area in Ass1, you MUST use the following input pairs of S and G: (for checking purpose)

	Goal	Start
Test1:	(8, 3)	(2, 5)
Test2:	(9, 3)	(3, 10)
Test3:	(7, 1)	(12, 12)

   b. Comment on your observation.

3. Other Instructions:

In this assignment the README.txt file will serve as a report which includes the following parts:

1) Overall structure of the code.
2) Instructions on how to compile and run the program.
3) Definition of the heuristic function.
4) Report of 2.3).

4. Marking scheme:

- The correctness of the result: 50%
- The user interface: 18%
- The modularity and readability of the code: 12%
- The README report: 20%

5. Bonus: (+10%)

The bonus marks will go to the work which provides a proper design for a more advanced heuristic knowledge, i.e. the knowledge function includes both the information of distance and the information of the forbidden area. The following presentation is required:

a) A clear definition of the new heuristic knowledge, and an analysis statement on why it is a better option.
b) A result comparison of using the two knowledge functions.
c) Comment on your observation, etc.

Have fun!