

BLG 435E, Artificial Intelligence, Fall 2012-2013

Assignment #1

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Due: October 31, 2012, 23.59 PM

Submission type: A hard copy report and an archive file including all files (source code files and soft copy report).

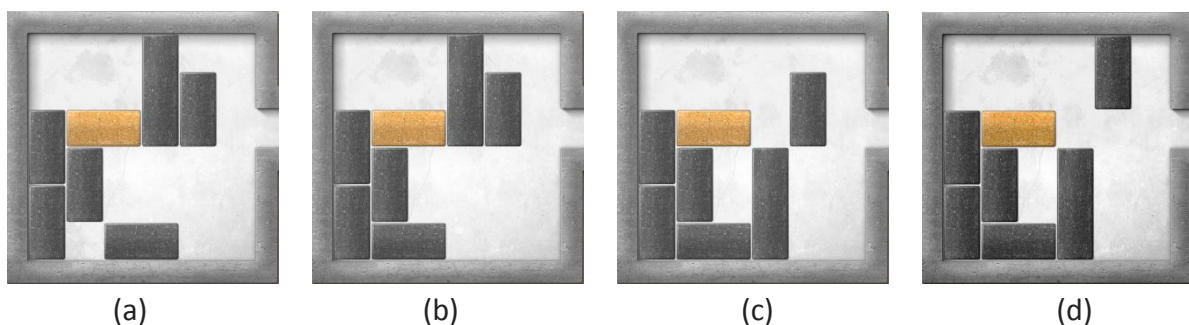
Q1. For each of the following agents, develop a PEAS description of the task environment:

- a) Home service robot
- b) A dynamic personalized e-mail organizer for email services
- c) Autonomous car driver agent
- d) Activity recognition and anomaly detection software agent in an airport

For each of these agent types characterize the environment according to the properties of the environment (observability, dynamism, etc.) and PEAS components. Then, determine the appropriate type of the agent architecture with reasonable arguments.

Q2. Prove that if a heuristic is consistent, it must be admissible. Construct an admissible heuristic that is not consistent.

Q3. In this section, you are asked to solve the sliding blocks problem. In this problem, the objective is moving a target block out of the environment from an exit gate. The environment also contains different sized blocks as obstacles. Environment can be represented by a 6 x 6 matrix and the exit gate is on location [3,6]. To clarify the problem, an example illustration scenario of the game is given in the following figure.



There are some constraints on movement of blocks;

- Blocks are either $1 \times n$ or $n \times 1$ sized rectangles. Here, n defines the length of the block and it should be greater than 1 (cannot be 1).
- $1 \times n$ sized blocks can move along right/left directions.
- $n \times 1$ sized rectangles can move along up/down directions.

(a) Formulate this problem in a well-defined form.

(b) Run three uninformed search algorithms and analyze the results. Give a detailed discussion in terms of both time and space requirements.

(c) Implement the A* algorithm to solve the sliding blocks problem.

(d) Run A* program with two different heuristic functions and give a detailed analysis of the results in your report.

The problem description will be given in a text file including the properties of the blocks. In this file, each row represents a block. In each row, the coordinates of the bottom left corner of the block, the length of the block and its direction is given (h for horizontal, v for vertical), respectively. The first row always presents the properties of the target block which is needed to be moved out of the environment.

Besides the detailed analysis, your programs should present the solution as a sequence of environment states in a file (You can see an example of state format in the input file (blocks.txt) provided with the homework for your output file). A Matlab code will also be given for you to visualize your solution as a simulation. There is also an online code repository at <http://aima.cs.berkeley.edu/code.html> which you can use.