CSCE476/876 **Spring 2005**

Homework 4

Assigned on: Wednesday February 16, 2005.

Due: Monday, February 28, 2005.
All exercices are pen and paper except for the two programming questions (i.e., Exercice 2 and 5), which must be submitted with `handin`.

Value: 96 points for ugrads and 100 points for grads.

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1 AIMA, Exercise 2.5 (a,b,c), Page 57. Total: 12 points

For each of the agent types listed below, characterize its performance measure, environment, actuators and sensors according to the properties given in Section 2.3: 6 points

- Robot soccer player
- Internet book-shopping agent
- Autonomous Mars rover

Then, characterize the enviroment according to the properties given in Section 2.3 (AIMA), and select a suitable agent design. 6 points

2 Implementing a simple-reflex agent. Total: 10 points

- Write in Common Lisp a function that 'models' the simple-reflex agent for the vacuum-cleaner problem in an environment with two locations, as summarized on page 5 of the Intructor's notes #4. The function should take as input the percepts of the agent as location of the agent and status of the room.
- Write a Common Lisp function that takes any of the 8 possible states of the vacuum-cleamer of Figure 3.20 of AIMA and runs the simple-reflect agent until the goal is reached.
- Design a performance measure that penalizes the agent for each step and each suck action. Record the agent performance for each one of the above 8 possible states.

3 AIMA, Exercise 3.7, Page 90. Total 6/10 points

- a: for ugrads and grads. 3 points
- b: for ugrads and grads. 3 points
- d: grads (bonus for ugrads). 4 points

4 AIMA, Exercise 3.8, Page 90. Total: 10 points

5 AIMA, Exercise 3.9, Page 90. Total: 38 points

- Question a: 6 points
- Question b: 30 points. You need to implement your algorithm in Common Lisp.
- Question c: 2 points

6 Evaluation function. Total: 4 points

Adapted from AIMA, Edition 1.

With $g(n)$ being the path length,

1. Suppose that we run a greedy search algorithm with $h(n) = -g(n)$. What sort of search will the greedy search emulate?
   Explain. 2 points
2. Suppose that we run a search algorithm with $h(n) = g(n)$. What sort of search will the greedy search emulate?
   Explain. 2 points

7 AIMA, Exercise 4.1, Page 134. Total: 10 points

8 AIMA, Exercise 4.3, Page 134. Total: 6 points