

Artificial intelligence - Lab 1

Agents

January 15, 2004

1 Task

The assignment is intended to make you acquainted with the concept of agents and how they can be implemented in software. It is recommended that you read chapter 2 in the book "Artificial Intelligence - A Modern Approach" (AIMA) before you start working. You will in the assignment be implementing a simulator for a vaccum cleaner world similar to the one depicted in Figure 2.2 and specified on page 36 (in the AIMA book).

2 Code

You can find a simple implementation of the vaccum example in the AIMA code repository at <http://aima.cs.berkeley.edu/code.html>. The Java code is recommended as it is simpler to understand and modify (unless you have previous LISP or PYTHON experience). To compile and run the basic program that gets you started go to the src directory (in the java zip-file) and type:

```
javac aima/basic/vaccum/TrivialVaccumDemo.java
java aima.basic.vaccum.TrivialVaccumDemo
```

If you do not have a Java compiler installed on your computer, download software development kit and documentation at <http://java.sun.com/j2se> (Java 2 Platform, Standard Edition (J2SE) version 1.4)

3 Grading

For grade 3: Implement a simulator of the vaccum world (random dirt placement on a 4x1 world) with a performance measuring system. Discuss different ways of measuring performance. Record the average scores of a simple reflex agent and a model based reflex agent (that keeps track of where it has been) and draw conclusions. Extend the simulator to be modular with respect to environment (size and shape). Compare the two agents for a circular shape environment.

For grade 4: Consider a version where the geography of the environment (extent, boundaries and obstacles) is unknown. Design an environment where a simple reflex agent with a randomized agent function outperforms a simple reflex agent. Design also an environment in which the randomized agent performs poorly.

For grade 5: The vacuum environments in the preceding exercises have all been deterministic. Discuss possible agent programs for each of the following stochastic versions:

- a. Murphy's Law: twenty-five percent of the time, the "Suck" action fails to clean the floor if it is dirty and deposits dirt onto the floor if the floor is clean. How is your agent program affected if the dirt sensor gives the wrong answer 10% of the time?
- b. Small children: At each time step, each clean square has a 10% chance of becoming dirty. Can you come up with a rational agent design for this case?

In order to get grade 4 you have to also complete the grade 3 assignment, for grade 5 you need to also complete both 3 and 4.