Introduction to Multi-Agent-Programming

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Exercise Sheet 2

Due: November 9th, 2010

Exercise 2.1 (Logic-Based and Reactive Architectures (2 Points))

(a) Consider the vacuum cleaner example in the lecture. How many rules in total would have to be written for the 3×3 Grid world? How does this change for a 10×10 world? (0.5)

(b) Describe a subsumption architecture solving this same problem. Assume the following definitions:

$$A = \{Suck, Forward, Turn\}$$

Full Observability, i.e.: Dirt = 0, 1, X = 0, . . . , n, Y = 0, . . . , n, $\Theta = \{North, South, East, West\}$ and

$$P = Dirt \times X \times Y \times \Theta$$

Give sensible definitions for the behaviors $b(c, a)$, especially the sets c and define the inhibition relation. (1.5)

Exercise 2.2 (Behavior networks (1 Point))

Draw a simple behavior network for the vacuum cleaner world as in the CS:Freiburg case study.
The graph should include:

(a) The competence modules

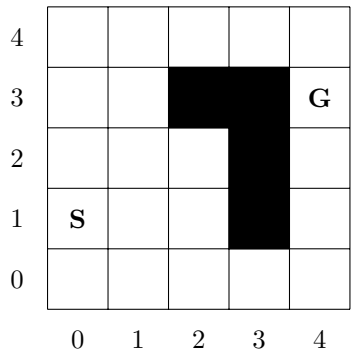
(b) Propositions in the world

(c) The goals

(d) pre-and postconditions connected via edges You can derive propositions, e.g. location_dirty, informally from the definitions in the previous exercise (i.e. it is ok to describe them in words, if it is clear, that they can be derived).

Exercise 2.3 (**Subsumption architecture (2pt, written)**)

Consider the following grid world.



A robot S need to go to G. The black cells are blocked. There are two behaviors.

(a) B_1: If forward is blocked, turn left.

(b) B_2: Go along the direction toward G.

$B_1 \prec B_2$, please draw the trajectory of S.

This exercise should be submitted during the lecture on Monday (Nov. 9th)