Principles of AI Planning
Summer 2004

Institut für Informatik
Universität Freiburg
Rintanen

Exercise 10

To be returned on Monday, July 19, 2004

Assignment 10.1 (6 points)

Consider the robot navigation problem with the following states split to four observational classes as follows, corresponding to states next to north or south wall, west or east wall, both, or no wall.

04	14	24	34	44
03	13	23	33	43
02	12	22	32	42
01	11	21	31	41
00	10	20	30	40

The actions are the following.

gowest$(x, y) = x - 1, y$, applicable when $x \in \{1, 2, 3, 4\}$

goeast$(x, y) = x + 1, y$, applicable when $x \in \{0, 1, 2, 3\}$

gosouth$(x, y) = x, y - 1$, applicable when $y \in \{1, 2, 3, 4\}$

gonorth$(x, y) = x, y + 1$, applicable when $y \in \{0, 1, 2, 3\}$

Derive a belief state that includes $I = \{22, 23, 32, 33\}$ starting from the goal belief state $G = \{22\}$ by using strong preimages and $\oplus$ as discussed in the lecture and in the lecture notes in Section 4.4.3.

You may first trace the execution of a plan in the forward direction starting from I, and once you know how it works, do the derivation backwards.

Assignment 10.2 (4 points)

Derive a formula for the number of belief states when there are n state variables and m of them are observable. Check that your formula works correctly in the special cases of full observability ($m = n$) and unobservability ($m = 0$).

You may work on these assignments and submit your results ***in groups of two students****. Make sure to clearly indicate both names on your work.* ***You may write your answers in English or German.***