

Principles of AI Planning

Prof. Dr. B. Nebel, Dr. R. Mattmüller
 D. Speck
 Winter Semester 2015/2016

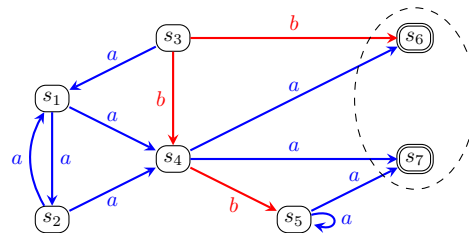
University of Freiburg
 Department of Computer Science

Exercise Sheet 13

Due: Friday, February 5th, 2016

Exercise 13.1 (AO* search, 4 points)

Consider the nondeterministic planning task that induces the following nondeterministic transition system.



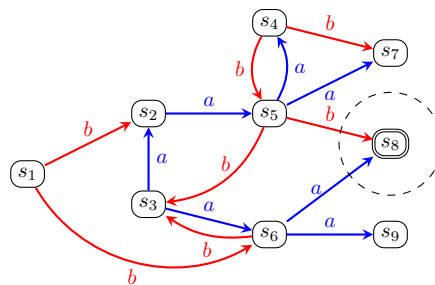
Determine a strong plan for the initial state s_3 using AO*-Search. Give the configuration of \mathcal{T}_e and \mathcal{T}_p in each iteration. It is sufficient to draw the graph \mathcal{T}_e (including f and h values), marking the corresponding hyper-edges to visualize \mathcal{T}_p .

During search, use the heuristic estimates given by the following table:

	s_1	s_2	s_3	s_4	s_5	s_6	s_7
$h(\cdot)$	1	3	2	2	∞	0	0

Exercise 13.2 (Strong cyclic planning, 3+3 points)

Consider the nondeterministic planning task that induces the following nondeterministic transition system.



- Apply the nested fixpoint algorithm presented in the lecture, and specify the candidate good state sets C_i as well as, for each iteration of the outer loop, the sets of states W_j from which a goal state can be reached in at most j steps without the danger of leaving the current set of candidate good states C_i . Extract a strong cyclic plan π for all good states.
- Apply the determinization-based incremental algorithm presented in the lecture for the initial state s_1 . Assume that the deterministic search algorithm computes the optimal plan in the determinization (e.g. that it finds a shortest path to the goal). For each iteration, specify $fail$, s , π' , π and choose the node with smallest index when selecting a node from $fail$.

You may and should solve the exercise sheets in groups of two. Please state both names on your solution.