Planning and Optimization

M. Helmert, G. Röger
R. Christen, P. Ferber, T. Keller

Self Test 1

Important: This is a small self-test that you should be able to solve within approximately 15 minutes. It's not necessary to also write down the answers formally and properly, but you should be able to come up with the answers. If answering these questions is difficult for you, please feel free to get in touch with us. We will help you fill the gaps.

Consider the planning task $\Pi = \langle V, I, O, \gamma \rangle$ with

$$V = \{a, b, c\}$$
$$I = \{a \mapsto \mathbf{F}, b \mapsto \mathbf{F}, c \mapsto \mathbf{F}\}$$
$$O = \{o_1, o_2\} \text{ where}$$
$$o_1 = \langle \neg b, a \wedge (a \rhd b) \rangle$$
$$o_2 = \langle a \wedge b, \neg a \wedge c \rangle$$
$$\gamma = b \wedge c$$

and let $s = \{a \mapsto \mathbf{T}, b \mapsto \mathbf{T}, c \mapsto \mathbf{F}\}$ and $s' = \{a \mapsto \mathbf{F}, b \mapsto \mathbf{T}, c \mapsto \mathbf{F}\}$.

1. Are o_1 and o_2 applicable in s and/or s'?

2. What is $s[\![o_2]\!]$?

3. What is $\textit{effcond}(x, o)$ for $x \in \{a, \neg a, b, \neg b\}$ and $o \in \{o_1, o_2\}$?

4. How many states are in the induced transition system of Π? How many of those states are reachable? Are s and s' among the reachable states?

5. What is a plan for Π? What is its length and what is its cost? Is your plan optimal?

6. Provide the transition system that is induced by Π.

7. What is the regression of γ with respect to o_2? Are s and s' in the set described by the formula?

8. Does a SAT planner find a solution with horizon $T = 2$ if the sequential encoding is used?

9. Do the operators $o_3 = \langle \top, a \wedge b \rangle$ and o_2 conflict?

10. Provide a BDD that represents all goal states of Π. How many states are represented by that BDD?