Principles of AI Planning
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SS 2005
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Exercise Sheet 6

To be submitted Monday, May 30

Exercise 6.1 (Invariants – 5 credits)
Find 2-literal invariants for the problem instance \((A, I, O, G)\) where
(a) \(A = \{a, b, c\}\),
(b) \(I \models a \land b \land c\),
(c) \(O = \{o_1, o_2, o_3\}\) where
- \(o_1 = \langle c, \neg b \land \neg c \rangle\)
- \(o_2 = \langle a \land \neg c, \neg a \land b \rangle\)
- \(o_3 = \langle \neg a, a \land c \rangle\)
(d) \(G = a \lor b \lor c\).

Use the algorithm presented in the lecture. Explain which calls to the procedure \textit{simplepreserved} are made (it suffices to consider only those calls that correspond to applicable operators.)

Exercise 6.2 (Representation – 5 credits)
Three actions are represented by the following three objects, a formula, a matrix and an operator. Represent \(a\) as a matrix, \(b\) as an operator, and \(c\) as a formula.
(a) \(\langle \neg (A \land B) \rangle \rightarrow A'\)
\[
\begin{pmatrix}
1 & 1 & 0 & 0 \\
1 & 1 & 0 & 0 \\
0 & 0 & 1 & 1 \\
0 & 0 & 0 & 0
\end{pmatrix}
\]
(b) \(\langle \neg (A \land B), (A \triangleright B) \land (A \not\triangleright A) \rangle\)

You may work on these assignments and submit your results \textbf{in groups of two students}. Make sure to clearly indicate both names on your work. \textbf{You may write your answers in English or German}. Please return your homework on \textbf{monday before 14:15}.

Exercise marks count towards your final grade for this course, which is calculated from exercise marks (15%) and exam marks (85%).