Principles of Knowledge Representation and Reasoning

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Winter Semester 2012/2013

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Exercise Sheet 10

Due: January 16th, 2013

Exercise 10.1 (Belief revision, 2)

We consider the following belief bases:

$$\begin{array}{rcl} K & = & \{a, c \rightarrow ((b \vee d) \wedge (\neg b \vee \neg d)), \neg a \vee c\} \\ A & = & \{\neg a, c \rightarrow (b \wedge d)\} \end{array}$$

First, give the models of A and the models of K, then give the result of the Dalal revision of K by A.

Exercise 10.2 (Syncretic assignment, 4)

We consider a syncretic assignement that associates a total pre-order $\leq_E$ to a belief profile E. We define the result of the merging operation $\Delta_{IC}(E)$ as the set of minimal elements of $\mathrm{Mod}(IC)$ according to the pre-order $\leq_E$. Show that Δ_{IC} satisfies all KP postulates.

Exercise 10.3 (Semantic belief revision - Implementation, 6)

For this practical assignment, you are asked to implement Dalal revision. You can use any programming language you like (given that it is usable under Ubuntu 12). You can re-use the code you made for parsing input propositional logic formulae and the one used for propositional logic tableau. Source code **must be submitted** on time to: `westpham@informatik.uni-freiburg.de`. The input format is identical to the "propositional logic with Tableau" implementation. The program takes two files as input, the first one being the old information and the second one being the new information. Both the old and new information must consist in a single formula (if not, then the conjunction of the formulae is the input). Implementation of Dalal revision operation can be done with the following algorithm:

(a) Compute models $\mathcal{A}$ for the new information

(b) Compute models $\mathcal{K}$ for the old information and their distance with all the elements in $\mathcal{A}$

(c) For each element ω of $\mathcal{A}$, compute its distance to K by keeping among all computed distance only the smallest distance from ω to an element of $\mathcal{K}$

(d) Return the elements of $\mathcal{A}$ with the smallest distance to K

Computing models of a belief base can be done easily using the (slightly modified) tableau procedure.