TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Computer Science Institute of Theoretical Computer Science, Chair of Automata Theory

Description Logics

Exercise Sheet 6

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Summer Semester 2011

Exercise 1

Show that the size $|C|_{\mathcal{T}}$ of a concept C w.r.t. to an acyclic TBox $\mathcal{T}$, as defined in the proof of Lemma 4.13 in the lecture, is well-defined.

Exercise 2

In the proof of Lemma 4.13 it is shown via structural induction that the canonical interpretation $\mathcal{I}_{\mathcal{A}}$ of an open and complete ABox $\mathcal{A}$ is indeed a model of $\mathcal{A}$. Complete the proof by showing $C(x) \in \mathcal{A} \Rightarrow x \in C^{\mathcal{I}_{\mathcal{A}}}$ for the case $C = \neg A$ for some defined concept A.

Exercise 3

Extend the proof of Lemma 4.8 to the lazy expansion rules $\equiv_1$ and $\equiv_2$.

Exercise 4

Use a tableau algorithm to decide, whether the following knowledge base is consistent.

$$\mathcal{T} = \{A \sqcap \forall r.\neg A \sqsubseteq \bot\}$$
$$\mathcal{A} = \{(\forall r.\neg A)(a),\ (\exists r.A)(b),\ r(a,b)\}$$