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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Winter Semester 2012/13

Exercise 20

Consider the tableau algorithm from the lecture and extend it with the following two rules:

- *Condition:* $\mathcal{A}$ contains $(\geq n\ r)(a)$, but $k = |\{b \mid r(a,b) \in \mathcal{A}\}| < n$
  Action: $\mathcal{A}' := \mathcal{A} \cup \{r(a,b_i) \mid k < i \leq n\}$ where b_i are new individual names
- *Condition:* $\mathcal{A}$ contains $(\leq n\ r)(a)$ and $k = |\{b \mid r(a,b) \in \mathcal{A}\}| > n$
  Action: $\mathcal{A}' := \mathcal{A} \cup \{A(b), \neg A(b)\}$ where A is a concept name and b is a new individual name

Is the obtained algorithm sound and complete for $\mathcal{ALCN}$? Explain why.

Exercise 21

Extend the proof of Lemma 4.1 (local correctness) to the $\sqcap$-rule and the $\forall$-rule.

Exercise 22

Prove by induction Lemma 4.5 from the lecture.

Exercise 23

Prove Lemma 4.6 from the lecture.