TECHNISCHE UNIVERSITÄT DRESDEN

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

Description Logics

Exercise Sheet 8

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Exercise 30

Show that the size of $|C|_{\mathcal{T}}$ of a concept C w.r.t. an acyclic TBox $\mathcal{T}$ is well-defined.

Exercise 31

For each of the following languages of binary $\{a, b\}$-trees, define a looping tree automaton that accepts it.

a) The set of all trees that contain a branch (starting at the root) in which all nodes are labelled with a.

b) The set of all trees that do not contain nodes n_0, n_1, n_2 such that

- $n_1 = n_0 i$ for some $i \in \{0, 1\}$,
- $n_2 = n_1 j$ for some $j \in \{0, 1\}$, and
- $T(n_0) = T(n_1) = T(n_2) = a$.

Exercise 32

Show that there is no looping tree automaton on binary $\{a, b\}$-trees that accepts the set of all trees that contain a branch with infinitely many nodes labelled with a.

Exercise 33

Reconsider the claim: for all $D \in S_{C,\mathcal{T}}$, we have $D \in R(u) \implies u \in D^{\mathcal{I}_R}$. Show the claim by induction on the structure of D for the missing cases:

- $D = D_1 \sqcup D_2$ and
- $D = \forall r.E$.