TECHNISCHE UNIVERSITÄT DRESDEN

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

Logic-Based Ontology Engineering

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Exercise Sheet 12 – Depleting Modules

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Exercise 12.1 Consider $\Sigma = \{A, B, C, r\}$ and

$$\begin{aligned}\mathcal{O} = \{ \quad & B \sqsubseteq B \sqcup E, \\ & \exists r.D \sqsubseteq C, \\ & D \sqsubseteq \exists s.F, \\ & \forall r.A \sqsubseteq F \quad \}.\end{aligned}$$

(a) Which of the axioms in $\mathcal{O}$ are $\bot$-Σ-local? Which are $\emptyset$-Σ-local?

(b) Is $\mathcal{O}$ x-Σ-safe (for $x \in \{\bot, \emptyset, \mathsf{m}\}$)?

Exercise 12.2 Given $\Sigma = \{A, B, r\}$, use the locality-based module extraction algorithm to extract a depleting x-Σ-module from the following ontology

$$\begin{aligned}\mathcal{O} = \{ \quad & A \sqsubseteq \exists r.B, \\ & B \sqsubseteq D \sqcap A, \\ & \exists r.C \sqsubseteq A, \\ & \forall r.C \sqsubseteq \forall r.B \quad \}\end{aligned}$$

for the cases

(a) $x = \bot$.

(b) $x = \emptyset$.

Are there smaller x-Σ-modules of $\mathcal{O}$?