Fuzzy Description Logics

Exercise Sheet 7

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Exercise 30

Show that the exhaustive application of the normalization rules NF1-NF5 to a fuzzy $\mathcal{EL}$-TBox terminates in polynomial time and yields a normalized TBox.

Exercise 31

Let $\mathcal{T}$ be a fuzzy $\mathcal{EL}$-TBox and $\mathcal{T}'$ the fuzzy TBox obtained from $\mathcal{T}$ by the rule NF1 or the rule NF2. Prove that for every $A, B \in \mathcal{N}_C \cup \{\top\}$ and every $q \in [0, 1]$ it holds that

$$\langle A \sqsubseteq_{\mathcal{T}} B \geq q \rangle \text{ iff } \langle A \sqsubseteq_{\mathcal{T}'} B \geq q \rangle.$$

Exercise 32

Show that the application of the completion rules R1 and R2 preserves the invariants

- $(B, q) \in S(A)$ implies $\langle A \sqsubseteq_{\mathcal{T}} B, q \rangle$, and
- $(r, q) \in R(A, B)$ implies $\langle A \sqsubseteq_{\mathcal{T}} \exists r.B \geq q \rangle$.