Description Logics

Exercise Sheet 13

Dr. Anni-Yasmin Turhan / Dr. Felix Distel
Summer Semester 2011

Exercise 1

Consider the concrete domain $\mathcal{N}$ defined in Section 7.2 of the lecture. Show that $\mathcal{N}$ is admissible.

Exercise 2

Define a new concept constructor $\forall u_1, \ldots, u_n.P$, where $u_1, \ldots, u_n$ are feature chains and P is an n-ary predicate, and with the following semantics:

$$(\forall u_1, \ldots, u_n.P)^{\mathcal{I}} :=$$
$$\{d \in \Delta^{\mathcal{I}} \mid \forall x_1, \ldots, x_n \in \Delta^{\mathcal{N}} : u_i^{\mathcal{I}}(d) = x_i \text{ for all } i \in \{1, \ldots, n\} \text{ implies } (x_1, \ldots, x_n) \in P^{\mathcal{N}}\}.$$

Prove that the new constructor can be expressed in $\mathcal{ALC}(\mathcal{N})$, i.e., that there is an $\mathcal{ALC}(\mathcal{N})$-concept that is equivalent to $\forall u_1, \ldots, u_n.P$, for all feature chains $u_1, \ldots, u_n$ and all predicates $P \in \Phi^{\mathcal{N}}$.

Exercise 3

Adapt the blackbox pinpointing algorithm for consequences of the form "a is an instance of C", where a is an individual and C a concept description.