

Ontologies

Exercise 1

Create an RDFS ontology (in triple notation) about Persons and Universities. Create at least 3 classes and at least 2 properties; use at least 2 subClassOf statements.

Exercise 2

Assume a DL ontology which includes the following classes: Lecturer, SoundLecturer, Student, SpecialStudent, Course, CSCourse, and the following properties: hasDegree, enrolledIn. Translate the following into DL expressions:

1. students who are enrolled in computer science courses.
2. students who are enrolled only in computer science courses.
3. all students are enrolled in some course.
4. a sound lecturer = a lecturer who has a PhD degree.
5. a student is a special student if he/she is enrolled in less than 2 courses.

Exercise 3

Consider the following small knowledge base (ontology) with the following DL axioms (TBox):

Person	$\subseteq T$
Man	$\subseteq \text{Person}$
Woman	$\equiv \text{Person} \cap \neg \text{Man}$
Parent	$\equiv \text{Person} \cap \exists \text{hasChild}.\text{Person}$
Father	$\equiv \text{Man} \cap \text{Parent}$
Mother	$\equiv \text{Woman} \cap \text{Parent}$
TwoChildFather	$\equiv \text{Father} \cap \geq 2 \text{ hasChild} \cap \leq 2 \text{ hasChild}$
HappyFather	$\equiv \text{Father} \cap \exists \text{hasChild}.\text{Man} \cap \exists \text{hasChild}.\text{Woman}$
TiredParent	$\equiv \text{Parent} \cap \geq 5 \text{ hasChild}$
hasChild	$\subseteq \text{hasDescendant}$
hasDescendant ⁺	$\subseteq \text{hasDescendant}$
hasAncestor	$\subseteq \text{hasDescendant}^-$

and the following extensions (ABox):

ext(T) = {a, b, c, d, e, f, g, h}
ext(Person) = {a, b, d, f, g, h}
ext(Man) = {a, g, h}
ext(Woman) = {b}
ext(hasChild) = {(a,b), (a,h), (b,d), (g,a), (g,f)}

1. Give the extensions of the other classes and properties of the ontology, i.e. complete the following:
ext(Woman) =
ext(Parent) =
ext(Father) =
ext(Mother) =
ext(TwoChildFather) =
ext(HappyFather) =
ext(TiredParent) =
ext(hasDescendant) =
ext(hasAncestor) =
2. is the extension of any of the concepts empty? If so, does this mean that these concepts are unsatisfiable? Explain your answer.
3. Is the extension of HappyFather empty? If not, does this mean that HappyFather is satisfiable w.r.t. the ontology? Explain your answer.
4. Is the extension of TwoChildFather equal to the extension of HappyFather? If so, does this mean that the two concepts are equivalent w.r.t. the ontology? Explain your answer.