

AI 1 2022/23
Assignment11: Knowledge Representation
– Given Jan. 26, Due Feb. 5 –

Problem 11.1 (CompLog Students in ALC) 30 pt

Using ALC, first give a list of suitable primitive concepts and roles and then use them to represent the following:

1. the concept of students that are registered for at least one course
2. the concept of students that are only registered for courses taught by a woman
3. the fact that only students are registered for courses

Give the result of translating the ALC formulas into first-order logic. (Recall that a fact/concept is translated into a first-order formula with 0/1 free variables.)

Problem 11.2 (ALC Semantics) 30 pt

Consider the ALC concepts $\forall R.(C \sqcap D)$ and $(\forall R.C) \sqcap (\forall R.D)$.

1. By applying the semantics of ALC, show that the two are equivalent.
2. Translate both formulas to first-order logic and state which FOL formula we would need to prove (e.g., with the ND calculus) to show that the two are equivalent.

Problem 11.3 (ALC TBox) 40 pt

Consider ALC with the following

- primitive concepts: woman, man
- roles: has_child, has_parent, has_sibling, has_spouse

Give an ALC TBox that defines the concepts person, parent, mother, father, grandmother, aunt, uncle, sister, brother, onlychild, cousin, nephew, niece, fatherinlaw, motherinlaw.