oblig5

Lamo

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1 Model Semantics

1.1 Interpretation

1. **Create an intepretation $\mathcal{I}_1$ such that $\mathcal{I}_1 \models \Gamma_1$.**

   Let b identify the blank node in
   `:JollyJumper :favouriteFood _:b .`

   $\Delta^{\mathcal{I}_1} = \{$ Tweety, JJ, Bruce $\}$
   $Animal^{\mathcal{I}_1} = \Delta^{\mathcal{I}_1}$
   $Food^{\mathcal{I}_1} = \{$ Bruce $\}$
   $Bird^{\mathcal{I}_1} = \{$ Tweety $\}$
   $Penguin^{\mathcal{I}_1} = \{$ Tweety $\}$
   $Fish^{\mathcal{I}_1} = \{$ Bruce $\}$
   $Horse^{\mathcal{I}_1} = \{$ JJ, Bruce $\}$
   $Vegetable^{\mathcal{I}_1} = \emptyset$

   $Tweety^{\mathcal{I}_1} =$ Tweety
   $JollyJumper^{\mathcal{I}_1} =$ JJ
   $Bruce^{\mathcal{I}_1} =$ Bruce

   $eats^{\mathcal{I}_1} = \{$ <Tweety, Bruce>, <JJ, someFood>$\}$
   $likes^{\mathcal{I}_1}$ $\{$ <JJ, Tweety>$\}$
   $hasNickname^{\mathcal{I}_1} = \{$ <JJ, "JJ">, <Bruce, "Alonso">$\}$
   $favoriteFood^{\mathcal{I}_1} = eats^{\mathcal{I}_1}$

   Let
   $\beta(b) =$ someFood

2. **Create an intepretation $\mathcal{I}_2$ such that $\mathcal{I}_2 \not\models \Gamma_1$.**

   $Animal^{\mathcal{I}_2} = \emptyset$

1.2 Entailment

1.2.1 :Tweety is an animal.

1. :Tweety rdf:type :Penguin — P
2. :Penguin rdfs:subClassOf :Bird — P
3. :Tweety rdf:type :Bird — rdfs9, 1, 2
4. :Bird rdfs:subClassOf :Animal — P
5. :Tweety rdf:type :Animal — rdfs9, 3, 4

1.2.2 :Tweety likes :JollyJumper.

1. We use $\mathcal{I}_1$ as the basis for the counter-model.
2. $<$Tweety, JJ$>\notin likes^{\mathcal{I}_1}$

1.2.3 :Food is the range of :favouriteFood.

1. :favoriteFood rdfs:subPropertyOf :eats — P
2. :eats rdfs:range :Food — P
3. Since sub-properties inherent range and :favoriteFood is a sub-property of :eats we know that :favoriteFood inherented rdfs:range :Food.

1.2.4 :Bruce has some favourite food.

1. We use $\mathcal{I}_1$ as the basis for the counter-model.
2. $<$Bruce, ______$>\notin favoriteFood^{\mathcal{I}_1}$

1.2.5 :Bruce is a vegetable.

1. We use $\mathcal{I}_1$ as the basis for the counter-model.
2. $Vegetable^{\mathcal{I}_1}$ is empty

1.2.6 :Bruce is a horse

1. :hasNickname rdfs:domain :Horse — P
2. :Bruce :hasNickname "Alonso" — P
3. :Bruce rdf:type :Horse — rdfs2 1, 2

1.2.7 :Bruce is a fish.

1. :Bruce rdf:type :Fish — P

2 Semantic web and reasoning

1. "Closed world assumption" is that the default property if absent is false. Where as "open world assumption" it is not known that the property is true. The semantic web uses "open world assumption". Since the web is incomplete it's safer to assume something is unknown if information is missing.

2. "Unique name assumption" states that every entity can only have one reference. "Non-unique name assumption" is simply that the same entity can have multiple references. The semantic web uses the non-unique assumption. It's impossible to coordinate every person to use the same namespace when referring to a specific entity, and there is no central authority who delegate URI references.

3.

4. RDFS entailment is sound. That means that when the arguments are valid the conclusion is also valid. If the proposition is correct that implies the entailment is also correct.

5. RDFS entailment rules are not complete. That means there are valid conclusions that are impossible to logically deduce. We can see an example of this in this assignment 1.2.3 **:Food is the range of :favouriteFood.**. It's impossible to deduce the statement even though it's intuitive.

   I'm really bad at expressing logic in a formal manner, but **4** and **5** deserve a proper definition. And rather than half-heartedly paraphrasing the text box definition I'll leave a quote here.

   From FSWT page 91

   > A deduction calculus is sound with respect to a given semantics if every proposition set P' that can be derived from a set of propositions P by means of the deduction rules is a semantic consequence; formally $P \vdash P'$ implies $P \models P'$. On the other hand, a deduction calculus is called complete if every proposition set P' that is semantically entailed by a proposition set P can also be deduced by means of the provided deduction rules, i.e. if $P \models P'$ implies $P \vdash P'$.