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Semantic Web Technologies

Exercise 8: OWL 2

8.1. Building OWL Ontologies

You have already worked with the Linked Open Numbers dataset in a previous exercise, when you asked SPARQL queries against that dataset. Now, you can try to refine the ontology by adding new classes.

In the ontology, the class Number is given with individual instances, their sucessors and predecessors, as well as the prime factors of those instances.

Define the following classes:

1. EvenNumber, containing all even numbers
2. OddNumber, containing all odd numbers
3. PrimeNumber, containing all prime numbers

Can you also define a class containing all non-prime numbers?

For the advanced:

4. Find an efficient(!) way to define that all the numbers in the dataset are pairwise different from each other. Hint: this is possible with less than a dozen OWL axioms.

8.2. Tableau Reasoning

You are given the following ontology:

```
:Baby rdfs:subClassOf :Human .
:Adult rdfs:subClassOf :Human .
:Andy a :Baby .
:Andy a :Adult .
```

Show that the tableau algorithm cannot produce a contradiction from this.

Now, add the following axiom:

```
:Baby owl:disjointWith :Adult .
```

Show that the tableau algorithm is now capable of finding a contradiction.

8.3. Zebra Puzzle / Einstein's Puzzle (2)

Note: this looks similar to the logic puzzle in the previous exercise sheet, but it is subtly different. However, you can reuse and extend the solution of that last exercise for solving this one.

There are three houses, a pink, a yellow, and a blue house. They stand next to each other and are enumerated from one to three. A person lives in each of the houses. Each of the persons has a different hobby (i.e., rugby, lacrosse, or tennis), and a different favorite meal (eggs, waffles, or ice cream).

You are furthermore given the following facts:

- The person who likes ice cream lives in the pink house.
- The tennis player lives left from the lacrosse player.
- The person in house no. 3 does not play lacrosse.
- The person who plays tennis lives in the yellow house.
- The blue house stands on the right of the yellow house.
- The lacrosse player lives directly next to the person who likes eggs.