M164 CS2 Knowledge Technologies
Fall 2024-2025
Homework III
Out: January 6, 2025
Due: February 10, 2025 at 23:59
Total marks: 40%

Exercise 3 (Pokémon Ontology)

For this exercise you will design an ontology to model the Pokémon world data available at the Pokémon Database (https://pokemondb.net/). You will need to model information about Pokémons from Generation 1, then populate the ontology to form a small Knowledge Graph and finally pose some queries over the data.

First become familiar with the domain, by visiting the following pages:

- Basic information for each Pokémon (e.g., Bulbasaur): https://pokemondb.net/pokedex/bulbasaur
- Pokémon moves: https://pokemondb.net/move/generation/1
- Pokémon items: https://pokemondb.net/item/all
- Pokémon location guide: https://pokemondb.net/location
- Pokémon evolution guide: https://pokemondb.net/evolution

Based on the above information you will design an ontology in Protégé to model information regarding Pokémons from Generation 1 with their evolutions, moves and items, along with the locations they can be found and caught. More specifically for each Pokémon you will model their name, Pokédex data (exclude Local Numbers), training and breeding information, base stats (exclude min, max), evolutions, moves and locations. Furthermore you will need to model items and locations based on the information found in the respective links above. The ontology must capture the domain using appropriate classes and properties and will be formulated in OWL.

Then you will need to import the following individuals in the ontology (for Pokémon moves import only five along with Body Press if available) :

- https://pokemondb.net/pokedex/blastoise
- https://pokemondb.net/pokedex/snorlax
- https://pokemondb.net/pokedex/alakazam
- https://pokemondb.net/pokedex/gastly
- https://pokemondb.net/pokedex/gengar
- https://pokemondb.net/pokedex/chansey
- https://pokemondb.net/pokedex/eevee
- https://pokemondb.net/pokedex/mew
- https://pokemondb.net/move/body-press (only move data and effects)
- https://pokemondb.net/item/tr99
- https://pokemondb.net/location/kanto-pokemon-tower (Generation 1 - 7F)

Now formulate the following SPARQL queries in the SPARQL query Tab of Protégé:

1. Find all Pokémons in our knowledge graph and show their name, HP and type. List the results in alphabetical order.
2. Find the Pokémon with the highest body weight?
3. Which Pokémon has the most evolutions?
4. Are there any Pokémons with no evolutions?
5. Where can we find Gastly and what type does its evolution have?
6. Find the average Attack value of all Psychic Pokémons in our knowledge graph?
7. What is the name and type of Pokémons that can learn the move Body Press and what item is needed to learn it?
8. What is the most powerful move and which Pokémon(s) have it?
9. Which type of Pokémon has the most Defense?
10. Is there any type of Pokémon with an average speed greater than 100?

Finally formulate the following DL queries in the DL query Tab of Protégé:

1. Define the class of Pokémons that have at least 2 types.
2. Define the class of Pokémons we catch only in the location Kanto-Pokémon Tower?
3. Define the class of Pokémons that can fly (Flying type) only when they evolve.
4. Define the class of Pokémons that either have the abilities Storm Drain and Lightning Rod, or not the ability Water Absorb.

Deliverables

For this homework, you will submit through e-class a zip file with the following:

- A pdf report (the first page should include your name and ID) with any comments and thoughts on how you decided to model the data and design the ontology. You will also add the SPARQL and DL queries with some documentation/remarks if needed.
- The OWL ontology as a file (.owl).
- A text file with the SPARQL and DL queries.