Documentation

Introduction

In this assignment, an interactive command-line application has been created. Through this application, the user has the ability and the opportunity to access and modify a knowledge graph and even run specific SPARQL queries. A menu is presented to the user and then in turn is able to choose basic operations, for instance load an ontology, do specific ontology operations, add a class or a property to the ontology, and execute SPARQL queries. Finally, for the assignment 3, similar to assignment 2, the ontology film was used regarding the interactive operations that the user is willing to do.

Additional Information

The command-line application was built using the programming language Python (3.11). Furthermore, no additional libraries or a UI (web/native/mobile app) on top of the command line application was used during the creation of it, for instance *Click* for Python. The two most important libraries that were used are the RDFLib plus the OWLRL reasoner engine, as proposed from the assignment description.

Regarding the Python file, the menu, all the operations and the SPARQL queries are included in the file **kg_app.py**. A function for each operation has been created and the SPARQL queries are included in the source code as a global list. Thus, no further files or python scripts was used. All the implemented features are located in the source code, i.e., the **kg_app.py**.

Execution

Before the explanation of how each feature is executed, it is worth mentioning that the URI of the film ontology (*http://semantics.id/ns/example/film/ontology.ttl#*) was used as a global variable in the source code, similar to the queries that mentioned above, in order to use the URI easily in the ontology operations. Also, all the operations, except the loading of the ontology, can only be executed if an existing ontology has been loaded. Otherwise, an error message is appeared to the user. Finally, for the operations LoadOntology, ActivateReasoner and ExportGraph different ontologies can be used other than the film ontology. However, regarding the ontology and basic queries operations, the film ontology must be used.

Starting Menu

First thing that appears the moment the user run the executable file, is the main menu. The menu informs the user for all the potential operations. The user is able to choose between 1 to 9 for the knowledge graph operations and 10 in case that decides to exit. If a number higher than 10 is given as input, an error message is appeared and the main menu is presented again in order to give the user an additional attempt to choose the correct operation. At the end of each operation, the main menu is presented again to the user giving him the chance to execute an additional operation.

Exit

The user is able to exit from the application by choosing the option 10 from the main menu.

Basic Operations

Load Ontology

Regarding the loading of the ontology, first the user chooses the operation 1 from the main menu and then has two choices, either to write the URI of the ontology or to give as input the ontology file with the destination where the file belongs to, for example C:/Users/Username/Desktop/film.ttl in case the file is located to the Desktop.

Activate Reasoner

In order the reasoner to be activated, the user should choose the operation 2 from the main menu. Then, the user should choose the option 1 for the RDFS Reasoner or the option 2 for the OWL2-RL + RDFS Reasoner. It is worth mentioning that after the user activates the reasoner, there is no option to deactivate it. Thus, the user must load again the ontology by choosing the option 1 from the main menu.

Export Graph

The third operation is the graph exportation. This is the third option of the main menu. By selecting the specific option, all the different format are presented to the user. Consequently, the user should choose the format and also the location where he wants to export the file.

(*One thing that was observed when first the reasoner is activating and then the graph is exported is that the exported file cannot be opened using the Protégé program from the assignment 1. Thus, it is recommended to export the graph without the reasoner activation. However, with the reasoner being activated, the exportation of the graph can normally be done.*)

Ontology Operations

As mentioned above, for the ontology operations, it is assumed that the film ontology is used from the user. In addition, all the ontology operations can be executed with the reasoner being on or off.

Add Class

From the main menu, the user chooses the option 4. After that, the class name must be given in order the class to be created.

Add Property

From the main menu, the user chooses the option 5. After that, the property name must be given in order the property to be created. Furthermore, the user should include the name of the domain and the range of the property.

Add Instance

From the main menu, the user chooses the option 6. After that, the instance and the class name, where the instance should belong to, must be given.

SPARQL Queries Operations

As mentioned above, for the ontology operations, it is assumed that the film ontology is used from the user. In addition, all the queries' operations can be executed with the reasoner being on or off.

Show Queries

From the main menu, the user chooses the option 7. By choosing the specific option, the user is able to see a list of all the queries that have been developed in the assignment 2.

Execute Select Query

From the main menu, the user chooses the option 8. By choosing the specific option, the user is able to choose 1 of the available select queries that have been presented in the Show Queries operation. Then, the results of the selected query are presented to the user.

Execute Construct Query

From the main menu, the user chooses the option 9. By choosing the specific option, the user is able to choose 1 of the available construct queries that have been presented in the Show Queries operation. Then, the results of the constructed query are presented to the user. Afterwards, the results from the construct query are saved and exported as turtle file in the location chosen by the user.