Semantic Web

Assignment 2

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Some of the tasks may require you to do additional research extending the lecture. Please keep the citation rules in mind.

For all the assignment questions that require you to write a code, make sure to include the code in the answer sheet, along with a separate python file. Where screen shots are required, please add them in the answers directly and not as separate files.

Team Name: XXXX
Team Members: XXXX

1 Modelling T-Box and A-Box

Assume there is an ALC knowledge base with the following reasoning:

Peter is a human;

Mary is Peter's niece;

Adam is Peter's nephew;

Mary is Bob's grandchild;

Stephen and Mary are twins

a) Define a signature

$$S = (N_C, N_R, N_O)$$

Include the corresponding concepts, relations and objects. You may use your own reasoning and implicit knowledge of humans, their gender (i. e. female or male), family relationships etc.

b) Using the sets

$$S = (N_C, N_R,)$$

you defined on the previous step, and only those, define a T-Box in ALC for the given scenario. Your specification must contemplate all information provided above.

c) Using

$$S = (N_C, N_R, N_O)$$

define an A-Box in ALC to the given scenario.

2 Interpretation

Consider the following list of statements:

1. A Person can be either a Student, a Teacher or a Parent.

2. The concepts Student, Teacher and Parent are mutually exclusive.

3. Some Students only *take* Seminars.

4. There are Parents who *manage* a Company that *employs* at least one Student.

5. There are Students that only *have parents* that *manage* or *work* for a Company that *employs* at least one Student.

6.Parents cannot *teach* Courses.

7.Only Students can *take* Courses.

a) Formalize each of the statements in ALC. Give your answer in a form of a list, where the n-th element of your list corresponds to the formalisation of the n-th statement of the list above.

b) Define a model for the T-Box you defined in the previous step. Your interpretation must have at least one instance for each concept, and each relation must have at least one pair.

Important Notes

Submission

- Solutions have to be submitted to the OLAT repository Submission in the respected folder.
- The name of the group and the names of all participating students with matriculation numbers must be listed on each submission.
- Solution format: all solutions as *one* PDF document. Programming code has to be submitted as Python code to the OLAT repository. Upload *all* `.py` files of your program! Use `UTF-8` as the file encoding. *Other encodings will not be taken into account!*
- Check that your code compiles without errors.
- Make sure your code is formatted to be easy to read.
  - Make sure you code has consistent indentation.
  - Make sure you comment and document your code adequately in English.
  - Choose consistent and intuitive names for your identifiers.
- Do *not* use any accents, spaces or special characters in your filenames.

Acknowledgment

This pdfLaTeX template was adapted by Jun Sun and Iryna Dubrovska based on the LuaLaTeX version by Lukas Schmelzeisen.

LaTeX

Use `pdflatex assignment_X.tex` to build your PDF.