CS6852: Theory and Applications of Ontologies :: 2024

Assignment Descriptions

IMPORTANT NOTE: No submitted material can be taken from any internet or other sources. Also, materials submitted for this course can not be used for any other courses and/or academic credit. It is understood that by submitting your work reports, you agree that you are liable for penalties/disciplinary actions for violating these undertakings.

Please read the entire set of assignment descriptions before you choose your domain and plan out your work. Each group would be assigned to a Teaching Assistant (TA) of the course and you can consult him/her for any clarifications.

Assignment 1: Ontology Design

Group task:

Each team is required to pick a domain of their choice and create an ontology or a semantic model of the domain. They need to develop a semantic model using description logic SROIQ.

Submission guidelines:You are required to submit a pdf document containing
1) A plain text description of the domain of interest and a list of concrete pieces of knowledge you would like to capture in the domain. 2) the DL ontology (TBox) and 3) a write-up about the design choices made and the details of the design - the explanations for classes, properties, DL axioms, motivating situations/examples - of terms in the ontology. Please keep the overall goal of the full set of assignments in mind while designing the ontology. You can plan to have members of the primitive symbols (concepts and relationships) available/ extractable from XML data you would generate later in Assignment 2.

Deadline: Sept 7th 2024, 11:55 PM

Assignment 2: XML Data Design

Group task:

Consider the same domain from Assignment 1 and each team is required to create an XML DTD that can be used to structure data in the domain. Also, populate with data on an appropriate platform. Write a brief description about the design of the DTD.

Individual Task: Each student is required to run an interesting set of XPATH and XQuery queries on the data and submit the results along with the plain English description of the queries. Any tools that support these languages can be used for this purpose.

Submission guidelines: You are required to submit the DTD file with description and XML data, your queries and the results obtained.

Deadline: Sept 25th, 2024, 11:55 PM

Assignment 3: Ontology Development

Group task:

Each team is required to produce an OWL Ontology using Protege ontology editor for the semantic model designed in Assignment 1. The developed ontology needs to be checked for consistency before submission.

Submission guidelines: You are required to submit the OWL file (check consistency before submission) and a “report” pdf file to communicate any comments regarding the OWL file. If some modifications/additions to the semantic model are made (wrt Assignment1 submission), it should be documented in the “report” pdf file, with appropriate reasons for modifications.

Deadline: October 20th, 2024 11:55 PM

Assignment 4: Inference using OWL

Individual task:

Each student is required to develop a program that extracts XML data and combines it with the ontology. That is, take appropriate portions of the XML data created in Assignment 2 and convert them to RDF triples. The triples should be consistent with the OWL ontology of Assignment-3. You should check for consistency using an OWL reasoner. You should infer additional triples by running the reasoner on the ontology and the triples extracted from the XML data store. Display both the extracted and inferred triples as the final result of the program.

APIs: You can use OWLAPI in Java/ OWLReady in Python.
A nice tutorial on OWLAPI can be accessed from
http://rad.ihu.edu.gr/fileadmin/labsfiles/knowledge_management/TUTORIALS/OWL-API.pdf.
If you want to use any other language, make sure that it supports all the required components and APIs like OWL reasoners and XPath / XQuery engines.

Submission guidelines: A compressed folder containing the mapping program, XML file, RDF triples, ontology and any other files needed to run the program. An additional readme file containing the instructions on how to run the program.

Deadline: November 8th, 2024, 11:55 PM