

Ontology of studies at universities or Developing ontologies with legal documents as primary knowledge sources

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Abstract

Domains that could be especially interesting and challenging for ontology development are certainly those described by laws and formal documents. Namely, a term "loophole in the law" is well known. Examples of such a domain are also studies at Croatian universities, as well as ontology of one part of Croatian Family Legislation Act that covers motherhood and parenthood terms.

Studies at universities example

The Bologna process and new higher education legislation in Croatia have made the domain of studies at universities an interesting subject for domain ontology development at the country level. The ontology was developed in several steps. As, first, a domain model was created using TBox of simple description logic language *ALC*, according to which hierarchy was created in Protégé-OWL and classification was made using Racer tool (<http://www.racer-systems.com>, Copyright (C) 2004, 2005 by Racer Systems GmbH & Co. KG). Model development in such a way automatically opens possibility for developing OWL ontology later.

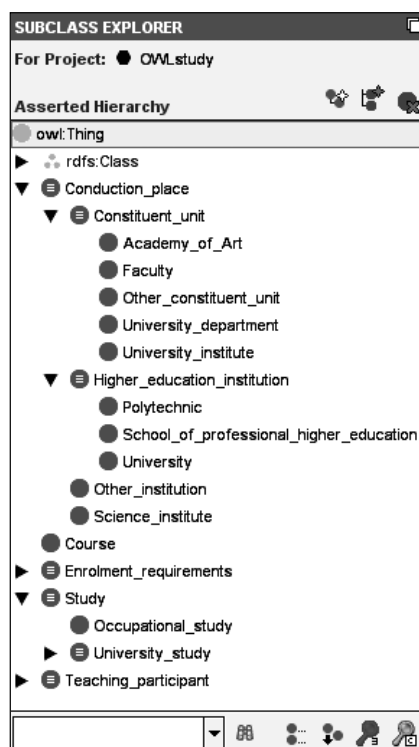
Although ontologies mostly shift from Protégé-Frames to Protégé-OWL, in this case it was done vice versa. Since the primary goal was to see how well the domain can be described using first order logic, the ontology was finally developed in Protégé-Frames according to a Protégé-OWL domain model, from which an initial ontology hierarchy was created. All attributes and their restrictions were entered into Protégé-Frames. All concept constraints that couldn't have been expressed with attribute restrictions were implemented with Protégé Axiom Language.

Ontology was evaluated through verification and validation process. For ontology verification two methods were used: Taxonomy evaluation (A. Gómez-Pérez) and OntoClean method (N. Guarino and C. Welty). For validation purposes application ontology for a concrete faculty was created, with the help and evaluation of a domain expert. Also, evaluation of ontology content was made (A. Gómez-Pérez). The evaluation showed that development of a formal ontology of studies at Croatian universities discovered inconsistencies and understatement of existing domain vocabulary and rule system. A completeness of ontology, as a general ontology problem, was present in this domain even more regarding primary knowledge sources, but was lesser in a concrete faculty example, where information available was more detailed.

Similar example

The authors had prior experience in dealing with legal documents as primary knowledge sources when developing ontology of one part of Croatian Family Legislation Act that concentrates on terms motherhood and fatherhood. It was ontology developed for easier understanding of the Family Legislation Act by the very same people influenced by it. Still, the place of practical usage of this ontology is the court and the knowledge source itself has

several loopholes. In communication with a domain expert (judge of the Family Court in Varaždin County Court) it was found out that those loopholes are very rarely part of some court case and they are left for judges to resolve them according to specific case and their experience.



Part of studies at universities domain hierarchy

Conclusion

In the studies at universities example even a detailed model development in description logic and its classification, as well as other evaluation methods used, couldn't negate the influence of too general domain description (in higher-level legal documents) to domain ontology completeness. On the other side, concrete application ontology for a single faculty showed that more detailed information in lower-level legal documents with usage of an expert can minimize this effect. Also, in the second example it was stated clearly by the expert that existing loopholes are interpreted individually and depend on judges. Therefore it can be concluded that the usage of a more lower-level legal documents, such as rulebooks, and a help of a domain experts is important when dealing with the completeness problem in ontologies with legal documents as primary knowledge sources.

Keywords: study at university, ontology knowledge source, legal knowledge source, ontology development, ontology evaluation

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