Visualizing Ontologies – A Literature Survey

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Introduction: Information, as a representation of the "real world", is required to faithfully demonstrate the relevant aspects of the application domain. To describe the structure of a domain, various fields have employed ontological representations. Visualization of the said ontologies can improve tasks such as understanding of implicit knowledge as well as information alignment.

Goals and Objectives: (1) Survey the existing literature focusing on visualization of domain ontologies. (2) Synthesize the data from empirical experiments evaluating different ontological visualizations (i.e. meta-analysis).

Background: Ontology is a "branch of philosophy [that] deals with the order and structure of reality in the broadest sense possible" (Angeles 1981). Practitioners as well as researchers in information sciences have used ontologies to describe the order and structure of application domains (Wand and Weber 1989, Bodart et al. 2001, Shanks et al. 2008, Recker et al. 2011). Domain ontology is defined as a set of concepts, the relationship between concepts, what can happen, and what can exist - the axioms (Wand and Weber 2002).

Diverse fields such as biomedical informatics, systems engineering, and semantic web[1] have developed ontologies to represent the semantic meta-data within their fields. One of the largest ontologies available is the ontology of the DBpedia project, which is a manually created cross-domain ontology with over 4.2 million resources (things) in the ontology[2].

Visualizations of ontologies have been proposed in prior research (Mutton and Golbeck 2003, Lanzenberger et al. 2010, Bera et al. 2011). Visualization in general is created to augment human capabilities in performing a task (Munzner 2014). Some of the tasks that can benefit from visualizing ontologies could be implicit knowledge

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[1] http://protegewiki.stanford.edu/wiki/Protege_Ontology_Library Accessed on 27/10/2014

[2] http://wiki.dbpedia.org/Ontology2014?v=l4h Accessed on 27/10/2014

identification in a domain (Bera et al. 2011), integration of data sources (Parsons and Wand 2003), and understanding a domain in general.

Proposed Plan: I plan to conduct this study in two phases. For the first phase – to be completed by November 14th – I will gather the relevant methodology papers that tried to visualize ontologies. The second phase will involve performing the review of the papers found in the first phase. In my initial search, I found some papers that had done an empirical study comparing different visualization methods that could be used to represent ontologies (e.g. Plaisant et al. 2002). A statistical synthesis (i.e. meta-analysis) of the empirical work would be an analytical reflection upon the findings of the past researchers, and broadens the base of their studies (Borenstein et al. 2011). The second phase will be completed by December 10th.

Personal Background: I started my doctoral studies at the Management Information Systems division of the Sauder School of Business, UBC in January 2013, under the supervision of Professor Yair Wand - who has published high impact research in areas of information modelling and classification principles. I also conducted my MSc research under Prof. Wand's supervision. My area of research is on ontological and cognitive principles in information systems modelling. So far, we have produced two papers (one of which was a meta-analysis on similar papers related to my thesis).

The proposed project for this course provides high synergy and complementarity value with my existing research. The distinction is that my work is mostly related to modelling domains and compliance with ontologies of real world, while the proposed survey focuses on visualization of domain ontologies.

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