

On Using a Graphical Notation in Ontology Engineering

Abstract

The enormous need for well engineered ontologies is growing rapidly, as the need for ontologies is increasing in many application areas such as data integration, the semantic web, knowledge engineering, enhanced information retrieval, etc. Due to the central role ontologies are playing, the World Wide Web Consortium (W3C) developed the Web Ontology Language (OWL) as a language to author ontologies. However, OWL, like many other similar ontology languages, does not provide a practical and methodological means for ontology engineering. In addition, one is required to understand the logical foundation underpinning OWL, which is very difficult for domain experts. For an ontology language to be easily understood by domain experts it must be close to the natural language they speak and the 'logic' they use. Also, it should have a graphical notation to enable simple and conceptual modeling. The expressive, methodological, and graphical capabilities of Object-Role Modeling (ORM) make it a good candidate for use in ontology engineering. The modeling approach (ORM) selected here is one of the richest graphical modeling approaches and the knowledge and practice of it is easy to be acquired at a short period of time. The second version of OWL (OWL 2) is a recommended web ontology language from W3C which contains the majority of the constructs to be used for building any needed ontology. Many reasoners such as RacerPro 2.0, Pellet, Hermit, Fact++ and others support reasoning ontologies represented in OWL 2 which is created using the description logic SROIQ (characterized by expressivity and decidability). In this research, we (i) map the most commonly used ORM constructs to OWL 2 using SROIQ Description Logic and, on the other hand, we (ii) extend the ORM notation to cover all OWL 2 constructs not currently covered by ORM. By doing so, we combine the strengths of both ORM and the W3C-recommended Web Ontology Language (OWL). This creates a framework that allows one to engineer OWL ontologies graphically using ORM.