Lightweight Rule Extended Ontology Languages

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1 Research Problem

The combination of ontologies and rules is considered to be an important step forward for the Semantic Web. The OWL Web Ontology Language is the current W3C recommendation for representing ontologies on the Semantic Web. However, many applications require expressivity beyond that which OWL provides, e.g., to express constraints or to reason about closed-world knowledge. Logic programming rules can provide such expressivity and consequently, their combination with OWL DL is an active research area. Furthermore, the World Wide Web Consortium (W3C) have set up a Rule Interchange Format (RIF) Working Group to standardise the exchange of rules on the Web.

Combining OWL DL with rules is not a straight-forward task. Simply extending OWL DL with arbitrary rules leads to undecidability of certain core reasoning tasks. Additionally, efficiency and scalability are crucial for practical use of rule extended ontology languages in real world, large scale applications. Unfortunately, the reasoning tasks of OWL DL alone have a high complexity, resulting in intractability and are therefore often not are scalable enough for practical applications.

For OWL DL, there are generally two approaches to achieve scalable reasoning. The first, is to use a lightweight ontology language (such as DL-Lite [2], EL++ [1] or DLP [4]) that is tractable for the desired reasoning tasks. The second, is to use approximation methods [6, 13] to reduce reasoning tasks over the OWL DL ontology to that of a lightweight ontology language.

In this paper we outline our approach provide an expressive rule extended ontology language to users, while still allowing scalable and efficient reasoning.

The remainder of this paper is organised as follows. Section 2 gives details on the related work, Section 3 outlines our approach, Section 4 presents the methodology will be used and finally we conclude in Section 5.

2 Related Work

Currently, there is a wide range of proposed approaches for extending OWL DL with rules. However, as identified in [3], the availability scalable and efficient implementations is still of concern. In this section, we outline a number of these approaches, beginning with scalable approaches for reasoning in OWL DL.