Abstract

This thesis focuses on the problem of dealing with Semantic Web data in a new way. In particular, it is taken in consideration the opportunity of exploiting the Answer Set Programming (ASP) methodology to meet many of the requirements the community is still investigating on. Besides suggesting a possible way of solving known issues, we also provide higher capabilities to the overall picture of the Semantic Web. The goal of this thesis is tackled from a twofold perspective: on the one hand, we consider the practical feasibility of adopting ASP technologies for actual Semantic Web applications. In particular, we look at ASP as an appropriate technology for building the necessary infrastructure for managing, storing, querying and reasoning over Semantic Web data, with a special focus on RDF information sources. We will present a prototype triplestore system capable of persistently storing, querying and inferencing (with parametric inference semantics) over RDF datasets.

On the other hand, we formally show how ASP can deal with some open knowledge representation issues: in this respect we will illustrate the feasibility of ASP as a modeling language for representing and integrating knowledge sources, and define their semantics. We will show how ASP languages can be used to faithfully model and integrate knowledge expressed in RDFS and beyond, taking in consideration a formalization and implementation of Frame Logic in a novel answer set semantics scenario.

We expect to provide relevant answers to the research community concerning the definition of new reasoning and query answering techniques (based on expressive query and rules languages), and the investigation of the interplay between ontology and rules languages.