

The Live OWL Documentation Environment: A Tool for the Automatic Generation of Ontology Documentation

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Abstract. In this paper we introduce *LODE*, the *Live OWL Documentation Environment*, an online service that automatically generates a human-readable description of any OWL ontology (or, more generally, an RDF vocabulary), taking into account both ontological axioms and annotations, and ordering these with the appearance and functionality of a W3C Recommendations document. This documentation is presented to the user as an HTML page with embedded links for ease of browsing and navigation. We have tested LODE's completeness and usability by recording the success of test users in completing tasks of ontology comprehension, and here present the results of that study.

Keywords: LODE, OWL ontologies, Web tools, ontology documentation, user testing.

1 Introduction

Any strategy that guarantees the broad adoption of Semantic Web technologies must address the need for improved human interaction with semantic models and data. While research has been undertaken on models, theoretical approaches and the development of tools to infer new information from data and ontologies, the Semantic Web will never be really integrated with the everyday Web until semantic information is easily accessible to ordinary users through Web browsers, not limited to Semantic Web practitioners employing specialist tools. This point is even more crucial for Semantic Publishing, since its end-users are by definition publishers, researchers, librarians and general readers, rather than experts in semantic technologies. Thus the Semantic Web / Semantic Publishing communities need to develop user-friendly Web interfaces that mediate between semantic models and end-users.

Of course, work has already been done in this direction. For instance, ontology development editors have been created (e.g. Protégé¹ [12] and the NeOn Toolkit [19]), Web search engines to look for semantic resources launched (e.g.

¹ Protégé: <http://protege.stanford.edu>

Sindice² [15] and Watson³ [5]), and semantic desktop applications released (e.g. SemNotes⁴ [7]). However, what is still missing, and what the Semantic Publishing community urgently needs, are tools that assist people who are not expert in semantic technologies in dealing with and publishing semantic data, and in particular in understanding the ontologies that make this possible.

Human interactions with ontologies usually involves the following steps:

1. Once ontologies suitable for the particular domain of interest have been identified, people need to *understand* these models with the minimum amount of effort.
2. Then, if the existing vocabularies/ontologies are not able to fully describe the domain in consideration, people *develop* new models. The development process requires interaction with domain experts and end-users in order to produce a model that address the domain under consideration as fully as possible.
3. Finally, people have to *add* data according to the adopted or developed models and to *modify* those data in the future.

Each of these four operations – understanding, developing, adding and modifying – need to be supported by appropriate interfaces that simplify the work of people who may not be expert in ontology-related formalisms and Semantic Web technologies. In this paper, our focus is on the first point of the above list: *ontology understanding*.

Usually, the first activity performed when someone wants to understand the extent of a particular ontology is to consult its human-readable documentation. A large number of ontologies, especially those used in the Linked Data world, have good comprehensive Web pages describing their theoretical backgrounds and the features of their developed entities. However, problems arise when we look at under-developed models, since natural language documentation is usually only published once an ontology has become stable. This approach is justifiable: writing proper documentation costs effort, and re-writing it every time the developing ontology is modified is not practical.

Thus, the only previous way of getting a sense of existing ontologies was to open them in an ontology editor so as to explore their logical axioms. This approach presents practical and cognitive barriers to a person approaching the ontology world for the very first time. First, (s)he has to download and install an ontology editor. Second, (s)he must learn to use the editor, which typically will have a complex and non-intuitive user interface, presenting the user with novel technical terms such as 'axiom' and 'refactor', or common English words used in novel ways, e.g. 'individual' or 'functional'. Then and only then (s)he can try to get a sense of structure of the ontology itself. Obviously these processes are challenging and time-consuming, presenting a barrier that is too great for the majority of non-specialists.

² Sindice: <http://sindice.com>

³ Watson: <http://watson.kmi.open.ac.uk>

⁴ SemNotes: <http://smile.deri.ie/projects/semn>