A Framework for Ontology-based Authoring Environments

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Abstract

This poster presents the goals and methodologies of an ongoing PhD research* whose objective is to design a framework for authoring environments that use ontologies to access and represent knowledge in the Semantic Web at the moment authors produce documents. We wish to contribute in the identification and description of a new semantic web authoring workflow, the evaluation of ontology-based authoring systems as well as in providing guidelines for the development of new ones.

Keywords: ontology, semantic annotation, authoring environment, semantic web, evaluation criteria, system requirements.

1. Introduction

Tim Berners-Lee Semantic Web is a promising e-universe where knowledge will be created and connected in a revolutionary semantic way, confirming the visions of Vannevar Bush, Douglas Englebart and Ted Nelson. This will change completely the way documents are being produced and disclosed on the Web, with the rise of ontology technologies that allow annotation, representation, navigation and visualization of semantic information, to name just a few.

The potential of using ontologies to enhance knowledge access and representation at authoring time is an issue under investigation and is now being reflected in the development of what we call ontology-based authoring environments.

Ontology-based authoring tools are writing and editing environments that interactively supports the user to perform some additional tasks that enhances knowledge access, use and representation during authoring time by: semantically annotating a document, creating metadata, linking terms in the document to external ontologies, linking similar documents to each other, turning citations into labeled links, making explicit the rhetorical structure of the document, and directly linking a paper to comments made by reviewers.

To attain these purposes, some research groups are developing ontology-based authoring tools that explore this new scenario and offer a range of possibilities of writing, considering that authors are becoming more responsible for representing their own documents.

However, it is not clear yet what requirements should be fulfilled by these tools in order to be processed by and explore the potentials of the Semantic Web. Yet, they should provide production environments that generate documents according to W3C recommended information representations. Furthermore, there is a lack on evaluation criteria of authoring tools considering the many capabilities that they can provide to content authors.

2. Research Goals

In order to tackle these issues, this research has the following main goals:

i) define ***evaluation criteria*** for ontology-based authoring tools for the Semantic Web;
ii) make a ***requirement analysis*** of some existing tools and evaluate them based on the resulting criteria;
iii) identify and draw the new semantic web ***authoring workflow***;
iv) provide a general framework for ontology-based authoring environments in the shape of an ***architecture and guidelines*** for developers of such tools.

3. Methodology

We are now developing a specific methodology to evaluate ontology-based authoring systems. Due to the lack of this kind of methodology, we will study and adapt existing criteria that have been applied to the evaluation of similar ontology-based initiatives. By merging these methodologies with theories and referred literature, and selecting the necessary aspects to the new authoring possibilities, we intend to cover the necessary aspects that should be observed in these environments.

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Selected Tools - we are searching ontology-based authoring environments for authors of the semantic web, that perform at least the following tasks: authoring, annotating and hyperlinking. So far we have selected the following authoring tools: S-Cream Ont-o-Mat [1], WiCKEd [2] Trellis [3], Claimaker [4] and Semantic Word [5].

Criteria - define a set of criteria with which to test and evaluate the ontology-based authoring tools. Due to the lack of an existing approach, we intend to create a specific evaluation criteria, based on existing ones in related areas, based on the state of the art as well as the W3C recommendations [6-14].

Observed Aspects - we intend to identify and score in these tools some elements such as: requirements, features and components (annotation, metadata generation, semantic browsing, ontology editing and visualization, etc.) the amount of knowledge users have to acquire in order to use the tools (easy to use), accessibility aspects, consistency, referencing, maintenance, efficiency, etc.

Workflow Identification and Design - we wish to identify and describe the new workflow of authoring in the semantic web, i.e. the way documents are now being produced with the help of these technologies. As part of the evaluation, we will identify which available systems fulfill each step of this workflow.

User Evaluation - some of the tools will be tested by a population of 50-60 master students in the laboratories of the Department of Computer Science of Vrije Universiteit Amsterdam, where the criteria aspects will be observed and pointed out.

4. Partial Results

In a preliminary study [15] we analyzed some ontology-based tools in search for requirements and capabilities of knowledge representation that could be adopted by authoring environments. The tools selected performed tasks such as semantic annotation and browsing, document review and argumentation and information extraction. It revealed a set of general requirements that can be taken into account in the design of new authoring environments for the semantic web. It was clear that none of the tools analysed could deliver the solution as a whole. In this paper we concluded that many knowledge technologies have been developed and show that, if integrated, they might be a great asset to knowledge authoring and representation on the Semantic Web.

The former study was focused on tools that used ontologies for diverse knowledge representation goals, but in this present research we have narrowed the scope and will focus only on tools that provide ontology-based authoring solutions.

We believe that the added value of this research is to contribute to the quality and enhancement of knowledge representation in the Semantic Web, so that new documents can be more easily processed, accessed and used, by means of ontology technologies.

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