Ontology based Assistive Interfaces for Editing Clinical Practice Guidlines

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Background

OncoLogiK is a Semantic Wiki which houses 144 oncology related clinical practice guidelines, which are sets of statements that provide healthcare professionals with assistance for treatment methodology. The Semantic Wiki is a plugin for MediaWiki by the same name, Semantic MediaWiki, that enables semantic markup, which is essentially descriptive metadata that describes information and it's relationship to other bits of data. MediaWiki is a software package that underlies most wiki software, and is produced by the Wikimedia Foundation. The Semantic wiki is maintained by Oncolor, the regional oncology network In Lorraine, whose purpose is to improve areas of care, prevention, awareness and also training. The network is connected to the needs of children, families and caregivers. It aims to provide a community and also quality when it comes to care.

Wikitext entry with many wiki implementations is done by hand. For OncoLogiK in particular, this usually involved many pieces of information which had to be kept "in the head," such as individual contributor names and URLs, or medical terminology such as MeSH. In order to improve the usability of the wiki as a whole, an alternate editing interface was designed which would assist users with term entry.
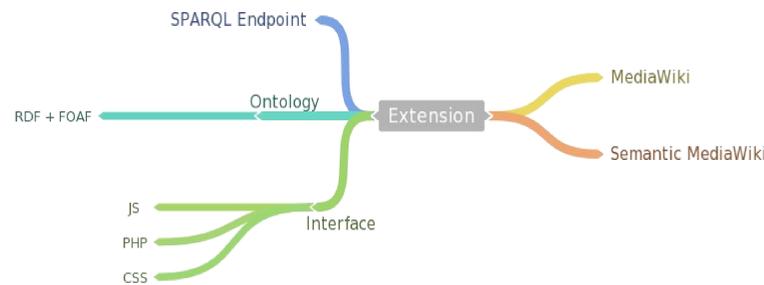

Figure 1. A concept map connecting various aspects of implementation.

Figure 2. Suggestions based on partial term entry

Methodology

Uschold and King (1995) identify four major steps that are generally required for developing ontologies: identifying purpose, building the ontology, evaluation, and documentation (p.16). The primary goal with respect to the ontology is to provide a human-machine interoperable structure for use by a suggestion mechanism, which the format itself already facilitates.

Beyond modeling the ontology, the suggestion mechanism must be created for editing wiki pages. The editing features available through MediaWiki are themselves extensible, and thus provide interfaces and hooks that simplify the integration of additional functionality. A concept map showing the various parts of the implementation can be seen in Figure 1.

Figure 3. Exact suggestions based on partial term, with complete entry above

Discussion & Conclusion

Developing ontologies from wikitext is not often a simple process because of the ambiguities and incompleteness of natural language. It was not important to model contributors in a complete sense, because this information is not important to the end user of the interface within MediaWiki.

Ease of use is a primary concern in the implementation of this mechanism, because it aims to solve a canonical usability problem that plagues software that is "knowledge heavy." Given a large enough set of data, it becomes difficult to remember valid entries, whether they be a set of contributors, or perhaps a particular set of MeSH terms. Similar systems have been implemented elsewhere, albeit with different aims (Hoehndorf, et al, 2009).

The use of guided wikitext entry is an effective interface mechanism on the basis of consistency alone, and is invaluable when users are confronted with large knowledge bases, which must otherwise reside in mind.

Design

Crafting an Ontology
To serve as a model, several guidelines within OncoLogiK were selected and scraped manually for contributor information. This information was expressed in FOAF, an RDF framework, and ultimately created within Protege 4.3.

Interface
The primary functionality of the interface is to provide suggestions, drawing on our existing ontology, and searching based on data entered. An example of how suggestions are provided on partial term entry can be seen in Figure 2, with Figure 3 demonstrating term completion, and an exact term suggestion.

A number of existing extensions provide similar functionality, albeit without the ability to query RDF data stores. One such extension named QuickLink, which itself is based on Link Suggest, has been used as a base for the development of this extension.

SPARQL
A SPARQL endpoint is required to query RDF, and functions as the intermediary between our editing interface and the underlying ontology.

References

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