Web Service Access to Semantic Web Ontologies for Data Annotation

Joshua D. Franklin, MS [1], José L.V. Mejino Jr., MD[1], Landon T. Detwiler, MS[1], Daniel L. Rubin, MD, MS[2], and James F. Brinkley, MD, PhD[1]
[1]Structural Informatics Group, Dept of Biological Structure, Univ of Washington, Seattle, WA; [2]Center for Biomedical Informatics Research, Stanford Univ, Stanford, CA

Abstract

Recent advances in semantic web technologies now provide the methodology for efficient and adaptable deployment of ontology support to biomedical applications for data annotation and integration.

Introduction

The use of ontology in data annotation and integration has gained wide acceptance. If data are annotated with terms from standardized ontologies, then they are more easily shared and integrated. Ontology support to annotation applications generally entails either hard-coding the ontology elements within the application or embedding the ontology in the local system, both of which result in tedious maintenance and curation of data as well as complicated versioning issues. However, the continuing evolution of the Semantic Web now affords a third option, which is to incorporate into the application the ability to contact via standard web protocols a remote server hosting an ontology source.

Semantic Web Integration

In this study we explored this third option by adapting AnnoteImage, an image annotation tool we previously created, to access an ontology web service. AnnoteImage enables users to draw contours around regions of interest and to label the regions with anatomical names. Previously, AnnoteImage incorporated the entire Foundational Model of Anatomy (FMA) ontology, a reference ontology representing the structural phenotype of the human body at all levels of granularity[1]. However, the size (95MB) and complexity of the FMA required users to have some level of technical expertise to install and configure it. Additionally the scope of the FMA content is too broad to give a more focused facility for accessing terms.

In the current work AnnoteImage calls a semantic Web service hosting a materialized "view" [2] of the FMA, called FMA-RadLex, that is customized specifically for radiology-related image annotation tasks and converted into OWL (Web Ontology Language). For a given anatomical region, only the structures expected to appear in a radiological image of that region are shown to the user, thereby greatly reducing the number of terms the user needs to browse (Figure 1). A SparQL query obtains terms from the FMA-RadLex ontology Web service, in this example the parts of the abdomen.

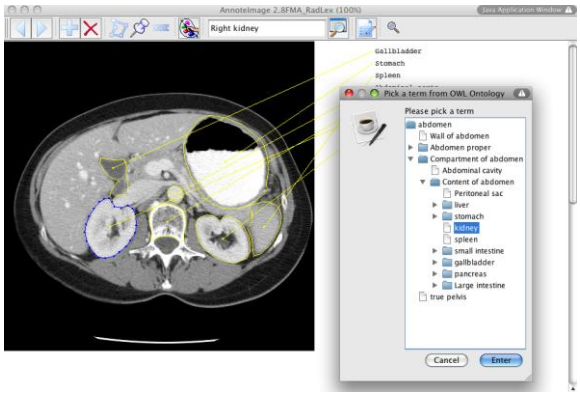

Figure 1. Parts of the abdomen obtained by SparQL query

Discussion

Advantages of the ontology Web service approach include 1) the application does not need to load the entire ontology at once, 2) the Web service can be a view of a larger reference ontology, thereby only showing the terms that are relevant to the application while retaining the advantages of a common reference ontology, 3) the use of SparQL queries within the application allows the particular terms presented to vary with the data content, and 4) the ontology content is always up-to-date.

Supported by NIH grant HL087706

References

1. Rosse C, Mejino, JLV. The Foundational Model of Anatomy Ontology, in *Anatomy Ontologies for Bioinformatics: Principles and Practice*. New York: Springer-Verlang, 2007.
2. Brinkley JF, Suciu D, Detwiler LT, Gennari JH Rosse C. A framework for using reference ontologies as a foundation for the semantic web. AMIA Fall Symposium 2006: 96-100.