

An RDF Editor and Portal for the Semantic Web

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1 ABSTRACT

RDF is emerging as one of the main languages for creating semantic markup on the web. The RDF Editor combines WYSIWIG HTML editing with a semantic web portal for guided semantic markup using distributed vocabularies. Instead of serving as a platform for developing vocabularies and relationships, this editor is designed to provide a simple interface for users to add RDF to their HTML documents as they are created. Users can search online repositories for existing ontologies to borrow terms for use in their own documents. This paper describes the implementation and interface features of the tool.

2 INTRODUCTION

The current World Wide Web began and evolved as a mechanism for presenting data to human users. While people can easily understand the concepts within a document, it is currently very difficult for machines to extract any knowledge from a page. The Semantic Web allows users to create precise, unambiguous encodings of information in a machine-readable form. This promises to lead to many advances in the services and tools available to web users.

RDF (Resource Description Framework) is emerging as one of the primary languages for encoding semantic material on the web. To encourage web users to semantically markup their documents, we need a tool that will allow them to easily describe the knowledge that is being presented without forcing them to learn RDF.

In this paper, we present the RDF Editor, a graphical tool for creating RDF within an HTML document. There are many excellent tools available that allow users to manage and create vocabularies. The purpose of this tool is different. The design encourages the use of existing ontologies by providing features to search and manage the outside references. While users are creating HTML, they can quickly indicate words and phrases to be included in the RDF (as classes, objects, properties, or values). The software automatically generates the correct RDF for the relationships expressed, and in the end, the users can save the RDF to its own file or include it within their HTML document.

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3 RDF EDITOR AND SEMANTIC WEB PORTAL

The goal of the RDF Editor is fourfold:

1. To provide the user with a flexible environment in which he can create his web page with few markup hindrances
2. To allow the user to markup with minimal knowledge of RDF terms and syntax
3. To provide a reference to existing ontologies on the internet for use in the markup
4. To ensure accurate and complete RDF with the ability to make modifications easily

For someone adding semantic markup to a webpage, many potential tasks exist: searching for and using existing ontologies, extending those ontologies, creating new ontologies, and linking the marked up page to others online once the RDF markup is generated. While some tools exist for each of these individual tasks, the RDF Editor provides all these functions in an easy to use interface while introducing new features..

Below, we describe each of the features of the RDF Editor and how they help facilitate the tasks just described.

4.1 Text/RDF Editor Window

The Text/RDF editor window works in three modes to address the different needs of users.

Display Mode: In this mode, the window acts as a basic WYSIWYG HTML editor in which the user can enter text and insert images. Users can automatically generate HTML here, or use the window for its RDF editing purpose: to provide semantic classification.

Using one of four keyboard shortcuts, the user can quickly classify any word. The word immediately next to the cursor is entered as Class, Object, Property, or Value.

If the user employs one of the shortcut keys, the window enters a value insertion mode. This mode provides the user with another set of shortcuts that can be keyed in to properly establish the relationship between the selected term and its place within the RDF structure.

HTML Source Mode: In this mode, the source HTML code is displayed for editing. Users can paste in pre-written HTML code or hand code their own pages. To

preview the HTML or to tag terms for inclusion in the RDF, the user can enter Display Mode.

RDF Mode: In this mode, the RDF markup is displayed. The dataset specified by the user along with references from web ontologies/properties are used to construct the RDF. Users can view or edit the generated RDF here.

4.2. Ontology Browser

A particularly innovative feature of the RDF Editor is that it encourages users to work with multiple ontologies. Many existing tools allow users to create their own ontologies for use in RDF documents. This tool encourages users to work with and extend pre-existing ontologies, exploiting the distributed nature of the Semantic Web. The ontology browser is the first part of the tool that support that.

This interface allows the user to browse through existing ontologies on the Internet with the aim of finding relevant terms and properties. The default starting page is the DAML Ontology web site: (<http://www.daml.org/ontologies>) from where the user could issue search queries using Class/Property names as keys. Once the appropriate ontology has been located, the user can add it to the local database, and the properties of the ontology are automatically added to the Local Ontology Information where it can be managed.

4.3 Local Ontology Information

This is the second feature of this tool that supports the use of multiple ontologies. This window shows the URI of all ontologies currently in use in the local document. For a selected ontology, a list of its classes and properties is also displayed.

This window is used only for managing the ontologies and terms of interest. If a user wants to create an instance of a borrowed class, or to otherwise use classes and properties defined in an outside ontology, he can click the term of interest and include it in the appropriate place in the semantics of the current document. This makes the term appear in the Textual Semantics List

4.4 Textual Semantics List

The Textual Semantics window has four lists (Classes, Objects, Properties, and Values) that display the semantic elements of the text as marked up by the user. The following features are provided:

1. Shortcut keys to insert Classes, Objects, Properties and Values directly into the hierarchy - For instance, consider the example in Figure 1. If the user's cursor is next to the word "behavior: in the text, the selected element in the Class List is "AquaticOrganism", and the selected element in the Object List is ""cassisfly larvae", then

pressing shortcut key for Properties will directly insert the word "behavior" into the Property List as a property of element AquaticOrganism:cassisfly larvae.

2. Shortcut keys to insert Unassociated Objects, Properties, and Values to the lists. Any unassociated element is automatically associated with the explicitly defined element that is added next.
3. To use an ontology from the local database, the user can select the appropriate class or property from the Ontology List and click on a button to transfer it to the Class or Property List. Thus, the user can either replace the class and property names used in his document with existing ontology names and their properties or alternatively submit them as part of a new ontology.

4.5 RDF Instance Creator

The RDF Instance Creator (RIC) is a tool designed to ease the process of marking up data. RIC allows the user to generate RDF simply by filling a series of forms. The intent is to free the user from needing to know RDF while still providing all the benefits that it has to offer.

RIC can use any valid ontology that is currently accessible through the Internet. RIC is incorporated to the RDF Editor as an alternative method for creating instances. By selecting the appropriate ontology from the Local Ontology Information window, the user adds it to the RIC active data area.

Selecting an object from the active data area brings its properties up in the workspace. The workspace provides a simple form interface where the user enters data for each of the object's properties. Some error checking is also built in. For example, a field has an integer range, the user cannot enter "3.2" or "two."

4.6 Semantic Web Portal

The Semantic Web Portal is a prototype for what will become far more than just a Semantic Web search engine. Content creators can submit pages which are indexed by their semantic markup. To search in the Semantic Web Portal, users select an ontology and term, and run a search for any page that is indexed by that term. The portal returns a list of marked up web pages that describe the term, giving an individual user the ability to see how other people relate to the same concept in the World Wide Web. For example, if the user is writing a web page about a "Fish", searching in the Semantic Web Portal would give him a wealth of information about "fish" defined by other end users from which he could borrow ideas, qualitative and quantitative data.

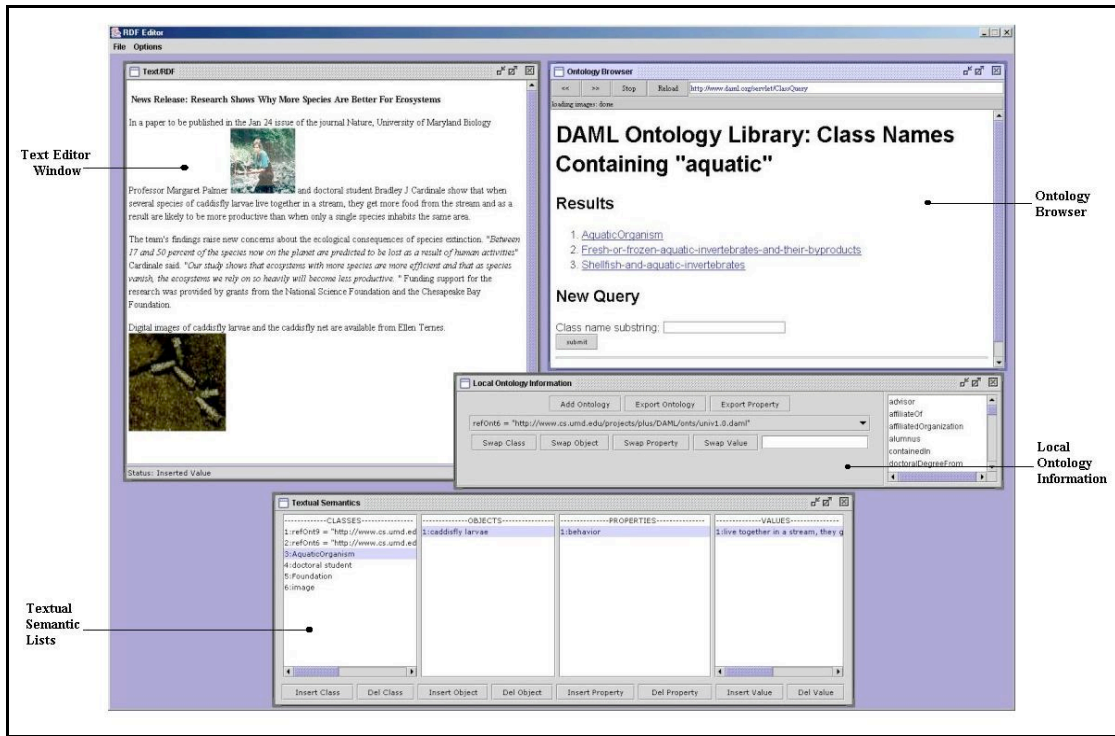


Figure 1: The RDF Editor Interface

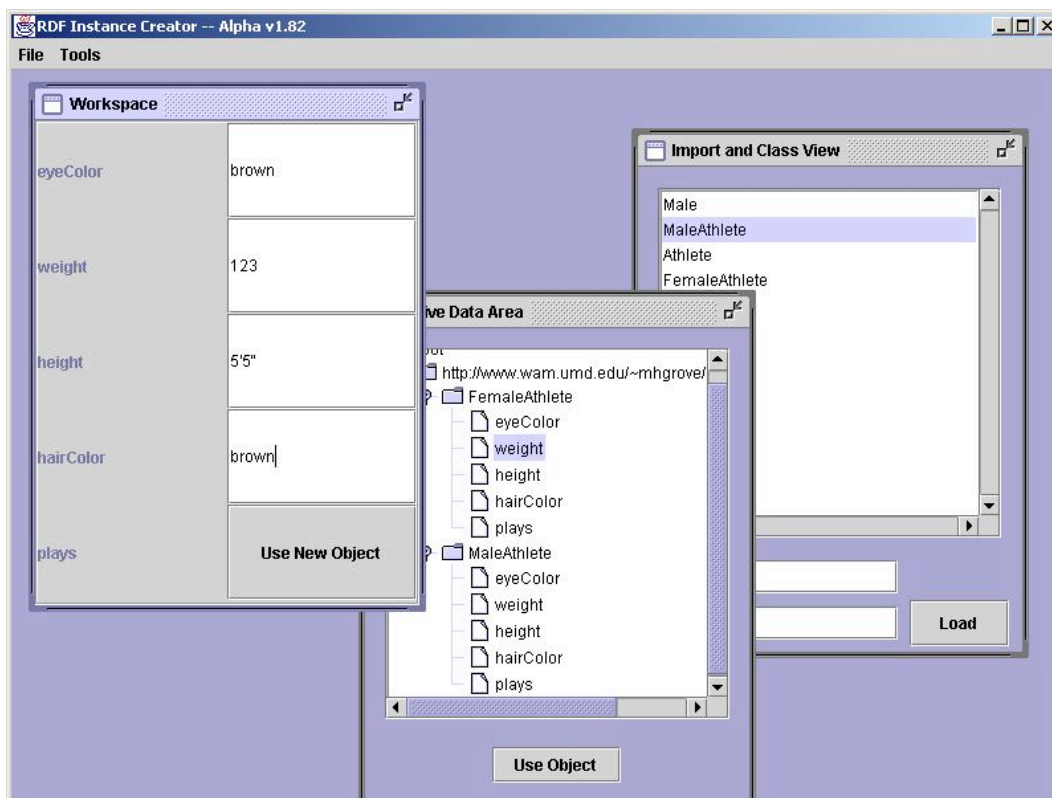


Figure 2: The RDF Instance Creator

Incorporating this tool into the RDF Editor provides several new functionalities. First, the user can quickly submit his marked up page for indexing from the tool. Perhaps more importantly, as the user includes a term from an ontology, the Semantic Web Portal automatically can provide references to other documents that use that same term. If the user includes the term “fish” from an ontology, the portal may provide a link to a picture of a fish. If the user decides to borrow that picture, the portal can also make a note of the link between the two documents.

5 CONCLUSIONS

The expansion of the current web provides a valuable lesson to researchers interested in expanding the semantic web. In the early 1990’s, content on the web has to be hand coded in HTML, and thus the population of users was restricted to techno-savvy computer users. Tools like Microsoft FrontPage, Netscape Composer, and countless other HTML generators opened up the world of the web to everyday users by allowing them to create content without forcing them to learn anything about HTML.

For academics and “real world” users to start using the semantic web, a tool for generating RDF will encourage use because it eliminates the knowledge

that is a barrier to entry. The RDF Editor integrates a wealth of features into one software package, and introduces many new features that are unavailable anywhere else. By creating an easy to use and highly useful tool for creating RDF for individual HTML documents, we believe that everyday users will be more likely to use and benefit from the semantic web.

Demos of this project and others can be found on the MIND SWAP website at <http://www.mindswap.org>.

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