Unifying Semantic Wikis and Semantic Web Applications

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ABSTRACT
Many Semantic Wiki Engines have been developed in response to a semi-structured domain of application. Nevertheless these engines take very few advantages of the structured model on their viewing and editing interfaces. In this paper we present HyperDEWiki implementation where we combine Semantic Wiki and model-based Semantic Web Application allowing specialized interfaces and navigation. The tool is also intended to support domain ontology evolution.

Categories and Subject Descriptors
H.5.4 [**Hypertext/Hypermedia**]: Architecture; Navigation. D.2.1 [**Software Engineering**]: Requirements/Specification. D.2.2 [**Software Engineering**]: Design Tools and Techniques.

General Terms
Design, Languages.

Keywords
Wiki, Semantic Wiki, Web Application, Development Environment, Semantic Web.

1. INTRODUCTION
Semantic Wikis allow the association of semantic markup, or semantic annotations, with the usual text that makes up a Wiki page. It is envisaged that information provided to the user in the Wiki page is enhanced with (possibly) computed information based on the associated semantic markup. As it has been said in [2], current semantic wikis use metadata for navigation, rendering and search features. However, navigation is limited to dynamically generated lists (indexes as queries over the data) with no context information. Therefore resources are always shown the same way, no matter where user came from and which information he might be interested.

In HyperDEWiki we took the usage of metadata a step further. We used HyperDE [5] that offers an implementation of the MDD [8] based on SHDM [4]. Beyond common Semantic Wiki features, HyperDEWiki provides the user with the ability to define specific pages for instances of formally described types... By doing that user can create a dynamic page that is better suited to support the manipulation of structured information in a set of tasks.

HyperDEWiki also provides the community with the ability to edit its ontology. As the wiki's base evolves over time, its ontology also may need to adapt to new content. HyperDEWiki has features to support the ontology evolution over time. These features allow ontology refactoring and suggests changes to be made.

2. ENHANCED METADATA USAGE
HyperDEWiki has a meta-model similar to other wiki engines – such as Semantic Media Wiki [9], OntoWiki [1], and IkeWiki [6], among others. Our tool allows pages to be linked to each other as a standard wiki would do and also allows semantic (typed) links. Pages may as well declare datatype properties. Likewise other engines, HyperDEWiki renders the wiki text as hypertext and displays a generic FactBox with all declared properties for a page. Moreover this meta-model is built on top of HyperDE's MDD which combines the domain ontology with the SHDM navigation model. Here we present examples of how this model enables more specific treatment for the formally described information.

The motivating scenario is based on a group of friends in Rio de Janeiro, who are bicycle riders and like to meet on weekends to ride their bicycles around town. They have created CycleWiki using HyperDEWiki to share information and experience about biking trails, equipment, tips, etc… Figure 1 shows the initial schema (ontology) used.

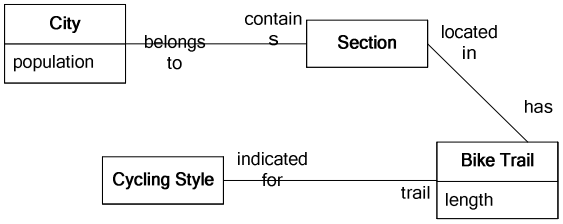

Figure 1. CycleWiki initial ontology

2.1 Semantic enabled views
Rio de Janeiro was described with a wiki text. Annotations in this text linked Rio to other relevant pages as its country, Brazil, and a related city, São Paulo. Those links do not belong to the ontology. There were also annotations creating formalized links from Rio to some of its sections. Wiki text also contained a query to display all of Rio's sections.

Figure 2 shows how a specific view can take advantage of formal information. This view applies to every city page. In this case, besides the regular wiki text rendering, it displays a summarized InfoBox with some of the desired formal information taking advantage of the fact that this information will be present for most cities. This InfoBox displays the name of the city, its population and an index to its sections. The index displayed is also specific: when user navigates to one of the sections, it is shown in a navigational context [7] of sections of a city, in this case, sections of Rio de Janeiro. Therefore section's page may be displayed in a specialized view for this context also allowing contextual navigation to others sections of Rio. Notice that the city instance

Rio de Janeiro, was not aware of how a specific view was going to display it. Also, the view is fully customizable and could render any set information in different places and layouts (not only as an InfoBox).

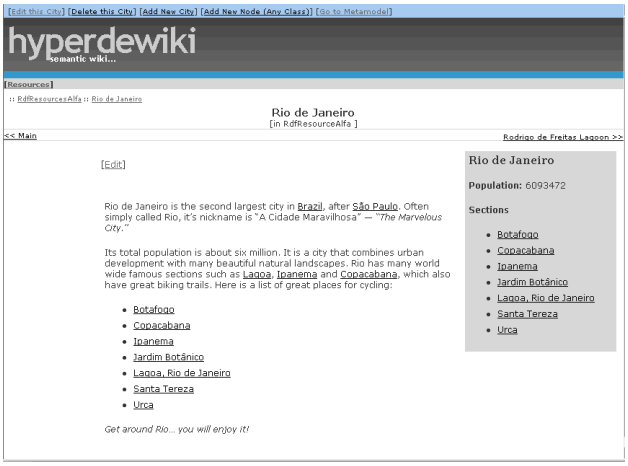

Figure 2. City specialized view applied to Rio de Janeiro

Specialized views may also be created to edit resources. Besides the common wiki style editing with annotations, the environment provides another editing interface, which looks at resources as a structured information item, where the attributes can be edited individually. Yet again, other views may be provided to support more specific tasks.

2.2 Organic ontology evolution

One of the Wiki Design Principles by Ward Cunningham is that a wiki is organic, meaning that its structure and text are open to editing and evolution [3]. We believe that, in a semantic wiki, this concept also applies to its possibly underlying ontology. HyperDEWiki has two types of features that support this evolution. First, features that enable refactoring the emerging ontology and eventually changing instances. Those features allow the community to change the ontology over time according to their needs. Second, the system tries to recognize some regularity (i.e., emerging structure) and suggests changes to the users. This recognition uses the ontology structure itself, the page instances and declared properties, or both.

In the given scenario, after the wiki was been used for some time, it became popular among users with a slightly different profile. These users also practiced mountain bike. They added the new Cycling Style and some trails. Many trails mentioned its difficulty level as an annotated property, e.g.: [difficulty level:=7]. The property was not formally described, therefore HyperDEWiki created a generic property with WikiPage as its domain and a literal, string, as its range. At that moment "difficulty level" had a very weak semantic, it was only a label to a generic value assigned to some WikiPage's instances. This practice became common in the mountain biking group. After some time many trails had the "difficulty level" property, the system suggests a change: to incorporate the new property to the "Bike Trail" class, giving to it a formal and specific meaning.

These ontology evolution suggestions are a work in progress in our study. We are testing different approaches based on the existing ontology's structure and pages instances.

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