# SEMANTIC MEDIAWIKI: A USER-ORIENTED SYSTEM FOR INTEGRATED CONTENT AND METADATA MANAGEMENT SYSTEM

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## ABSTRACT

This paper describes a Semantic MediaWiki, a MediaWiki extended to include the ideas of Semantic Web. The proposed Semantic MediaWiki works as an integrated system for content management and metadata management.

## KEYWORDS

Semantic Web, MediaWiki, RDF statement

## 1. INTRODUCTION

In the increasing interest in the Semantic Web, more and more Semantic Web applications are being developed. One of the current main issues for the Semantic Web applications' development is the simplicity and user-friendliness for the end users, especially for people with non-IT background.

On the other hand, in the context of collaboration on the web, Wiki has proven itself to be a simple and user-friendly interface. For example, the community of Wikipedia[1], the free content encyclopedia is becoming larger and larger. There have been more than 13,000 people who gave their contributions, either by creating or by editing articles in Wikipedia. Wiki is a discussion medium, a repository of ideas and a tool for collaboration [Leuf01]. It is a simple publishing system that is easy to learn and quick to use. In Wiki, people can create or edit a Wiki page using a simple syntax to write content. So, it is normal to make an assumption that an extended Wiki will be useful for the development of a simple and easy-to-use Semantic Web application.

In a Wiki environment, it is easy to make an RDF resource, since a Wiki page always has a URL, e.g. http://hostname/wiki/pagename, and this URL can be used as an URI of an RDF resource. RDF consists of subject-predicate-object triples that state specific facts about resources or concepts, e.g. "[Homer]<IsFatherOf>[Bart]", where subject, predicate and object (if not a literal) are identified via URIs. Thus, constructing RDF triples in a Wiki environment can be done by enabling the construction of labeled links. The labeled link represents the RDF property that links the RDF subject with its object.

This paper presents a Semantic MediaWiki[2]. Semantic MediaWiki is a MediaWiki extended to enable the collaborative editing of metadata according to simple RDF statement. In the next section, we describe the modification of MediaWiki to enable the construction of RDF triples. In Section 3, we describe the implementation of the proposed Semantic MediaWiki.

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[1] http://en.wikipedia.org
[2] Our current prototype is accessible from http://www.semanticwiki.jp/

## 2. SEMANTIC MEDIAWIKI

### 2.1 MediaWiki

MediaWiki[3] is a Wiki software that is written in PHP and uses MySQL database. It is being used to run the Wikipedia and also other encyclopedia and dictionary sites. MediaWiki is a very useful tool for collaborative content management. MediaWiki also has the category management function. This category management function allows a Wiki page under the namespace ("Category:") to be used as a metadata, and also allows user to create class and sub-class relation, and class and instance relation between Wiki pages. In other words, MediaWiki has the capability to manage: (1) contents, (2) metadata, and (3) the relations between contents and metadata. However, this category management function is not able to construct RDF triples, the building blocks of the Semantic Web. Constructing RDF statement in a MediaWiki environment can be done by enabling the writing of labeled links. We use the existing category management function as a reference to enable the writing of labeled links.

### 2.2 Extending the MediaWiki

Using the existing category management function as a reference, we create a new namespace ("Term:"). A new table is also created in the Wiki database to deal with the new namespace. Wiki pages that use this new namespace are being enabled to use the labeled links. The Wiki syntax is [[Term:target_page| property]]. The RDF triple will be as follows.

    source_page property target_page.

    Each time the Wiki syntax is used, the Wiki engine will store the RDF triple into the new table in the Wiki database. By directly querying the table, the labeled link relation will be displayed on the source_page as follows.

    -> property -> target_page

    By clicking the target_page link, the target_page will be created automatically. On the target_page, the relation will be automatically displayed as follows.

    <- property <- source_page

    By clicking the link that represents the RDF property, the property page will be created automatically. On the property page, all triples that use the property will be listed.

    Fig.1(a) shows the example of the Wiki syntax writing. Fig.1(b) shows the RDF triples that are stored in the new table of the Wiki database. Fig.2(a) shows the example of how the relations are displayed on the source_page. Fig.2(b) shows the example of how the relation is shown automatically on the target_page. Fig.2(c) shows the example of how the relations are listed on the property page.

    So by enabling the writing of labeled link, RDF triples can be constructed. Thus, Semantic MediaWiki can be used as an editor of metadata according to simple RDF statement. It is also worth to note that Semantic MediaWiki, as an extension of MediaWiki, has the benefit of having all the functions available in MediaWiki as a content management system. And as shown in Fig.3, Semantic MediaWiki can serve as an integrated system for content management and metadata management.



(a) Using the Wiki syntax for RDF triple construction.    (b) RDF triples are stored in a table of Wiki DB.

Figure1. Writing RDF triples in Semantic MediaWiki.

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[3] http://wikipedia.sourceforge.net

(a) Display of the source_page.
->property->target_page

(b) Display of the target_page.
<-property<-source_page

(c) Display of the property page.
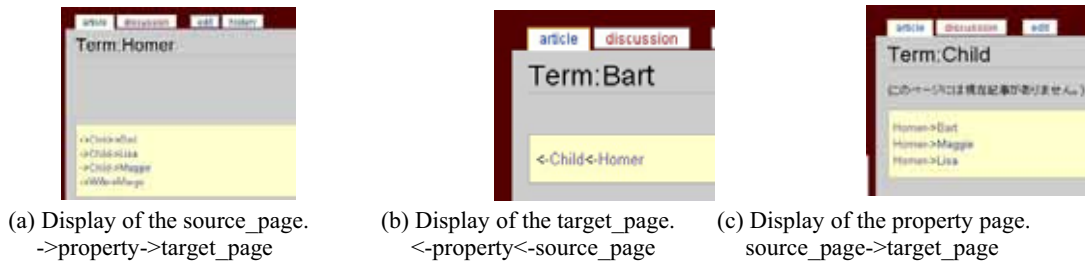source_page->target_page

Figure 2. Display of the Semantic MediaWiki pages.



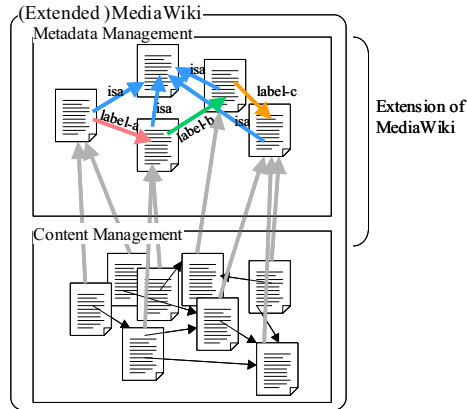Figure 3. Semantic MediaWiki as an integrated system for content management and metadata management

## 3. IMPLEMENTATION

In this section, we show a sample use of the Semantic MediaWiki for the Japanese biodictionary development. Currently, we use MediaWiki 1.3.11 as the base of the Semantic MediaWiki.

Fig.4 shows a Wiki page of a Japanese biology term. A new Wiki page can be created by directly writing the Wiki page name on the browser, e.g. http://localhost/wiki/Term:biology_term. Fig.4(a) shows the editing box of the Wiki page. Fig.4(b) shows the display of the Wiki page of the biology term in the biodictionary. Currently, we have about 1,000 pages as terms in the biodictionary on our system. There are three RDF properties used in this biodictionary: Synonym, English and English Synonym. Synonym is used to link a Japanese biology term with its Japanese synonym. English is used to link a term with its direct translation's English term, while English Synonym is used to link a term with its English term's synonym. Fig.5 shows the displays of the property pages. On each property page, the list of terms which use the particular property is displayed. The property pages can be used as a quick reference for seeing relations between terms. Thus, Semantic MediaWiki is useful for the collaborative editing of contents and metadata according to simple RDF statement.
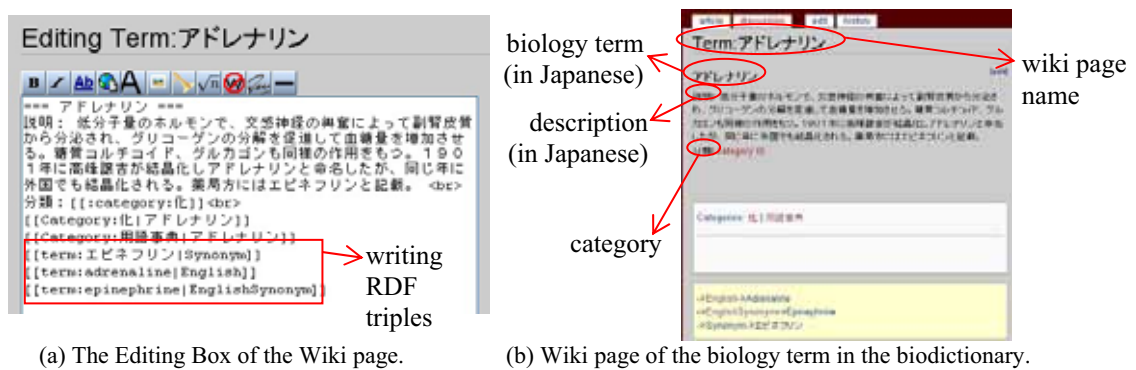


(a) The Editing Box of the Wiki page.

(b) Wiki page of the biology term in the biodictionary.

Figure 4. Creating a Wiki page for the biodictionary in the Semantic MediaWiki environment.

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(a) Wiki page of Term:Synonym.     (c) Wiki page of Term:EnglishSynonym.

(b) Wiki page of Term:English.

Fig.5 Wiki pages of the RDF properties used in the biodictionary.

## 4. RELATED WORK

There are some other Semantic Wikis being proposed [Tazzoli, 2004] [Aumueller, 2005]. SHAWN, a Semantic Wiki that is proposed in [Aumueller, 2005] is a well-designed system and has the similar purpose to our system. But it is designed to serve as a metadata management system, rather than as an integrated system for content management and metadata management, as the Semantic MediaWiki (see Fig.3).

## 5. CONCLUSION

Semantic MediaWiki is proposed as an extension of MediaWiki that is able to write labeled links to construct RDF triples. It is a very simple software and as one tries to use this software, one may enjoy a visible editing of Wiki pages' relations. And since it also inherits all the functions available in MediaWiki, it can serve as a useful tool for the collaborative editing of contents and metadata according to simple RDF statements.

However, it is also true to say that Semantic MediaWiki could only handle simple RDF statements. It cannot handle blank node, since a Wiki page should have a name. Further work needs to be done to solve this problem. Another further works that need to be done are enabling Semantic MediaWiki to import RDF statement from external sources, to handle RDFS, and also to construct the inference function within the Wiki environment or by integrating Semantic MediaWiki with external application, e.g. Sesame[4], an RDF repository and inference engine.

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[4] http://www.openrdf.org