

Semantic Wiki as a Light-Weight Metadata Management System

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For the development of technologies for Semantic Web, machine-understandable metadata such as RDF is essential. Constructing RDF triples in a Wiki environment can be done by enabling the writing of labeled links. The labeled link represents the RDF property that links the RDF subject with its object. In a Semantic Wiki environment, users can write and edit RDF triples even though users have no knowledge about it. Semantic Wiki can be used for lightweight metadata management, and is useful to bridge the gap between non-technical users and Semantic Web technology.

1. Introduction

In these few years, Semantic Web has gained more and more attention from academic as well as industry. Nowadays, there have been so many Semantic Web applications available. However, bridging the gap between non-technical users and Semantic Web technology is still an issue. It is necessary to develop an application which is simple and easy-to-use by non-technical users.

For the development of technologies for Semantic Web, machine-understandable metadata such as RDF is essential [Takeda 2004]. 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]<HasChild>[Bart]", where subject, predicate and object (if not a literal) are identified via URIs. Constructing RDF triples in a Wiki environment can be done by enabling the construction of labeled links [Takeda 2005]. The labeled link represents the RDF property that links the RDF subject with its object.

This paper presents Semantic Wiki as a lightweight metadata management system. In a Semantic Wiki environment, users can write and edit RDF triples even though users have no knowledge about it.

2. Semantic Wiki for Lightweight Metadata Management

2.1 Semantic extension of MediaWiki

MediaWiki is the Wiki software used for the development of the proposed Semantic Wiki. MediaWiki has the category management function that allows a Wiki page under the namespace ("Category:") to be used as a metadata. This function allows user to create class-sub-class relation and class-instance

relation of Wiki pages. However, it is not able to construct RDF triples.

Using the existing category management function as a reference, a new syntax is created to write the labeled links. Wiki syntax to write the labeled link is [[term:target_page|property]]. Each time this syntax is written on a Wiki page, the triple will be stored into a new table in the Wiki database.

Fig.1 shows the example of the Wiki syntax writing on a Wiki page. The Wiki page on which the syntax is written will become the source page of the RDF triple. Fig.2 shows the RDF triples that are stored in the new table of the Wiki database. Fig.3, Fig.4, Fig.5 show how the labeled link relations are displayed on the source_page, target_page and property page respectively. Displaying labeled link relation allows users to navigate the relation between pages easily.

Enabling MediaWiki to write labeled links with simple syntax allows users to create and manage relations between Wiki pages easily and flexibly. The writing of labeled links allows users to write and edit RDF triples even though users have no knowledge about it.

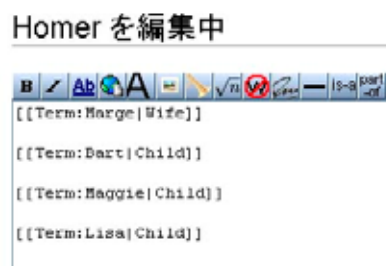


Fig.1 Wiki syntax to write the labeled link

Resource	Property	Value
Homer	Child	Bart
Homer	Child	Maggie
Homer	Child	Lisa

Fig.2 RDF triples

Homer

```

->Child->Bart
->Child->Lisa
->Child->Maggie
->Wife->Marge
    
```

Fig.3 Labeled link relations displayed on the source_page
->property->target_page

Bart

who ?

```

<-Child<-Homer
    
```

Fig.4 Labeled link relations displayed on the target_page
<-property<-source_page

Child

```

Homer->Bart
Homer->Maggie
Homer->Lisa
    
```

Fig.5 Labeled link relations displayed on the property source_page->target_page

2.2 Mapping to other Semantic Web application

The proposed Semantic Wiki emphasizes the user-friendliness of the Wiki engine. It is developed to allow non-technical users to manage metadata easily, and leaves the more technical aspects to external applications.

Fig.6 shows the overall structure of the proposed Semantic Wiki. The RDF triples are stored in a table in the Semantic Wiki database. By converting the RDF triples into XML-encoded RDF data format, the RDF triples can be exported to RDF database such as Sesame¹. Using Sesame, users can explore the exported RDF triples (see Fig.7), make queries etc. Sesame can also bridge the proposed Semantic Wiki to other Semantic Web applications [Broekstra 2004].

In other words, the proposed Semantic Wiki can be used to bridge non-technical users and Semantic Web technology

3. Implementation

The proposed Semantic Wiki is developed for the development of a Web-based Japanese Biodictionary. Using Semantic Wiki, researchers from various Biology fields can create relations between terms flexibly, easily and visually, and also construct RDF triples even though they have no knowledge about it.

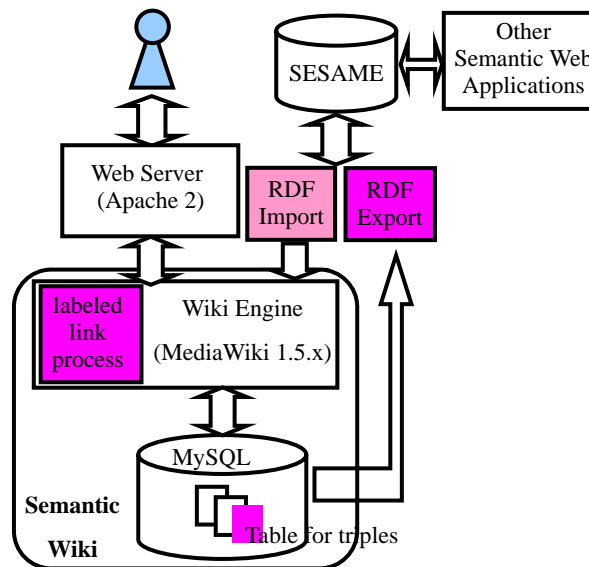


Fig.6 The overall structure of the proposed Semantic Wiki

Logged in: **Hendry** [log out] Read actions: [SeRQL-S](#) [SeRQL-C](#) [RDQL](#)
[Extract](#) [Explore](#)
 Repository: **MySQL RDF Wiki** Modify actions: [Add \(file\)](#) [Add \(www\)](#) [Add \(copy-paste\)](#) [Remove](#) [Clear](#)
DB [[select](#) [other](#)]

Explore repository

Enter a URI to start the exploration with:

Or start with one of the following classes or properties:

classes properties

<http://localhost/wiki/index.php/Child>
<http://localhost/wiki/index.php/Wife>

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(a)

Explore repository

Showing statements for: <http://localhost/wiki/index.php/Homer>

Use resource labels in overview

Statements with this value as subject:

subject	predicate	object
-	http://localhost/wiki/index.php/Child	http://localhost/wiki/index.php/Bart
-	http://localhost/wiki/index.php/Child	http://localhost/wiki/index.php/Lisa
-	http://localhost/wiki/index.php/Child	http://localhost/wiki/index.php/Maggie
-	http://localhost/wiki/index.php/Wife	http://localhost/wiki/index.php/Marge

Statements with this value as predicate:

subject	predicate	object
-- no statements found --		

(b)

Fig.7 Exploring the RDF repository

¹ <http://openrdf.org/>

A new Wiki page can be created by directly writing the Wiki page name on the browser, e.g. http://localhost/wiki/biology_term. Fig.8 and Fig.9 show the editing page of a Wiki page of a Japanese biology term and the Wiki page respectively. Currently, the prototype system contains more than 4,000 terms (see Fig.10).

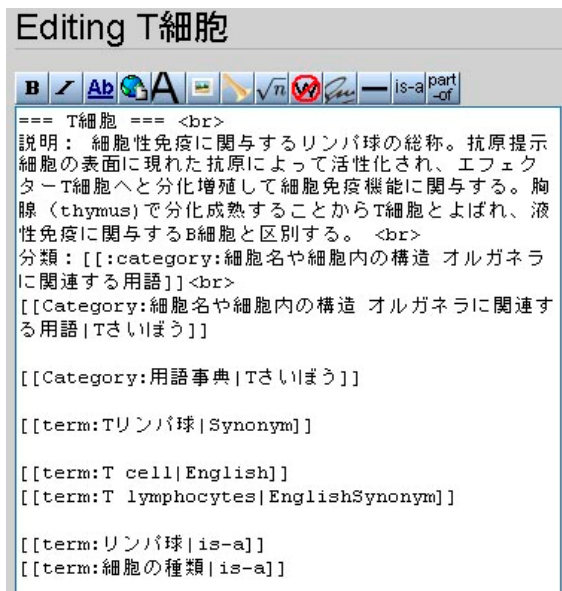


Fig.8 Editing box of the Wiki page

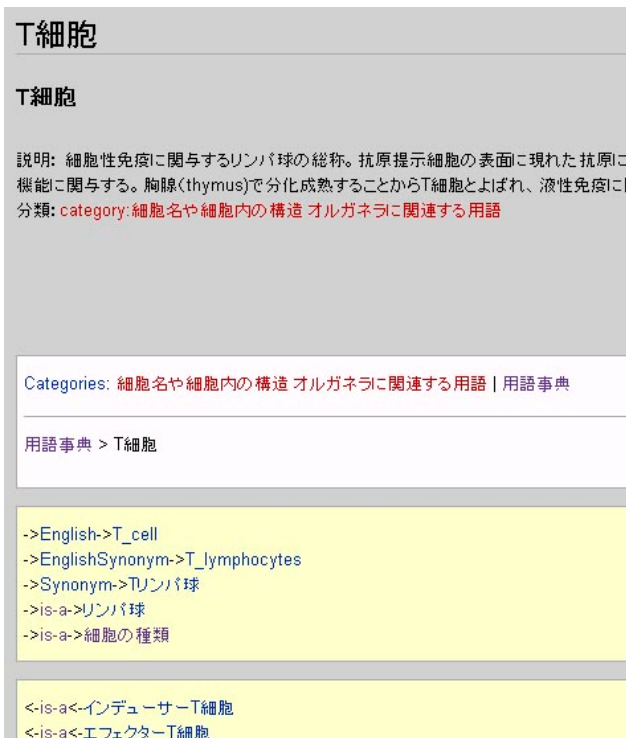


Fig.9 A wiki page in the biodictionary



Fig.10 List of the created biology terms

4. Conclusion

Enabling MediaWiki to write labeled links with simple syntax allows users to create and manage relations between Wiki pages easily and flexibly. The writing of labeled links allows users to write and edit RDF triples even though the users have no knowledge about it.

The proposed Semantic Wiki is developed to allow non-technical users to manage metadata easily, and leaves the more technical aspects to external applications. It is a useful tool to bridge non-technical users and Semantic Web technology.

References

[Broekstra 2004] Broekstra Jeen, Kampman Arjohn: RDF(S) manipulation, storage and querying using Sesame, in Demo Proc. of the Third International Semantic Web Conference (ISWC2004), 2004.

[Takeda 2004] Takeda Hideaki, Semantic Web: A Road to the Knowledge Infrastructure on the Internet, New Generation Computing, Vol. 22, No. 4, pp. 395–413, 2004.

[Takeda 2005] Takeda Hideaki, Muljadi Hendry, Towards Semantic MediaWiki, in Proc. of the 9th Semantic Web and Ontology SIG, JSAI, 2005 (in Japanese).