TMwiki – a Collaborative Environment for Topic Map Development

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ABSTRACT

TMwiki is a prototype for a collaborative environment that helps to reduce the complexity of developing large semantic structures. It features standard Wiki-functionality and gives users access to several useful Topic Map tools. It comprises a powerful browser component which provides a topic search as well as a collaborative editing section coupled with a revision history for Topic Maps.

Categories and Subject Descriptors

D.4.9 [**Operating Systems**]: Systems Programs and Utilities – *Php*. H.3.7 [**Digital Libraries**]: collection. I.2.4 [**Artificial Intelligence**]: Knowledge Representation Formalisms

General Terms

Algorithms

Keywords

Topic Maps, Digital Libraries, Wiki, Collaboration

1. INTRODUCTION

The major objective of digital libraries is to provide users with an effective access to information resources that are represented in various formats. Issues in the implementation of Digital Libraries have been widely addressed in the literature. A key challenge is to provide effective information retrieval mechanisms for heterogeneous information resources with different levels of complexity. Semantic technologies, e.g. Topic Maps, frames or semantic mark-up languages, can be used to structure heterogeneous information resources. Thus, the complex relationships of information resources can be modelled with the help of semantic technologies. This helps to improve information

retrieval in digital libraries. We have developed TMwiki as part of the DMGLib (Digital Mechanism and Gear Library) project [1]. The objective of DMGLib is to develop a digital library for mechanical engineering. DMGLib contains a vast amount of digital documents representing more than 1000 gear models, 100 machines, 3500 photographs, 100 videos and animations, 400 books published before 1898 and nearly 10000 mechanical engineering documents, such as technical reports, patent specifications, research papers and books [1]. These digital documents are represented in various different formats and media. DMGLib is developed by approx. 30 engineers at 8 different sites.

A universal solution to the problem of structuring large information spaces demands for an interdisciplinary, distributed, and collaborative approach [2, 3]. TMwiki is a first step towards building such a collaborative environment. It also is an essential element of a sophisticated navigation tool in the DMGLib-Portal. We implement a semantic meta-layer that helps to integrate different terminologies, languages, research paradigms and historic eras in which the digital documents included in the library have been developed. This facilitates information retrieval in voluminous and complex libraries.

2. TMwiki

TMwiki (www.topic-maps.org) is a prototype for a collaborative environment that supports the development of Topic Maps. It is a web application which allows users to add and edit content. TMwiki is based on DokuWiki [4], a standards compliant and simple to use Wiki engine.

TMwiki supports collaborative work by providing numerous features. Besides standard Wiki-features such as collections of relevant resources (Topic Map software, Topic Map samples, glossary, web pages, blogs), mailing lists and discussion areas, RSS feeds and a tutorial section, it also provides access to some dedicated Topic Map tools, e.g. MERLINO [5], a tool for semi automated generation of occurrences in topic maps and a TopicMapVisualizer (see below). TMwiki also offers a sandbox for exploring and testing these applications.

2.1 TopicMapVisualizer - TMV

The collaborative use of Topic Maps requires a flexible and powerful navigation engine. TMV is a generic Topic Map browser which is used in TMwiki as an interface for displaying

and navigating in Topic Maps. TMV consists of the following components:

Overview

The overview section helps users to get a general idea of the Topic Map that is currently displayed. The overview section displays all major structure elements (topics types, association types, scope topics and role specifications used in associations) of the current Topic Map.

Topic Map Graph Viewer

The Topic Map Graph Viewer enables user-friendly navigation and browsing in the current Topic Map. When a specific topic has been found by a search query, this topic is displayed as centroid of the relevant Topic Map. Associated topics are grouped around it. They are displayed as circles. When association types are detected they are displayed as labels at the connection line between the topics. The MouseOver-function displays an information box showing topic id, baseNames, class name and references to relevant sources. The standard viewing option can be extended to a broader view that shows all associations.
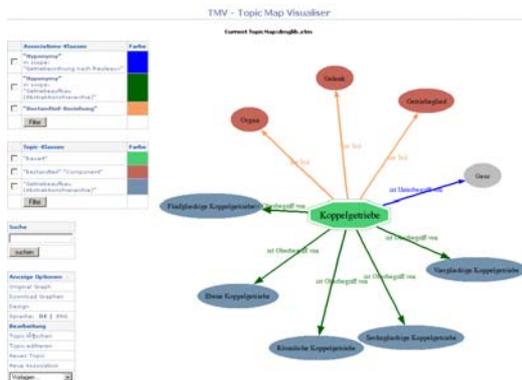

Figure 1: TMV screen with Class Filter section

Navigation in the current Topic Map is very easy. When users click on an associated topic, the Topic Map Graph Viewer switches to a new graph structure that displays the current topic as centroid.

Class Filter

The Class Filter helps users to select specific classes in complex Topic Maps. Users may select specific views of the semantic structure by hiding classes that are currently not required.

Topic Map Search

The search option allows users to perform a case sensitive, truncated search in Topic IDs, BaseNames, and Occurrences in a Topic Map.

Information Table

The Information Table displays all available attributes of the current topic: topic names and their scopes, subject identity of the topic, classes of the topic, occurrences (references and internal data) and their scopes and classes, associated topics including role specifications of all members and association classes, all topics that are instances of the current topic, all topics that reference the current topic as a scope in one of their BaseNames, and all topics

that reference the current topic in one of the occurrences or as scope in an involved association.

2.2 Editor

The editor of TMwiki helps users to upload and edit any XTM compliant Topic Map. Several short-cut-buttons (see Figure 2) support the design of a well-formed Topic Map. TMwiki also checks the edited code and validates it on the basis of the XTM version=1.0 DTD. If a topic map has an error, a message is displayed in the upper field of the editing screen. The revision history allows users to track recent changes.

Figure 2: Editing section of TMwiki

3. CONCLUSION

The major advantage of TMwiki is its ability to support the collaborative development of Topic Maps. TMwiki offers a powerful navigation interface coupled with a user-friendly editing section. It helps users to create and maintain semantic structures.

However, TMwiki is a prototype. It has to be tested more thoroughly. This will be done during the next months in the DMGLib project.

4. REFERENCES

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