Semantic Knowledge Sharing within a Collaborative Work Environment

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ABSTRACT

Knowledge sharing is vital in collaborative work environments, and sharing resources within a contextual knowledge structure constructed based on a collective intelligence of the people working in a same environment can aid better communication. In this paper, we discuss a semantic knowledge structure for effective knowledge sharing and communication, and present a Wiki-based knowledge sharing system for research projects with effective navigation means.

1. INTRODUCTION

In a large knowledge space like the Web, a huge amount of information exists and people seek the necessary information for different purposes, and it may be virtually impossible to construct a single semantic schema to manage the whole information with all different kinds of contexts. On the contrary, let us consider a finite information space where the information is collected or created by a group of people working collaboratively in the same contextual environment. For example, in a single organisation, or even in a virtual organisation, people have the same (or similar) interest(s) and share a common understanding of the context - the structure of the organisation, the tasks or topics of interests, etc. Here, an information system managing such knowledge is not only a data storage but also a communication media, and the resources can be shared more effectively in connection with the shared context. In addition, the context information itself can be constructed not by a single (or a group of) domain expert(s) but also by the collective intelligence of all users.

Therefore, this paper presents a semantic knowledge structure to create and manage the resources with a shared contextual structure, and we introduce our RIKI implementation[1] to describe how such knowledge can be effectively shared and accessed in a R&D environment.

2. COLLABORATIVE KNOWLEDGE SHARING

Knowledge sharing in a collaborative work environment has a few characteristics. First, the members share the same contextual knowledge obtained by being affiliated to the same group. For example, in a research project group, they share the same goal of the project, the list of tasks, and information on other members with their speciality and assigned, and so on. Second, the shared resources (e.g. documents) are given additional meaning from the contexts.

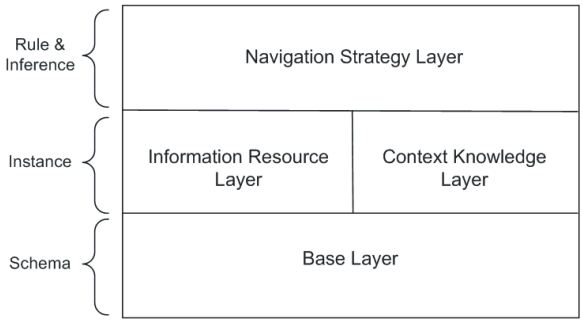

Figure 1: An overview of a semantic knowledge structure.

Suppose there are two documents with different contents and they are created by the same person while working on a specific task, then those two documents may not be regarded to be closely related to each other in terms of their contents but within the environment they are created, they have a close relationship as they both contains contents related to the same task. Third, although the members have common understanding on the contexts, each member may have deeper knowledge on their specialised area, and this can be reflected and represented in not only the resources they create but also the structure of the context. Again in a research project, a generic hierarchy of tasks and/or topics may be given, and it can be extended by each user's deeper knowledge on his/her specialised area.

Having defined the characteristics, we propose an overview of a semantic structure for effective knowledge sharing in a collaborative environment (Figure 1). As discussed above, not only the resources but also the context information are the knowledge to be shared (*Information Resource Layer & Context Knowledge Layer*), and in ontological representation, they both are managed as instances to enable frequent update. To manage those knowledge, a semantic schema which defines the fundamental concepts, relations and other attributes is required (*Base Layer*), and this forms the classes and properties of a ontology. The *Navigation Strategy Layer* contains additional rules or other information that can be inferred which are to be used for developing knowledge navigation methods for improved knowledge access.

3. RIKI IMPLEMENTATION

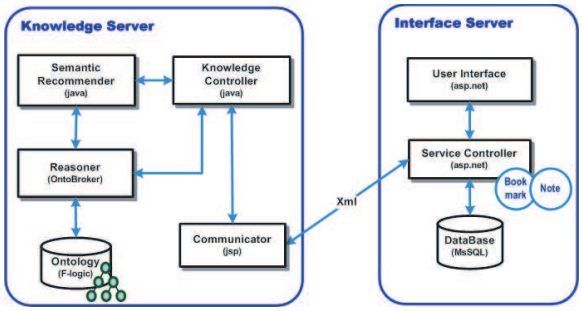

Figure 2: The RIKI system structure.

The RIKI[1] is a Wiki-based knowledge sharing portal, and its main purpose is to enable sharing not only well-organised documents but also unorganised drafts or even rough ideas easily in a collaborative research project. RIKI is developed following four principles.

1. co-authoring the resources (articles)
2. co-constructing the context structure
3. annotating resources with the context knowledge
4. easier navigation

First, for co-authoring of the resources, RIKI is developed as a Wiki-based platform which is a collaborative authoring tool. Second, the task, topic, event, and person hierarchies are considered to be the context information in RIKI and they can be updated by its users so that the individual user's context knowledge can also be reflected and shared. Third, resource annotation and setting relations are implemented by adding property editing feature in the resource creation or edition interface, and *Structured Browsing* based on the hierarchical structure of the contexts and *Relevant Article Recommendation* based on the *semantic relevance measure*[2][3] are implemented to provide easier navigation for its users. Note that, unlike other *Semantic Wikis*[4][5][6], ontology is applied in RIKI mainly to enable collaborative construction of context information as well as resources, and easier knowledge navigation. The system structure is described in Figure 2 and the main interface is shown in Figure 3.

4. CONCLUDING REMARKS

In this paper, we described the semantic knowledge structure for a collaborative environment to enable not only resource sharing but also constructing the context information from the collective intelligence of the users. The RIKI system we introduced is an example implementation of this idea in academic research projects. Our future work will include, but not limited to, making the article pages compatible with other Wikis and enabling RIKI to collect data from external sources (e.g. Wikipedia[7]), applying tags for easier annotation and a social-network based resource matching, and adding a scheduling feature to improve the practicality of RIKI.

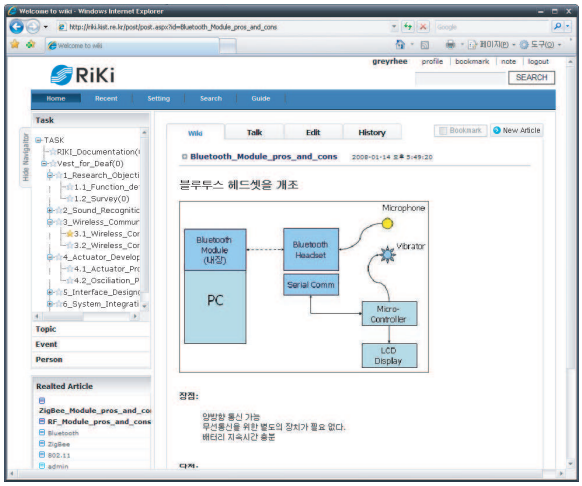

Figure 3: The RIKI interface.

5. ACKNOWLEDGMENTS

This work was sponsored by the Korea Institute of Science and Technology (KIST) with the project 'Tangible Space Initiative (TSI)'.

6. REFERENCES

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