An Ontology-Based Content Model for Intelligent Web Content Access Services

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ABSTRACT

Intelligent Web content access is a fundamental Web service, representing the first step toward semantic Web services. A lack of adequate and sufficient interpretation for content in current methods impedes access to content. This study regards Web content as any content described and published in the format of a markup language such as HTML or XML. In this paper, we will present our Content Model, combining subjective information from the content itself with objective information from people's perceptions of this content, providing an integrated interpretation of a content item. During accessing, a search engine examines the description of a content item, as found in the Content Model, to find matching files. An ontology-based Content Model is developed and applied to the Web environment to enhance Web content accessibility. Results of this study demonstrate that the proposed Content Model provides essential content descriptions for locating, accessing, and interacting with content providers.

Keywords: annotation; Content Model; Web content access; Web services

INTRODUCTION

The Internet is a rich repository of information. However, accessing content by commercial search engines such as Google, Yahoo, and Lycos becomes complicated and annoying when the user receives numerous links that occupy the entire screen. The user must search among many links to obtain the required information. This problem arises from inadequate Web content descriptions. For instance, the information used to denote content is often limited. In most cases, description of content contains only high-level abstract information, such as title, authors, and keywords. We need more information to describe clusters of content with related topics; cluster of content created by particular author under a particular topic; or a cluster of authors who created content with
related topics. Besides the explicit relationship between content and authors, we also need to consider implied relationship among related content, such as annotations, comments, and bibliography to enhance the usages of content. For example, some readers will make notes or annotations on the content while they are reading, such annotation is a kind of important knowledge resource to describe the association among the annotated object, annotation, and the annotators. Let an annotated object represent a topic of interest; we are interested in finding all annotations associated with the annotated object and finding other annotators through the annotations to find more annotation made by a particular annotators.

Lacking correct descriptions, a searching mechanism encounters significant difficulties in locating and evaluating possible Web content. To alleviate this access problem, a searching mechanism must acknowledge content and associated resources before being executed. In other words, description method determines the quality of content search. An ideal descriptive model should connect, integrate, and share two dimensions of Web content services, called content description and content access. Content description is an overall description of content, including all the constituents and interrelationships, while content access refers to Web services such as finding the right content, retrieving content, and interacting with content providers. This study presents an ontological-based Content Model to address the formal representation of Web content and a mechanism to retrieve the content and to bridge the content access between content requesters and providers.

This Content Model formally interprets Web content, including all the constituents and relationships existing among corresponding annotation, comments, and bibliography. In this study, Web content denotes any content described and published in markup language formats such as HTML and XML. The Content Model consists of four metadata: core, structural, behavioral, and annotation metadata, to support semantic representation at different levels. Core and structural metadata provide basic descriptions, such as the title, keywords and subsection title, from content itself. Additionally, structural metadata and supports anchor positioning to connect user’s annotation to specified words. Additionally, people’s perspectives of content are an important resource to help the user comprehend content in an efficient way. Therefore, we developed annotation metadata to record the user’s perspective from outside viewpoints. During the implementation we found the associated resource, like annotation, has rich semantic information to extend content usage. Therefore, behavior metadata provides ontological descriptions of content in a hierarchical knowledge system and useful associations with other resources, such as a group’s annotation. Experiments were conducted to assess the proposed method, and the preliminary results demonstrate that the proposed method can enhance the quality of content access for locating content, accessing content, and interacting with content providers.

The remainder of this study is structured as follows: We briefly review the latest research on Web services, content access, and annotation technologies, then describe in detail the ontology-based Content Model. The implementation of an intelligent Web content access system is evaluated in a case study experiment with the results and we conclude this study with suggestions for future research.

RELATED WORKS

Much research has been proposed to increase the accessibility and readability of Web content by using various description mechanisms. Typical works include utilizing metadata for resource discovery and description, presentation, multimedia, learning object, government, geo-spatial information, and general information (DSTC: MAENAD, 2004). However, a user’s query may be presented in different levels of abstraction depending on query context, such as term, topic, concept or service. Besides, a Web service can be located, accessed, and executed only after being properly described.
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