Chapter 24
Research and Implementation of Mine Risk Area Semantic Retrieval System Based on Ontology

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ABSTRACT

In this paper, the authors first analyze the research and development of semantic retrieval technology based on ontology, and introduce the key theoretical knowledge of ontology and semantic web, including the definition, description language, classification and semantic web. Secondly, this thesis makes a deep research on the ontology based semantic retrieval including semantic annotation, Chinese word segmentation, ontology storage, semantic association algorithm and so on. At the same time, it analyzes and introduces the construction principle, methods and tools involved in ontology. Finally, this paper designs and implements a complete ontology based semantic retrieval system based on the ontology of coal mine risk domain ontology, and verifies the feasibility of the system and the theory, and provides the basis for the development and popularization of the ontology based semantic retrieval technology.

1. INTRODUCTION

1.1. The Research Background and Meaning

1.1.1. Research Background

The current era is the era of network information technology; the speed of internet development has already exceeded people's initially expectation. The amount of network information has increased dramatically with the widespread popularity of the Internet. Work and study on the Internet has become part of people's life, amazing amount of data of learning resources in the form of electronic documents widely spread on the Internet. Such a huge amount of information makes the Internet to be a good source of information. But how to provide more convenient for the network users a simple and efficient way to retrieve, it is often more difficult.

The currently popular two search engines - Google and Baidu are two preferred tools for users to retrieve information from the Internet. According to the survey report, as of June 2015, China's Internet users has more than 650 million, the Internet penetration rate has reached 48.8% in the mass of information access, the search engine accounted for more than 80%(The 36th Statistical Report on Internet Development in China. 2015).

The search engine provides a convenient way for Internet users to search for useful information, but the traditional information retrieval system is often based on keyword and full-text search technology, It can only be based on the user's keyword input matching search, rather than attach importance to information semantic mining, The consequences of doing so is to return to a large-scale information, but also the lack of a certain relevance, it also cannot give users a satisfactory result. Although the current search engine is supplemented with various techniques for improving accuracy, the following problems still exist due to defects in the model (Chen, 2009; Li, 2009; Gao,2014; Yang, 2006):

The first: the problem of "information overload". Excessive pursuit of high recall leads to returning a large number of search results. It is unlikely for the user to give a keyword that exactly matches the content in the source. So, users often need to spend more time on searching for useful information;

Second: the problem of "faithful expression". Due to the different requirements, although different users use the same keywords to search, but their respective emphases are not necessarily the same. Currently widespread search engine ignores the user's browsing behavior and their personal interest characteristics. Therefore, the user's needs cannot fully performance in the search process, and the search results are often unsatisfactory;

Finally: the problem of "isolated island of vocabulary". At present, keyword-based retrieval is only a literal match, but vocabularies in the human brain does not exist in isolation, How to extend the query content through semantic understanding and association based on the user's query vocabulary becomes a difficult problem.

Traditional search engines exposed above problems become major factors impede the retrieval performance boost. Researchers in this field are attempting to exploit the new perspective to change this unfavorable situation, such as: We can use the semantics to re-weave, store and retrieve the Internet information from the perspective of semantics. The application of ontology reasoning and other related technologies can make the search technology to get rid of the semantic representation limit, and then deep into the semantic level, and then improve the level of retrieval from the user's point of view.

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