An Ontology-based Web Engine

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Abstract

Access to and services for government information in the networked environment offer many opportunities and challenges. However, the abundance of information available on the Web may excite some and frighten others. This paper offers a way that information explorers can pursue information objects relevant to their tasks and apply task action steps to achieve their goals. The combination of task actions and information objects facilitates users' exploratory tasks by adding necessary information required to carry out these tasks.

Keywords: ontology, task action, information discovery, Web

1 Introduction

The amount of material stored in the World Wide Web poses the problem of finding what you want, particularly if users are not experts in the area of interest. They may have difficulty in querying information distributed across multiple sources using familiar terminology, e.g when exploring government information. An attempt has been made to match users' exploratory tasks by guiding users to cluster concepts and providing cross-linked references to browse related information. Therefore, it is important to provide semantic structure of the information environment. Ontology is useful for structuring concepts with their relationships [2,5]. It has been viewed as a general organisational device for the specification of conceptual knowledge. However, it is vital to note that the development of ontology depends on the task context.

The task of information seeking is complex. From a knowledge-based analysis point of view, we need to look at what users need to know about the information objects and actions involved in the exploratory task, and how that knowledge is organised. Our efforts have focused on the use of ontology to support information exploration on government information. Scenarios that arise in the applications motivate the development of ontologies. In this paper, we concentrate on describing users' information searching tasks by developing *user activity ontology*. [3] has proposed *organisational* and *domain activity ontologies* for indexing and classification purposes.

2 User Activity Ontology for Information Searching

User activity ontology is related to information seeking activities carried out by the end-users. Users' activities normally can be described by performing action tasks and information objectives related to information needs. The development of user activity ontology begins by building taxonomic classification of task knowledge and information objects. The combination of task actions and information objects present a dynamic reasoning knowledge. Generic verb or verb phrases represent task-action vocabularies, e.g. apply, appeal, which are domain-independent and can be handcrafted in a generic way. Generic nouns or noun phrases represent a set of objects related to the information. From the end-user point of view, they may not be familiar with organisational structure and terminologies used for business functions and activities with the domain. Therefore, the information objects include a higher-level description of organisational and domain activity ontologies [3]. A combination of a generic verb or a noun such as "verb+noun" can be referred to as a generic problem solving process [6].

The combination of task actions and information objects can then be designed to simulate exploring

behaviour by adding cross-linked references to browse relevant information. The retrieved relevant information can provide users with the necessary information for carrying out the exploration tasks and guide users to avoid getting lost in the cyberspace. For example, if a user is searching on "appeal permanent resident" information, where "appeal" represents the task action, and "permanent resident" is the information object. The retrieved information could be led to "humanitarian program" or "refugee review tribunal" related information objects. With a few mouse clicks, users can efficiently find the necessary information for appealing permanent resident. If a user is looking at "apply permanent resident" information, then the retrieved information could be led to "sponsor for permanent resident" or "resident in Australia" relevant information objects. It should be noted that the combination of task actions and information objects is not a one-to-one mapping. The categorising using verbs or nouns provide more "intelligent" associations to tailor users' information seeking needs. The retrieved relevant information is dependent on the task context. Each retrieved information provides links for descriptions.

3 Related Work

Recent ontology-based Web development focuses on providing knowledge representation for agents, e.g. SHOE (Simple HTML Ontology Extensions) [4]. SHOE allows the Web authors to annotate their pages with semantic knowledge links. It provides an easy way to discover implicit knowledge from the Web. The organisational knowledge of SHOE can be a contribution towards to our proposed system. In addition, the proposed system may not scale well as in a very large domain whereas SHOE has less semantic expressivity. As part of future work, we would be looking at ways to marry SHOE techniques and our proposed system towards more advanced Web search designs.

4 Conclusions

We have illustrated that the proposed ontology-based Web engine supports users' information exploratory task particularly if they are not familiar with the domain. Much of the work on ontologies has focused on encoding domain knowledge using a standard vocabulary [1,2]. We have argued that a distinct ontology for the problem-solving task is equally important. We have discussed that the combination of task actions and information objects facilitates information seeking and discovery.

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