Chapter XIII

Query Formation and Information Retrieval with Ontology

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Abstract

This chapter presents an ontology-based query formation and information retrieval system under the mobile commerce (m-commerce) agent framework. A query formation approach that combines the usage of ontology and keywords is implemented. This approach takes advantage of the tree structure in ontology to form queries visually and efficiently. It also uses additional aids such as keywords to complete the query formation process more efficiently. The proposed information retrieval scheme focuses on using genetic algorithms (GAs) to improve computational effectiveness. Other query optimization techniques used include query restructuring by logical terms and numerical constraints replacement.
Introduction

With the introduction of new technologies such as WAP, HSCSD, GPRS, UMTS, and Bluetooth, it is believed that the e- and m-commerce arena will sooner or later merge its applications with handheld devices to create more opportunities for the birth of a new generation of m-commerce. However, m-commerce is largely unrealized to date because there still does not exist a single application that can attract wireless users to use wireless services. According to a recent survey by Gartner, Inc. (Behrens & McGuire, 2004), besides the importance of coverage of wireless network and pricing issues, the wireless Internet and data services are the next crucial factors that attract users to use wireless services. As such, there is a need to improve the data services over the wireless network. Commonly seen data services include: product brokering, news on demand, stock quotes, stock price alert services, and so forth. One of these services is the information retrieval service.

Information retrieval is an important area of research in information systems and other disciplines such as medicine; library and information sciences; and so forth. Most electronic product information retrieval systems are still not efficient enough to cater to the increasing needs of customers. This is especially serious in the m-commerce arena where the bandwidth of mobile devices is low and large data transfers would not be possible. Thus, the discovery of new information retrieval techniques that would filter through thousands or millions of pages of information and return only minimal, while relevant, information to the users is inevitable.

Semantic Webs can be seen as a huge engineering solution to share and access data. As a globally linked database, it is an efficient way of representing data on the Web such that it is easily processable by machines. In this paper we propose an ontology-based query formation and information retrieval system focused towards use in the e-commerce arena. The system uses the concept of GAs in query modification and is an algorithm that is applicable to a query formation for a knowledge database such as the Semantic Web.

The main objective of this chapter is three-fold: (1) to research the use of ontology to assist the users in shaping up their product enquiries; (2) to study the use of GAs and agents in query restructuring and optimization; and (3) to develop efficient information retrieval services for the m-commerce arena. It proposes a methodology for efficient query formation for product databases and for effective information retrieval systems, which includes the evaluation of retrieved documents to enhance the quality of results that are obtained from product searches.

This chapter discusses the usage of ontology to create an efficient environment for m-commerce users to form queries. The establishment of a method that combines keyword searches with using ontology to perform query formation tasks further allows a more flexible m-commerce environment for users. Also, with the use of GAs, it is hoped that query effectiveness can be achieved, at the same time saving computational time and retrieval time.
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