Chapter XXXVI
Ontology-Based Information Retrieval Under a Mobile Business Environment

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ABSTRACT

The proposed OntoQuery system in the m-commerce agent framework investigates new methodologies for efficient query formation for product databases. It also forms new methodologies for effective information retrieval. The query formation approach implemented takes advantage of the tree pathway structure in ontology, as well as keywords, to form queries visually and efficiently. The proposed information retrieval system uses genetic algorithms, and is computationally more effective than iterative methods such as relevance feedback. Synonyms are used to mutate earlier queries. Mutation is used together with query optimization techniques like query restructuring by logical terms and numerical constraints replacement. The fitness function of the genetic algorithm is defined by three elements: (1) number of documents retrieved, (2) quality of documents, and (3) correlation of queries. The number and quality of documents retrieved give the basic strength of a mutated query, while query correlation accounts for mutated query ambiguities.

INTRODUCTION

Mobile computing will be the next buzzword of the twenty-first century. Presently, consumers demand personalized wireless computing services while they are mobile. This infantile paradigm of mobile computing is opening up new markets. Corporate power users who are at the cutting edge of technology are always armed with an arsenal of mobile equipment.

CURRENT SITUATION AND MOTIVATION OF RESEARCH

According to Reuters and NUA Internet surveys in 1997 (Wieerhold, Stefan, Sergey, Prasenjit, Yuhui, Sichun et al., 2000), about 1.81% people worldwide surf the Internet for information daily. In the same year, according to surveys done by the Forrester Research (Wieerhold et al., 2000) and the Yankee Group, there was a significant increase of online retail sales, from $600 million in 1996 to more than $2 billion in 1997. This value reached $282 billion in 2000 and is still increasing. With the exponentially growing number of Internet users over these few years, the International Data Corporation (IDC) expected an increase to $4.3 trillion by 2005. Thus, as can be seen, trading online has become increasingly important to the commercial world. It is inevitable that e-commerce will be the next strategy that companies will adopt.

At the same time, with the introduction of new technologies such as WAP, HSCSD, GPRS, UMTS, and Bluetooth, together with new and personalized applications, it is believed that the e-commerce arena will sooner or later merge its applications with handheld devices to create more opportunities for the birth of mobile commerce. In fact, research from the IDC expected the mobile portal to reach 55 million users by 2005.

However, according to the IDC, there is a 26% drop in the sales of handheld devices in the first quarter of 2002. One of the reasons why the potential of mobile commerce is largely unrealized to date is because a single killer application that can attract wireless users to use wireless services still does not exist. According to a recent survey by Gartner, Inc., besides the importance of coverage of wireless network and pricing issues, the wireless Internet and data services is the next crucial factor that attracts users to use wireless service. As such, there is a need to improve data services over the wireless network. One of these services is the information retrieval service.

Most electronic product information retrieval systems are still not efficient enough to cater to the increasing needs of customers. Typically, as product information in the Web soared eminently, reusing and sharing of product information has become extremely important. This is especially true in the m-commerce arena where the bandwidth of mobile devices is low and large data would not be possible. Thus, the discovery of new information retrieval techniques is inevitable. Also, observations and studies have shown that the average user often selects inappropriate information retrieval resources and uses them inefficiently and ineffectively. People seem to be content to retrieve any information on their topics, regardless of quality. Few people currently recognize the need for improving their information retrieval skills. Hence, there is a need to simplify the way people form queries to retrieve information.

OBJECTIVES AND RESEARCH CONTRIBUTION

The main objective of this chapter is to improve information retrieval services for the m-commerce arena. After considering the flaws in current information retrieval systems, this chapter proposes a methodology for efficient query formation for product databases in m-commerce. In addition, this chapter proposes a methodology 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 while using ontology to perform query