On an Enhancement of XML Applied for Mobile E-Commerce

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ABSTRACT

Extensible Markup Language (XML) is a textual markup language which becomes more and more important in the Internet web service. However, some distinct disadvantages exist in XML, such as its nature of redundancy, which consumes the limited network’s bandwidth greatly especially in mobile computing. Considering the characteristics of the mobile commerce, the handsets’ memory capability and data processing time are two problems for XML being applied. This paper studies an enhancement of XML for the purpose of application in mobile e-commerce, called SXML, which means Simple XML to enhance the XML used in mobile web service. It helps XML producers minimizing the size effects of XML, e.g., the size overhead and slow implementation speed. Comprehensive simulations show that the SXML could reduce the size of XML documents and reduce the time of implementation, consequently utilize the bandwidth effectively.

Keywords: Compress, E-Commerce, Encoding, Extensible Markup Language (XML), Mobile Service, Simply XML (SXML)

INTRODUCTION

XML is a versatile markup language capable of labeling the information content of diverse data sources including structured and semi-structured documents, etc. (Atique & Raut, 2012). From one perspective, XML is characterized by interoperability, ease of use, and extensibility, which means XML can be adopted in many circumstances; from another, XML has some distinct disadvantages, such as its nature of redundancy, which consumes the limited network’s bandwidth greatly (Harrusi, Averbuch, & Yehudai, 2006; Liefke & Suciu, 2000; Jian & Miller, 2005; Kotsakis & Bohm, 2000).

The nature of redundancy of the XML may have not significant side effects on the fixed computer Internet. But when it comes to mobile web service, these shortcomings will become a big problem as handsets have some limitations such as memory and capacity (Bottcher, Obermeier, & Wycisk, 2007). As a result, it increases in network bandwidth when sending/retrieving the equivalent XML contents. Additionally it increases in memory space that
being required to store the XML locally, and in time required for the XML parser to process the stream. For example, as XML is the main document format in mobile web service, on one hand, a user will have to wait for a long time when downloading a document from server platform because of limited bandwidth; one another hand, the handsets’ memory capability is not enough to hold several uncompressed courseware, whereas the learner has so many things to study etc.

Some efforts have been devoted to solve the redundancy problem (Xu, Shi, & Peng, 2010; Pankowski & Pika, 2008; Chiu, Devadithya, Wei, & Slominski, 2005; Geer, 2005) and the initial results have been achieved. The research (Mok, Fong, & Embley, 2010) gives a hypergraph and a set of embedded functional dependencies to generate redundancy-free XML storage structures with as few scheme trees as possible. And the redundancy-free XML structures guarantee both economy in storage space and the absence of update anomalies. Furthermore, another research studies the problem of the data redundancy in XML Keyword Search by SLCA and proposes a new mode to resolve the redundancy. Then it gives the concept of Indirect-SLCA to reduce the redundancy basing on the notion of Heterogeneous node (Gao, Wang, & Zhang, 2008). But most of them are too complicated to be applied or some new problems are caused.

This paper designs a novice method to keep the advantages of XML while to reduce the redundancy in order to make XML more suitable for mobile web service in e-commerce. Comprehensive simulations show that the SXML could reduce the size of XML documents, consequently utilize the bandwidth effectively.

Rest of this paper is organized as follows. First, we introduce some existing XML compress methods including XML compression an XML Encoding. Then we design the SXML to make it more suitable for mobile web applications of the e-commerce by improving XML language. Simulation and comparison are then presented in detail between XML and SXML. Final section concludes this work.

XML COMPRESSION METHODS

To solve the problem of XML redundancy, there are already some methods which are outlined as follows.

XML Compression

As XML is stored in plain text files, the most obvious approach to XML compression is to use existing text compressions such as Run Length Encoding (RLE) algorithm, Lempel-Ziv (LZ) series and Huffman algorithm (Lu & Gough, 1993).

Each compression has its own characters that the Run Length Encoding algorithm’s compression ratio is the highest among all these algorithms, but it’s too resource consuming and is not fit to use in the handset platform, the LZ series’ main principle is to consider each symbol as the beginning of the data stream and try to match the longest character string, which means the computing process is slow and not suitable for handset either, while Huffman coding is the best choice to compress text files, especially the files are not too large. In recent years, some improved compression methods and technologies have come out. For example, ecADXPI algorithm allows supporting Absolute Document XPath Indexing (ADXPI) and Score Sharing function by a top down scheme approach to improve efficiency of XML retrieval (Wichaiwong & Jaruskulcha, 2012). A new indexing process by re-indexing compressed XML date under Xmill compressor could efficiently improve the indexing compressed XML documents (Jedidi, Arfaoui, & Sassi-Hidri, 2012). Moreover, considering the verbose character of XML, for XML date compression two new approaches compared with other three compressed algorithms (WAP Binary Extensible Markup language, Xmill, Efficient XML interchange) are proposed mainly on compressing rate and
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