

Intelligent Library and Tutoring System for Brita in the PuBs Project

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Abstract. As digital libraries become more popular, information and knowledge overload has become a pressing yet required literature searching problem. Problems with searching in digital libraries will become more complex as the amount of information/knowledge increases. Traditional digital libraries often index words and documents while learners think in terms of topics and subjects. As a result, learners cannot determine how well a particular topic and/or subject is covered, or what types of search methods will provide the required information and knowledge without problems. In order to increase the efficiency and quality of the Brita in PuBs project's activities, an Intelligent Library and Tutoring System for the Brita in PuBs project (ILTS-BP) was developed. ILTS-BP has the ability to personalize, maximize reuse, index, analyse and integrate valuable information and knowledge from a wide selection of existing sources. Also, the authors have integrated ILTS-BP with a Voice Stress Analyser Subsystem. ILTS-BP is briefly analysed in this paper.

Keywords: real-time system, knowledge management, multiple user, intelligent library and tutoring system, Brita in PuBs Project, voice stress analysis.

1 Introduction

Most advanced e-libraries select, organize, retrieve, and transmit tacit and explicit knowledge. Different reports contain explicit criticisms of the libraries' focus on their specific collections and recommendations to focus more on the user's needs. There is a need to overpass key limitations in the development of traditional libraries, i.e. libraries which have been developed for particular content and a specific group of learners. We believe that future libraries will become a practical knowledge storehouse and will offer intelligent opportunities for users.

Search engine rankings have been adopted in most advanced intelligent libraries (Alexandrov *et al.*, 2003, Gutwin *et al.*, 1999, Hsinchun *et al.*, 1998, Kaklauskas *et al.*, 2006, Ruch *et al.*, 2007, Trnkoczy *et al.*, 2006, J. Wang, 2003) and tutoring systems (Armani *et al.*, 2000, Brusilovsky, 2000, Day *et al.*, 2007, Lucence, 2005, and Pouliquen *et al.*, 2005). As part of the ongoing Illinois Digital Library Initiative project, research proposes an intelligent personal spider (agent) approach to Internet searching, which is grounded on automatic textual analysis, general-purpose searches

and genetic algorithms (Hsinchun *et al.*, 1998). Pouliquen *et al.* (2005) that uses parsing techniques to extract information from texts, and provide a proper semantic indexation that is used by a medical-specific search engine. Day *et al.* (2007) use the Jakarta Lucene full-text indexer to index full-texts of textbooks. Jakarta Lucene is a high-performance, fully-featured text search engine library written entirely in Java. Its technology is suitable for nearly all applications that require full-text searches. ITA (Pouliquen *et al.*, 2005) index chapters, sections, and subsections of textbooks. Highlighters are used to highlight the index context. Finally, the ITA provides reading recommendations for students via a chapter similarity function. However, intelligent libraries (Alexandrov *et al.*, 2003, Gutwin *et al.*, 1999, Hsinchun *et al.*, 1998, Kaklauskas *et al.*, 2006, Ruch *et al.*, 2007, Trnkoczy *et al.*, 2006, J. Wang, 2003) and intelligent tutoring systems (Armani *et al.*, 2000, Brusilovsky, 2000, Day *et al.*, 2007, Lucence, 2005, and Pouliquen *et al.*, 2005) with search engine rankings cannot select chapters (sections, paragraphs) of specific texts, which are the most relevant to a student, cannot integrate the chapters (sections, paragraphs) of specific texts into learner-specific alternatives of teaching material and cannot select the most rational alternative, i.e. cannot develop alternatives of training materials, perform multiple criteria analysis and automatically select the most effective variant. However, an Intelligent Library and Tutoring System for the Brita in PuBs project (ILTS-BP) can perform the afore-mentioned functions. To the best of our knowledge the above function has not been implemented before, and so this attempt is the first time someone has done so. The proposed approach helps students to obtain suitably tailored material for any e-learning course. The above-mentioned and other improvements are possible when using the ILTS-BP.

The Brita in PuBs (Bringing Retrofit Innovation to Application in Public Buildings) project is being carried out with the financial assistance of the Framework 6 Programme. The BRITA in PuBs proposal on Eco-buildings aims to increase the market penetration of innovative and effective retrofit solutions so as to improve energy efficiency and implement renewables, with moderate cost additions. In order to increase the efficiency and quality of the delivery of training, teaching and research activities: an Intelligent Library and Tutoring System for Brita in PuBs project (ILTS-BP) have been developed. The developed System is also practically used in three distance MSc study programmes of Vilnius Gediminas Technical University (Real Estate Management; Construction Economics and Business; Internet Technologies and Real Estate Management). Currently, 236 students attend these two-year study programmes. All of them can use ILTS-BP. The main obstacle to wide application of the System in practice is the rather small Domain Model, which is small due to the problems related to copyright: learning material can be included in the Domain Model only with the consent of its authors. Therefore, considerably high financial expenditures are needed.

This paper is structured as follows: after this introduction, Section 2 describes the Intelligent Library and Tutoring System for Brita in PuBs Project; Section 3 depicts the Voice Stress Analyser Subsystem; Section 4 analyses ILTS-BP with Special Emphasis on the Multivariant Optional Module Design and Multiple Criteria Analysis and finally, concluding remarks and future works are presented in Section 5.