Chapter IX

Classroom for the Semantic Web

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Editors’ Notes

Goran, Vladan and Dragan provide an excellent demonstration on how Semantic Web technologies can be applied to didactical contexts. This is a really hot topic. In the coming years, context modelling will require multidisciplinary efforts toward the exploitation of contexts for human computing. We encourage you to read the article by Ambjorn Naeve entitled, The Human Semantic Web, in the International Journal of Semantic Web and Information Systems, Volume 1, Issue 3 (find more details at http://www.idea-group.com/ijswis). Moreover, authors provide an excellent introduction to the topic of Semantic Social Networking, which also reveals many challenges for the modern business organizations. A special issue on the Semantic and Social Aspects of Learning in Organizations has been finalized and will be published in late 2005 in the Learning Organization Journal of Emerald (Guest Editors: Lytras, Sicilia, Kinshuk, Sampson).
Abstract

This chapter emphasizes integration of Semantic Web technologies in intelligent learning systems by giving a proposal for an intelligent learning management system (ILMS) architecture we named Multitutor. This system is a Web-based environment for the development of e-learning courses and for the use of them by the students. Multitutor is designed as a Web-classroom client-server system, ontologically founded, and is built using modern intelligent and Web-related technologies. This system enables the teachers to develop tutoring systems for any course. The teacher has to define the metadata of the course: chapters, the lessons and the tests, the references of the learning materials. We also show how the Multitutor system can be employed to develop learning systems that use ontologically created learning materials as well as Web services. As an illustration we describe a simple Petri net teaching system that is based on the Petri net infrastructure for the Semantic Web.

Introduction

Using current Internet technology to support learning in the classroom is becoming much easier and much more feasible than it used to be. If a network of computers or workstations is available in a classroom (the same as on the global network), it is easy to install and use Apache, Tomcat, or another Web server. It can easily distribute HTML pages generated statically or dynamically by an educational application. Client computers/workstations should only have an Internet browser. Hardware and software requirements for the client machines are minimal.

Two groups of the adaptive education systems are the most frequently used on the Web. These are adaptive hypermedia (AH) and intelligent tutoring systems (ITSs). The AH systems are focused on non-linear and adaptable structure of the educational materials (Brusilovsky, 2003). AH systems provide the user with easy navigation, referencing, and global view to the content. Also, they provide presentational adaptation techniques (the conditional or stretch text, variants of pages and fragments, and frames linked to the concepts).

Both of them (AHS and ITS) are focused narrowly on the specific area of one domain. While the AH systems have compact system design with high coupled components (Brusilovsky, 2001), the ITSs have high-level modularity. ITSs provide user- (student-) oriented design and much more pedagogical knowledge implemented in the system. Today, many AH and ITS stand-alone systems are used for similar educational tasks. The same knowledge is developed at the same time on the different places. This is typically a waste of the domain experts’ time. Therefore, these systems are usually expensive and cannot be used without license, payment, or/and registering.

The learning management systems (LMSs) are much more successful in Web-enhanced education (related to a number of users). LMSs are integrated systems that support a number of teachers’ and students’ needs. Teachers can use a LMS to develop Web-
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