Chapter 2.30
Authoring of Adaptive Hypermedia Courseware Using *AHyCO* System

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ABSTRACT

This chapter describes an approach to the development of an adaptive hypermedia Web-based educational system and presents the model of an AHyCo (adaptive hypermedia courseware) system. An adaptive educational system should contain not only the learning environment for students, but also the authoring environment for teachers. A user friendly authoring module should be the integral part of such a system. The authoring of adaptive hypermedia consists of the development of actual hypermedia content (lessons, tests, etc.) together with the definition of the rules for adaptation. The authoring component of an AHyCo system, described in this chapter, includes both. By utilizing intuitive form-based user interface, it enables teachers from areas other than IT to produce and interconnect complex hypermedia content.

INTRODUCTION

Traditional computer-aided teaching techniques have been greatly enhanced recently by utilizing the hypermedia paradigm. Hypermedia learning programs demand more activity from students, who advance through learning materials in their individual manner. Diverse non-textual media improve student's motivation, resulting in easier learning.

Despite the advantages introduced by hypermedia and WWW, some problems related to the usage of such systems become apparent as well. Traditional organization of courseware inherited

the disadvantages of node-link data model, which does not separate the structure of hypermedia database from its content (Maurer & Scherbakov, 1996). Users can get disoriented, and predefined links do not permit the courseware to be adapted to the users of different backgrounds, qualities and interests.

Adaptive hypermedia (AH) is contemporary area of research within the field of hypermedia. An adaptive hypermedia system (AHS) adapts the presentation of hypermedia content, based on the user model (Brusilovsky, 1999).

An adaptive hypermedia educational system (AHES) should contain not only the learning environment for students, but also the authoring environment for teachers. Easy to use authoring module should be the integral part of such a system.

Here we describe our approach to the development of an AHES and present the model of AHyCo—the system for development and distribution of the adaptive Web-based courseware. Our goal is to develop a complete courseware management system offering learning environment with adaptive navigation, testing, course management and computer-mediated communication, all backed up with corresponding authoring tools. In contrast to the majority of available systems, for example WebCT and TopClass (Robson, 1999), AHyCo system is adaptive. The online tests are used not only for grading of student's knowledge, but also for the guidance in navigation. Only synchronous and asynchronous collaboration facilities have not been implemented yet, but the development of these facilities is in progress.

Particular attention is given to the design of the authoring component, which enables the specification of prerequisites for each lesson, and simplifies the creation of test questions.

BACKGROUND

According to Brusilovsky (1996), under the term adaptive hypermedia systems we denote all hypertext and hypermedia systems that reflect some features of the user in the user model and apply this model to adapt various visible aspects of the system to the user. An adaptive hypermedia system (AHS) adapts the presentation of content or links, based on the user model. We distinguish the two major technologies in adaptive hypermedia: adaptive presentation and adaptive navigation support. Adaptive presentation adapts either the content of a document or the style of the text. Adaptive navigation support concentrates on changing the presentation of links.

The most popular area for adaptive hypermedia research is the educational hypermedia, where the goal of a student is to learn the material on a particular subject (Brusilovsky, 1996). The most important element in educational hypermedia is the user knowledge of the subject that is being taught. Certain students may know almost nothing about the same lesson that may be trivial and boring for another. In both cases the students need navigational help to find their way through the knowledge because they can "get lost in hyperspace" (Maurer & Scherbakov, 1996).

A number of first-generation adaptive hypermedia systems (Carver, Hill, & Pooch, 1999) were built between 1985 and 1993. They were generally standalone PC or Macintosh-based systems with limited adaptability through stereotype-based user models and limited adaptation techniques. ISIS-Tutor is a good example of a first generation adaptive system (Brusilovsky & Pesin, 1994).

Since 1993, the Web has become the primary platform for developing AHES (Brusilovsky, 1999). These second-generation AHS were generally platform independent. They introduced new features such as adaptive multimedia. Some examples are ELM-ART (Brusilovsky, Schwarz, & Weber, 1996), InterBook (Eklund & Brusilovsky, 1998), DCG (Vassileva, 1997), AHM (Da Silva, 1998), CALAT (Nakabayashi, 1997), KBS Hyperbook (Henze & Nejdl, 2000), ALICE (Kavcic, 2001), AHA (De Bra & Ruiter, 2001), and AHA! (De Bra, Aerts, Berden, De Lange, Rous-