Chapter 4.12
Authoring of Adaptive Hypermedia

A. Cristea
Eindhoven University of Technology, The Netherlands

Craig Stewart
University of Nottingham, Jubilee Campus, UK

ABSTRACT

This chapter focuses on the aspect of Authoring in Adaptive Hypermedia from some of its different perspectives. It starts by showing the necessity of research in this area, then describes a new framework model for authoring of Adaptive Hypermedia, LAOS. Within LAOS, the adaptation model, which is the main aspect of adaptive hypermedia, is detailed into a separate model, LAG. The flexibility offered by the LAOS framework is analyzed and estimated. To illustrate the theory, the chapter describes an implementation of this framework, MOT, and test results. The chapter ends with conclusions and discussion on future trends.

INTRODUCTION

Adaptive Hypermedia (AH) (Brusilovsky 2002) is here, and researchers in the field (Bajraktarevic et al., 2003; Brailsford et al., 2002) hope that it is here to stay. Although a relatively new field (dating back only to the early 1990s), it has taken on board the advantages, while avoiding the pitfalls of its parent disciplines, Intelligent Tutoring Systems and User Modelling. An advantage it shares is offering a *personalized environment* (adaptive or adaptable[1]). Moreover, AH moves this environment to the Web. The main pitfall that it managed to avoid is complexity: traditional AH systems are simple, built on sketchy user models, mostly featuring a knowledge attribute overlaid on a simple domain model. This *simplicity* gives it the power of fast response and wide usage range.

From an authoring perspective, however, it turns out that efficient AH is not simple to design. Even with basic domain and user models, creating a powerful adaptive environment requires many alternatives of contents, linking, etc. Furthermore, granularity of information chunks, alternative display modes, etc., have to be taken into consideration.

Therefore, our main aim is to create a framework for powerful, flexible authoring tools for authors of adaptive hypermedia. This chapter translates the main aim into requirements of this framework: *data storage* with sufficient metadata labelling for reuse (both for collaborative authoring and adaptive presentation), *data clustering* depending on the intended level of reuse, and '*automatic authoring*', i.e., automatic generation of some default content structure, labelling and behaviour. We shall see how the products of this research also lead to patterns that could be used to extend existent standards (e.g., LOM, simple sequencing standard, SCORM) or even to generate new standards for AH.

The remainder of this chapter is structured as follows. First, we will give more background information on the driving forces behind the research on authoring of adaptive hypermedia systems, as well as a very short glimpse into the state of the art. Next, we present LAOS, a theoretical framework for authoring of AH, that we claim allows enough flexibility to embrace not only the existing adaptive hypermedia systems, but also to establish a solid basis for structured, pattern-based authoring of adaptive hypermedia. The latter is enabled by LAG, the three-layers model of adaptation granularity. We will also show some automatic transformations allowed by LAOS that give it its flexibility. Following that, we describe MOT (My Online Teacher) (Cristea & De Mooij, 2003a), a system that is gradually implementing the LAOS framework, and sketch the first tests done with MOT. Finally, we try to extract future trends for this line of research, and conclude.

BACKGROUND

Adaptive hypermedia systems were traditionally custom-designed applications for single use implementing hypermedia-based user models (Brusilovsky, 2002). Only recently, their author-ing aspect started being taken into consideration, partly because initial AHs were of small size (Brusilovsky et al., 1996). In such systems, re-use was not an issue. The interest in authoring shows the field's first steps toward maturity, as authoring first requires widely accepted common characteristics.

There are many other reasons why the time is now ripe to concentrate on authoring in adaptive hypermedia instead of on new adaptive hypermedia techniques. Some reasons include (i) the fact that the field is advanced enough; (ii) that we cannot expect any major break-through theoretical advances[2]; and (iii) that there are a number of common features we see repeated in almost all adaptive hypermedia, such as *user model* (Brusilovsky, 2002), *knowledge level* (De Bra & Calvi, 1998), *goals* (Grigoriadou et al., 2001), etc. A framework covering these features could, in principle, cover any type of AH system.

However, the main impetus for authoring research and development in AH comes from outside of the field: from *distance learning* and *Web-based educational systems*, but also from *e-commerce*—all driven by pressure from the fastest growing hypermedia system—the *Web*. The Web is a huge information resource, not just for research laboratories, but for everybody. The 'lost-in-hyperspace' syndrome, which adaptive hypermedia set out to fight, is becoming more of an everyday reality. Personalization is urgently required, in the sense of *adaptability* and *adaptivity* to the end-user. The many successful (educational) hypermedia authoring tools (WebCT, Blackboard, etc.) do not offer enough personalization. Adaptive hypermedia has the answers, but not yet the tools. This fact is gradually being perceived by the AH community, which is now investing more effort now into the authoring issue (Brusilovsky, 2003).

When this research started, authoring research was almost non-existent within adaptive hypermedia. AH taxonomies (Brusilovsky, 2002) and frameworks (AHAM) (Wu, 2001; The Munich

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