



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

 ScienceDirect

Computers & Education 49 (2007) 495–513

---

---

**COMPUTERS &  
EDUCATION**

---

---

[www.elsevier.com/locate/compedu](http://www.elsevier.com/locate/compedu)

# An approach for automatic generation of adaptive hypermedia in education with multilingual knowledge discovery techniques <sup>☆</sup>

Enrique Alfonseca <sup>\*</sup>, Pilar Rodríguez, Diana Pérez

*Department of Computer Science, Universidad Autónoma de Madrid, 29049 Madrid, Spain*

---

## Abstract

This work describes a framework that combines techniques from Adaptive Hypermedia and Natural Language processing in order to create, in a fully automated way, on-line information systems from linear texts in electronic format, such as textbooks. The process is divided into two steps: an *off-line* processing step, which analyses the source text, and an *on-line* step, which executes when a user connects to the system with a web browser, moment at which the contents and hyperlinks are generated. The framework has been implemented as the WELKIN system, which has been used to build three adaptive on-line information sites in a quick and easy way. Some controlled experiments have been performed with real users aimed to provide positive feedback on the implementation of the system.

© 2005 Elsevier Ltd. All rights reserved.

*Keywords:* Architectures for educational technology system; Authoring tools and methods; Multimedia/hypermedia systems

---

---

<sup>☆</sup> This work has been sponsored by CICYT, project numbers TIC2001-0685-C02-01 and TIN2004-03140.

<sup>\*</sup> Corresponding author. Tel.: +34 91 497 2244; fax: +34 91 497 2235.

*E-mail addresses:* [Enrique.Alfonseca@uam.es](mailto:Enrique.Alfonseca@uam.es) (E. Alfonseca), [Pilar.Rodriguez@uam.es](mailto:Pilar.Rodriguez@uam.es) (P. Rodríguez), [Diana.Perez@uam.es](mailto:Diana.Perez@uam.es) (D. Pérez).

## 1. Introduction

The World Wide Web has made hypermedia a widely used mean for conveying information. However, the quantity of data available on the Internet grows steadily, and the large amounts of information can pose potential problems to the web surfer (Wu & de Bra, 2002): firstly, static web sites offer the same information to all kinds of users, independently of their interests. In this situation, it can be difficult for students to find relevant data with which to increase their knowledge about some topic, or they may be forced to spend some time browsing uninteresting information before finding it. Secondly, web pages can also produce *comprehension problems* to the students, because the author of the pages is making implicit assumptions about their previous knowledge.

The previous problems have motivated research in many different areas. On the one hand, there appeared *Adaptive Hypermedia* (AH) applications that try to provide the students with the information they need, and to guide them in finding their way from document to document. AH has been applied in Information Retrieval applications (Baeza-Yates & Ribeiro-Neto, 1999), that either search for or filter information inside huge repositories of documents or in the Internet, according to some user's profile or query; adaptive hypermedia educational systems, that help the students to navigate across a course in function of the concepts that they have already learnt; or on-line information systems, that try to show the users the information that they need according to their interests and context (e.g. museum information systems).

On the other hand, there is a wholly different line of applications, thought to ameliorate the problem of the information overload, which stemmed from research on *Natural Language Processing* (NLP). Here, we may cite *Information Extraction* applications, that obtain structured information from textual documents; *Question Answering systems*, that look for the answer of a question written by a user in a collection of documents, or *Text Summarisation* applications, that condense the relevant information found in a larger textual source. In some cases, *Information Retrieval* (IR) applications use tools from the field of computational linguistics, such as stemmers, shallow parsers, language identification or multilingual resources. Therefore, we can also include IR in this group of applications.

This work centres on automatically building hypermedia sites that are adapted to the needs of the particular students who want to gain additional knowledge apart from that studied in a course. The following sections further specify the task addressed: firstly, Section 2 describes the motivations for attempting the work. Next, Section 3 describes the requisites with which it must comply, and the general architecture designed. Section 4 describes the different textual resources that were used for constructing some example adaptive sites, and the evaluation performed with those sites. Finally, Section 5 contains a discussion on the conclusions and contributions of this work.

## 2. Problem addressed

AH appeared as a mean to overcome the *one size fits all* paradigm, providing the framework needed to tailor web pages to the needs of the specific users. The adaptation is usually based

Download English Version:

<https://daneshyari.com/en/article/349936>

Download Persian Version:

<https://daneshyari.com/article/349936>

[Daneshyari.com](https://daneshyari.com)