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## Editorial

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**Biographical notes:** Ioannis Hatzilygeroudis is currently an Assistant Professor at the Department of Computer Engineering and Informatics, University of Patras, Greece. He is the Associate Editor-in-Chief of the *International Journal of Artificial Intelligence Tools (IJAIT)* and member of the Editorial Boards of the *International Journal of Hybrid Intelligent Systems (IJHIS)* and the *International Journal of Web-Based Communities (IJWBC)*. He has also been member of the PCs of several AI related conferences. His main research interests include artificial intelligence, knowledge representation, expert systems, knowledge engineering and intelligent educational systems. He has published over 50 papers.

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There have been a great number of research efforts in designing and implementing web-based education systems that offer personalised learning or other personalised educational facilities to users. Personalisation concerns a number of educational activities or facilities, like lesson planning, teaching content specification, answer or solution analysis, problem solving support, student evaluation, test generation, student collaboration, class monitoring, educational resources recommendation, etc. Personalisation is achieved by using methods/techniques coming from two main sources: Artificial Intelligence (AI) and Adaptive Hypermedia (AH). AI methods/techniques include: knowledge representation and reasoning, expert systems, AI planning, machine learning, neurocomputing, web usage mining or filtering techniques etc. AH methods/techniques include: adaptive text presentation, adaptive link annotation, adaptive link sorting, etc. AH methods/techniques may use AI methods/techniques for their implementation. However, most of the existing Adaptive Education Hypermedia Systems use methods/techniques that can hardly be considered as 'intelligent'. So, web-based intelligent/adaptive education systems that combine an AI method/technique either with another AI method/technique or with an AH method/technique for implementing the same or different educational activities/facilities constitute an interesting research direction.

Based on the above perspective, a workshop on 'Combining Intelligent and Adaptive Hypermedia Methods/Techniques in Web-Based Education Systems' was organised in conjunction with the 16th ACM Conference on Hypertext and Hypermedia (HT'05) held in Salzburg, Austria, in September, 2005. Eighteen papers from ten different countries were submitted to the workshop. The papers were carefully reviewed by at least two members of the program committee. Finally, six full and six short papers were accepted.

The authors were then invited to submit extended versions of their papers for possible inclusion in this special issue. After a second journal-level peer review round (and in some cases a third one) for the extended versions, finally nine (9) papers were accepted for publication, five (5) of them as full papers and four (4) of them as short papers. A brief overview of the papers is given below.

#### *Full papers*

- The work of Constantinos Koutsojannis et al. (*Using a hybrid AI approach for exercise difficulty level adaptation*) concerns a combination of the expert systems approach with a genetic algorithm approach for determining the difficulty levels of exercises in a web-based educational system. Difficulty levels are adapted to both the tutors experience and the student background. Experimental results support their approach.
- Mylonas et al., in their paper (*E-learning and intelligent content adaptation: an integrated approach*), present a web-based education system, called SPERO, which is capable of automatically extracting user profiles and use them for e-learning content adaptation to the users. To this end, an intelligent clustering technique is used.
- Sapiro et al. deal with educational discussion boards in their paper (*Annotating educational discussion boards to help students who are blind*) aiming to help blind students. They use a labelled tree based classification scheme to organise posted messages. Labels, which represent inter-dependency relations between messages, are specified via a rule-based system that allows for dynamic update of them.
- In their paper (*Adaptation languages as vehicles of explicit intelligence in adaptive hypermedia*) Stash et al. address the idea of explicitly representing the intelligent, adaptive behaviour of personalised web courseware, by separating it from the domain model. They present and compare two adaptation languages, LAG and LAG-XLS, based on that idea. The results reveal that the above idea is realistic.
- In the paper by Vassilyeva et al. (*Feedback adaptation in web-based learning systems*), a quite profound overview of the concept of feedback in web-based learning systems is the main issue. A taxonomy of feedback regarding the functions of feedback, its complexity, intention, time of occurrence, and way of presentation is presented. Also, a classification of feedback according to the level and way of adaptation is proposed. Finally, the conceptual framework of feedback adaptation in web-based learning systems is outlined.

#### *Short papers*

- Bártek and Kopeček in their paper (*Adapting web-based educational systems for the visually impaired*) propose methods for transforming web-based systems into speech dialogue systems. The methods represent techniques for constructing speech based mixed-initiative educational systems that are suitable especially for motor and visually impaired students.

- In their paper (*The use of concepts to improve content analysis in a distance learning system*), Carbonaro and Ferrini introduce EasyInfo, an hybrid recommender architecture extension, which processes resources to extract concepts (not just words) from the documents using semantic capabilities. Then, they are used to classify, retrieve and suggest documents with high semantic relevance with respect to the student and resource models.
- The work of Frigo et al. (*A method for modelling adaptive interactions in intelligent Tutoring Systems*) concerns a method, based on Ontologies and Hierarchical Object Petri Nets, for coupling the domain, student and pedagogical models in an Intelligent Tutoring System in such a way that the system can adapt itself to the student needs.
- Licchelli and Semeraro propose in their paper (*Student profiles to improve searching in e-learning systems*) a system, the Profile Extractor, based on Machine Learning techniques, which automatically builds the student model. Then, a Learning Management System and the Profile Extractor are integrated to improve searching among digital libraries.

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