Incorporating Learning styles in Adaptive Hypermedia

This research concerns providing support for adaptation to user’s learning/cognitive styles in adaptive hypermedia systems in general, and in AHA! system (The Adaptive Hypermedia Architecture) in particular. At the Eindhoven University of Technology the development of the AHA! system (author prof. Paul De Bra) dates back to 1996. Since July 2001 Natalia Stach was assigned as an assistant researcher in AHA! project. Later on the idea of incorporating learning styles in the system was proposed as a topic for a PhD thesis.

Adaptive hypermedia tries to deal with the fact that the users are individuals. Most adaptive educational systems take into account learner features like goals/tasks, knowledge, background, hyperspace experience, preferences and interests. However, less attention has been paid in adaptive hypermedia to the fact that people have different approaches to learning, namely that the individuals perceive and process information in very different ways. We refer to these differences as Learning Styles.

Recent researches are trying to alleviate this and integrate learning styles in the design of their adaptive applications (ARTHUR, iWeaver, CS388, AEC-CS, LSAS, MANIC, INSPIRE, Tangow). Different systems provide adaptation to learning styles in terms of content adaptation, navigation paths or usage of multiple navigational tools. However, in most cases the choice of learning styles and corresponding strategies to be applied is made by the developers of the system and not by the authors of the applications. Also in most systems the information about the user’s learning styles cannot be updated during the interaction with the system.

The proposed research tries to avoid the limitations described above. We assume that the web-designers (or authors) might want to apply various strategies for different applications and not only those specified by the developers of the system. Furthermore, as we are no psychologists, we cannot recommend any particular instructional strategy for a particular learning style. We can only research the implementation of various instructional strategies as specified by the cognitive science literature. We also suppose that for the same learning style various authors might have different visions of the corresponding strategy to be applied. Therefore the research proposes the development of a high-level authoring tool which will allow the authors defining their own adaptive strategies and specifying which instructional strategy corresponds to which user type. From the end-users’ side perspective, we assume that it is always important to provide them with different instructional strategies while using an application. So an option for them is to try different ones and select the one which corresponds better. Along with the instructional strategies the proposed tool should allow the authors defining the monitoring strategies or the ways to infer the user’s preferences during the interaction with the system. This can be done through observing his/her browsing behaviour. Therefore the information about the user’s preferences (preferences corresponding to some learning styles) which is part of the user model can be updated. And a strategy corresponding to another learning style might be suggested to the user.

In order to define the strategies or the adaptive rules adjusting the presentation to the user we need to provide the authors with some formalism. The adaptation language should be reusable and extendable as later on we will want to be able to create new strategies requiring new elements. The language should be connecting to the new emerging Web standards, to enhance reusability.

To achieve this we define the XML (E XTensible Markup Language) Learning Style Adaptation Language for AHA! and specify each strategy in a separate XML file. The only limitation for the authors while creating the strategies is to use only those elements which are present in the DTD (Document Type Definition) defined for our language.