Adaptation and user modeling in hypermedia learning environments using the SEM-HP model and the JSEM-HP tool

Nuria Medina-Medina · Fernando Molina-Ortiz · Lina García-Cabrera

Received: 14 January 2010 / Revised: 20 May 2010 / Accepted: 23 October 2010 / Published online: 13 November 2010 © Springer-Verlag London Limited 2010

Abstract This paper presents a model, called SEM-HP, which enables the development of evolutionary hypermedia systems that can adapt their functioning to each user and their structure to a particular group of users. The individual adaptation feature manages a user model that includes the personal data, experience, preferences, knowledge, and interests of each user. It applies knowledge-based adaptation techniques to the following tasks: (1) personalized selection of the navigation structure, (2) hiding and disabling of links to inappropriate information, (3) positive annotation of interesting links, (4) generation of guided routes, and (5) building of personalized conceptual summaries. The group adaptation feature uses transition matrices to model the navigational activities of a group of users and, based on these, suggests modifications to evolve the navigation structures defined by the author to bring them closer to the mental concept of the majority of users. The paper also introduces a general taxonomy of user models that makes it possible to classify any model according to various features of its structure and management. In addition, the taxonomy is used to classify the UM managed in SEM-HP, thus revealing its strengths and weaknesses. The last part of the paper describes a teaching experiment performed using the JSEM-HP tool, which is based on the SEM-HP model. This description includes the educational system created with the tool, the usage of the tool in the classroom, the evaluation performed after the tool was used, and the results obtained.

Keywords User model · Adaptation · Hypermedia system · Software evolution

N. Medina-Medina (✉) · F. Molina-Ortiz
University of Granada, Granada, Spain
e-mail: nmedina@ugr.es

F. Molina-Ortiz
e-mail: fmo@ugr.es

L. García-Cabrera
University of Jaén, Jaén, Spain
e-mail: lina@ujaen.es