Adaptable and Adaptive Web–Based Educational Systems

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INTRODUCTION

Nowadays, the use of computers and Internet in education is on the increase. Web-based educational systems (WES) are now widely used to both provide support to distance learning and to complement the traditional teaching process in the classroom.

To be very useful in the classroom, one of the characteristics expected in a WES is the ability to be aware of students’ behaviors so that it can take into account the level of knowledge and preferences of the students in order to make reasonable recommendations (Hong, Kinshuk, He, Patel, & Jesshope, 2001).

The main goal of adaptation in educational systems is to guide the students through the course material in order to improve the effectiveness of the learning process.

Usually, when speaking of adaptive Web-based educational systems, we refer also to adaptable systems. Nevertheless, these terms are not really synonyms. Adaptable systems are abundant (Kobsa, 2004). In these systems, any adaptation is predefined and can be modified by the users before the execution of the system. In contrast, adaptive systems are still quite rare. In adaptive systems, any adaptation is dynamic which changes while the user is interacting with the system, depending on users’ behaviors.

Nowadays, adaptable and adaptive systems recently gained strong popularity on the Web under the notion of personalized systems. A system can be adaptable and adaptive at the same time.

In educational context, adaptable systems include also those systems that allow the teacher to modify certain parameters and change the response that the system gives to the students.

In this situation, we claim that, in educational context, it is important to provide both types of personalization. On one hand, it is necessary to let teachers control the adaptation to students. On the other hand, due to a great diversity of interactions that take place in a WES, it is necessary to help teachers in the assessment of the students’ actions by providing certain dynamic adaptation automatically performed by the system. In this article, we will present how we can obtain adaptable and adaptive systems. Next, we will briefly present how we combine both types of personalization in PDINAMET, a WES for Physics. Finally we will describe some future trends and conclusions.

BACKGROUND

To provide personalization, systems store the information needed in the so-called models for adaptation. These models contain information about users’ characteristics and preferences (the so-called user model). Educational systems also need information about the domain that is being taught (the so-called domain model) and the pedagogical strategies that will be followed when guiding students (the so-called pedagogical model). The first systems in incorporating these models were the Intelligent Tutoring systems (Wenger, 1987).

These models usually make use of an attribute-value representation. The value of each attribute can be obtained directly from the users by means of initial questionnaires (for example, to acquire personal data). Other attributes can be directly obtained from the data that the system logs from the users’ interaction (for example, number of course pages visited) (Gaudioso & Boticario, 2002). Neverthe-
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