The Design of e-Learning Environment Oriented for Personalized Adaptability

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Abstract

A design of e-Learning environment is described for personalized adaptability. At first, we explain the whole system of our learning management system, WebClass RAPSODY, which has been developed to stand up to use by whole students in a university. In this topic, there are two points, 1) infrastructure construction/maintenance in university, 2) improvement of LMS to use it for official lecture of university. Then, new developing function is explained including unit for learning mode to monitor and analyze learner’s learning status and unit for contents to search and analyze content’s status. After learning a content, this system indicates next suitable content, with data mining of learner’s status and content’s status by genetic algorithm (GA). This function could support learner to sustain e-learning with well-understanding of contents and highly-motivation to learning.

1. Introduction

Our university has a three-year national support project named “Selected Efforts of the Distinctive University Education Support Program (Good Practice Project, abbreviated as GP Project) since April 2004 ([1], [2]). In this project, we developed new Learning Management System (LMS), WebClass RAPSODY by modifying a commercial LMS, WebClass™ [3].

2. The Learning Support Functions of RAPSODY

2.1 Infrastructure construction in a university

To use WebClass RAPSODY for official lectures, about 5000 students and 1000 subjects should be registered. As large-scale number students are registered, it is necessary to certify ID and password automatically. Thus LDAP certification service is used to register learners to WebClass RAPSODY, which is provided by the computer center in our university. The department of educational affair offers information about the registered subject. Unfortunately, the different manufacturer constructed the system of educational affair from WebClass. That is, we need to develop a module to change code of registration information in order to register it to WebClass RAPSODY.

2.2 LMS functions improvement

There are five modules in WebClass RAPSODY (Figure 1). One of five modules, that is administration module, works for registration such as certification of ID and password, change of registration information code, mentioned in 2.1. 2.2.1 Course management module. Course management module pick up information from LOM database and content database, and provide multi-choice, fill-blank, combination and order-correct test, as well as report task. 2.2.2 Authoring module. It converts files of text, LaTeX, image and flash into HTML, and simulations with Java Applet are displayed by web browser. P4Web which synchronizes movies with slides [4] is built into authoring module. Simple streaming VOD can be used as well. 2.2.3 Collaborative learning module. Collaborative learning module provides group BBS, mail, Wiki and peer-assessment. Data from these tools is sent to assessment module, and analyzed in order to realize interactive learning beyond time and space. 2.2.4 Assessment module. In assessment module, there are ePortfolio/eKarte, monitoring learning log and learning pattern, mentoring, searching specific learner, managing learner’s task and feedback of task status. These tools help teacher know learner’s status and analyze learning log for mentoring and feedback to learners.
3. The System Information for Personalized Adaptation

The design of system information for personalized adaptation is described here. Two units for this new function have been developed and analyze module is under constructions.

For indicating personalized content to learners, two units are needed. One is the unit for learning mode of individual learner and another is one for contents as suitable learning environment (Figure 2).

In the unit for learning mode, the log of learner’s behaviour in WebClass RAPSODY is collected from learning log database. Then the individual learning pattern is analyzed from the log of learner’s behaviour, and it records in the individual learning log database. The individual learning pattern includes his/her achievement, access number, access time, access period and behaviour in a course.

On the other hand, in the unit for contents, there is a learning environment search agent, which searches data about learning in both WebClass RAPSODY and other LMSs. Then the trait of contents is analyzed from information collected by the agent, and it records in the LOM database. The trait of contents includes its domain, level, style, period and prerequisite needed to learner.

After learning one content or section in a course, personalized contents module starts selecting next suitable contents. A learner finishes learning a content, then these learning activities are sent to analysis module in order to analyze his/her learning mode. By the individual learning mode, personalized contents module selects the suitable next content to the learner from LOM database, in which various contents data has been corrected by the search agent (Figure 3).

The content is selected from the LOM database by a genetic algorithm (GA) engine, which is capable of testing the fitness of a series consisting of several contents [5]. It is helpful for the learner to determine their own learning goal. The fitness function of GA is as below:

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f(x)=w_1f_1(x)+w_2f_2(x)
\]

\(w_1, w_2: \) weight for \(f_1(x)\) and \(f_2(x)\)

\(f_1(x): \) fitness between achievement and level

\(f_2(x): \) fitness between mode and form

4. References


