



Chapter VIII

Concept Effect Model: An Effective Approach to Developing Adaptive Hypermedia Systems

Gwo-Jen Hwang, National University of Tainan, Taiwan

Abstract

With the recent rapid progress of network technology, researchers have attempted to adopt artificial intelligence and use computer networks to develop adaptive hypermedia systems. The idea of adaptive hypermedia is to adapt the course content for a particular learner based on the profile or records of the learner. Meanwhile, researchers have also attempted to develop more effective programs to evaluate the student learning problems, so that the adaptive hypermedia systems can adapt displayed information and dynamically support navigation accordingly. Conventional testing systems simply give students a score, and do not give them the opportunity to learn how to improve their learning performance. Students would benefit more if the test results could be analyzed and hence advice could be provided accordingly. Concept effect model is an effective approach to coping with this problem. In this Chapter, the model and its relevant work are introduced.

Advance of Hypermedia Systems

With accelerated growth of computer and communication technologies, researchers have attempted to adopt computer network technology for research on education. Snow and Farr (1987) suggested that sound learning theories are incomplete or unrealistic if they do not include a whole person view, integrating both cognitive and affective aspects, which implies that no educational program can be successful without due attention to the personal learning needs of individual students. Brusilovsky (1998) suggested using adaptive hypermedia to support individual learning. The idea of adaptive hypermedia is to adapt the course content for a particular learner based on the profile or records of the learner (Hwang, 1998).

Most of the adaptive hypermedia systems can adapt displayed information and dynamically support navigation through hypermedia material. For example, Vasandani and Govindaraj (1989, 1991, 1995) proposed an intelligent tutoring system that can assist operators in organizing their system knowledge and operational information to enhance operation performance; Gonzalez and Ingraham (1994) developed an intelligent tutoring system, which is capable of determining exercise progression and remediation automatically during a training session according to the students' past performance. Moreover, Harp, Samad, and Villano (1995) employed the technique of neural networks to model the behavior of students in the context of an intelligent tutoring system. They used self-organizing feature maps to capture the possible states of student knowledge from an existing test database. Later, Ozdemir and Alpaslan (2000) presented an intelligent agent to guide students throughout the course material on the Internet. The agent can assist the students in learning concepts by allocating navigational support based on their knowledge levels. Clearly, the development of adaptive hypermedia systems has become an important issue in both computer science and education (Pugliesi & Rezende, 1999; Rosic, Slavomir, & Glavinic, 2000; Wong, Quek, & Looi, 1998; Yoshikawa, Shintani, & Ohba, 2000).

Paolucci (1998) addressed the importance of individualization in hypermedia that any strategy should be adaptive and personalized. To insure personalization, adaptive hypermedia systems should be capable of diagnosing and identifying each student's misconceptions. Therefore, it becomes an important issue to identify student learning problems such that the adaptive hypermedia systems can assist the students in improving their learning performance accordingly.

In the meanwhile, the development of online testing systems has also attracted the attention of researchers. Taking GRE (graduate record examinations) as an example, students have taken this test on computers since 1992, and the paper-and-pencil form had almost been abandoned in 1999. Lots of companies and educational institutes have been working on developing computerized testing

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