Chapter 8
A Method of Building Learner Model in Personalized E-Learning

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ABSTRACT

Learner modeling is the key aspect in personalized e-learning. The quality of the personalization largely depends on the accuracy of the learner model. The core data of a learner model include generally learner’s personality characteristics, interesting etc. While personality characteristics can describe a learner’s stable traces internally, interest can describe something that a learner wants externally. But, a learner’s personality characteristic may have many attributes, and all of them may not have equal values, while learner interests exist implicitly in the information of learner network behavior. The work discusses and evaluates how to find the key personality attributes and their weight, and how to mine learner interest from learner behavior. The method has been successfully used in China e-learning for a major research university. The experimental evaluation shows the modeling method is effective in personalized e-learning.

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INTRODUCTION

The growing information on the Web is exceeding limited human cognitive capabilities and users do not have sufficient knowledge or time for choose, so personalized information services become a pressing matter recently (Berkovsky et al. 2008). Nowadays, there has been a shift from the industrial age to the information age and many of traditional instructional models are no longer suitable for today’s society characterized by rapid change, global communication and high technology (Reigeluth, 1997a, 1997b). Reigeluth maintains that one of the key results of this shift is that instruction needs to be customized rather than standardized and it needs to be learner-centered and help people learn and develop their potential. The instructor needs to become a facilitator, empowering the learners to construct their own knowledge, rather than being the sole source of direction and knowledge in the class (Reigeluth, 1997a, 1997b, 1999).

The combined power of new communications and computer technologies is the driving force in this approach. The World Wide Web can be fruitfully employed to support every aspect of e-learning. The key aspect of hypermedia is that it should provide easy access to information within an interactive and customizable environment. The web-like linking of ideas that characterizes hypermedia is more akin to the functioning of human cognition than the traditional linear structure found in most educational programs. Also, as a web structure grows rapidly, it is easy for end users to customize the learning environment (Reigeluth, 1999).


The quality of the personalization largely depends on the accuracy of the user model. Learner modeling is the key aspect in personalized e-learning. The core data of a learner model include generally learner’s personality characteristics, interest, etc. While personality characteristics can describe a learner’s stable traces internally, interest can describe something that a learner wants externally. But, a learner’s personality characteristic may have many attributes, and all of them may not have equal values, while learner interests exist implicitly in the information of learner network behavior. The work discusses and evaluates how to find the key personality attributes and their weight, and how to mine learner interest from learner web behavior log.

Some fundamental learning theories show that learning strategies are vital aspects of personalized learning (Liu, 2002; Liu, 2004). Studies in educational psychology show that learning strategies are greatly affected by the learner’s personality characteristic (Liu, 2002; Vermetten, 2001). Personality characteristic refers to often subtle but relatively stable traits that are part of a person’s inner being. Physiologically, the characteristic includes physical traits that can be distinguished by human senses. Psychologically, the characteristic includes intellectual types, personal interests, motivation, emotion, will and others (Yang, 2003).

Finding a learner’s key personality characteristic attributes is a challenging job. First, it is necessary to describe a learner’s characteristic and obtain it quantitatively. Second, it is important to discover the key attributes because the personality characteristic consists of hundreds of attributes and the importance of these attributes is not equal, with some attributes even being redundant. If all attributes in a personalized e-learning environment are considered, the problem of “dimension disaster” becomes unavoidable. One example will be an e-learning university where thousands of students are enrolled and each of them needs hundreds of attributes to describe his/her characteristic. In this
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