Chapter 110
Recommending Academic Papers for Learning Based on Information Filtering Applied to Mobile Environments

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ABSTRACT

Mobile learning is about increasing learners' capability to carry their own learning environment along with them. Recommender Systems are widely used nowadays, especially in e-commerce sites and mobile devices, for example, Amazon.com and Submarino.com. In this chapter, the authors propose the use of such systems in the area of education, specifically for the recommendation of learning objects in mobile devices. The advantage of using Recommender Systems in mobile devices is that it is an easy way to deliver recommendations to students. Based on this scenario, this chapter presents a model of a recommender system based on information filtering for mobile environments. The proposed model was implemented in a prototype aimed to recommend learning objects in mobile devices. The evaluation of the received recommendations was conducted using a Likert scale of 5 points. At the end of this chapter, some future works are described.

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INTRODUCTION

Nowadays, studies focusing mobility in distributed systems are being stimulated by the proliferation of portable electronic devices (for example, smart phones, handheld computers, tablet PCs, and notebooks) and the use of interconnection technologies based on wireless communication (such as WiFi, WiMAX, and Bluetooth). This new mobile and distributed paradigm is called Mobile Computing (Satyanarayanan, 1996). Moreover, mobility together with the widespread use of wireless communication enabled the availability of computational services in specific contexts – Context-aware Computing (Dey et al., 1999). Furthermore, researches related to adaptation brought the possibility of continuous computational support, anytime and anywhere. This characteristic is sometimes referred as Ubiquitous Computing (Weiser, 1991; Grimm et al., 2004; Saha & Mukherjee, 2003; Satyanarayanan, 2001).

The application of mobile and ubiquitous computing in the improvement of education strategies has created two research fronts called Mobile Learning and Ubiquitous Learning. Mobile learning (m-learning) (Tatar, 2003) is fundamentally about increasing learners' capability to carry their own learning environment along with them. M-learning is the natural evolution of E-learning, and has the potential to make learning even more widely accessible. However, considering the ubiquitous view, mobile computers are still not embedded in the learners' surrounding environment, and as such they cannot seamlessly obtain contextual information.

On the other hand, Ubiquitous Learning (Barbosa, et al., 2007; Lewis, et al., 2010; Ogata, et al., 2010) refers to learning supported by the use of mobile and wireless communication technologies, sensors and location/tracking mechanisms, that work together to integrate learners with their environment. Ubiquitous learning environments connect virtual and real objects, people and events, in order to support a continuous, contextual and meaningful learning. A ubiquitous learning system can use embedded devices that communicate mutually to explore the context, and dynamically build models of their environments. It is considered that while the learner is moving with his/her mobile device, the system dynamically supports his/her learning by communicating with embedded computers in the environment. The opportunities made available by the context can be used to improve the learning experience.

The opportunities are clear but educators need to face some challenges. The greatest challenge with which every educator faces is the organization of content and activities aimed at the development of certain competencies in students. This challenge is intensified when we try to identify and recommend different materials, customized to each student based on individual needs and interests.

This chapter proposes a system to make personalized recommendations of learning objects (LO) using mobile devices, according to students' interests ("tastes" for certain learning objects). Learning objects are understood here as digital learning materials developed in a modular way so that they can be used separately and together - based on an object oriented paradigm (Wiley, 2000). In this sense, a scientific paper, a web page, a simulator, a program of planned questions and answers, all may be considered learning objects.

Among the computational techniques to assist in the search for relevant information, Recommender Systems (Adomavicius & Tuzhilin, 2005) are able to automatically identify contents that are appropriate for each individual based on their characteristics or "tastes", and the relevant content can be acess by a student using a mobile device.

RECOMMENDER SYSTEMS AND LEARNING OBJECTS

There are several applications of content retrieval which try to assist users in identifying items of interest. However, it is common that these