Smart Phone based Data Collecting System for Analyzing Learning Behaviors

Chengjiu YIN[a]*, Fumiya OKUBO[b], Atsushi SHIMADA[b], Kentaro KOJIMA[b], Masanori YAMADA[b], Hiroaki OGATA[b] , Naomi FUJIMURA[a]
[a]*Innovation Center for Educational Resource (ICER), Library, Kyushu University, Japan*
[b]*Faculty of Arts and Science, Kyushu University, Japan*
*yin.academic@gmail.com

Abstract: Nowadays, it is a hot topic to analyze the huge amount of data in the world. This issue also exists in the learning during students' life. The learning data are collected only to record students' learning status. As a result, most learning data are not used to improve the quality of learning for students. In this paper, we propose an order made education system, which can recommend students to select the courses they want to learn. In order to analyze students' learning behaviors, we collect students' learning data by using mobile devices.

Keywords: Data Mining, Analyzing Learning Behaviors, Big Data, Mobile learning

1. Introduction

Sensor networks have been widely used to detect certain aspects of the contexts of our daily lives, which embed computation and communication components into the environment (Peng et al., 2009).

By 2020, Ministry of Education, Culture, Sports, Science and Technology (MEXT) is scheduled to change all the textbooks for elementary, middle, and high schools into digital textbooks in Japan[1]. Using the digital textbooks, all the learning history can be collected; meanwhile this will create a huge amount of data. Therefore, how to analyze the huge amount of data has been a hot topic, especially in the students' daily learning life. However, most of learning data collection is not aiming at giving students suitable remainders about students' learning status.

We carry out a BYOPC (Bring Your Own PC) program in Kyushu University, which encourage all students to use their own PCs in the University campus. We have set sensors in the university campus to collect and analyze the students' behavior and accumulate various educational data; moreover, this year we are planning to offer digital textbooks for the freshman of our university. All of these learning logs can be used for demonstrating students' learning behaviors. However, most of the system analysis does not focus on giving suggestion of students' learning status.

In this paper, by using mobile devices, sensor technologies, and digital textbooks, we propose a system to collect students' learning data and give students suitable remainders by analyzing students' learning behaviors. The system also provides recommendation and navigation for students to use their available space and free time effectively.

2. Related Work

2.1 Analysis of learning behaviors

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[1] http://www.mext.go.jp/

Nowadays, many of studies are focusing to analyze student web-based learning behaviors. For example, Hwang et al. (2008) proposed to use Meta-Analyzer to assist the teachers to analyze student web-searching behaviors while they are using search engines for problem solving. Tsai at al. (2011) explored the correlates among teachers' epistemological beliefs concerning Internet environments, their web search strategies and search outcomes.

We can use our system to analyze students' learning behaviors and make students to remind their their learning status.

2.2 Open Educational Resources

Open educational resources (OERs), such as OCW, Moocs, have been widely documented recently. Learners can freely access these learning resources anytime and anywhere. Compared with OERs, traditional educational resources, such as books, textbooks, or their learning contents cannot easily be accessed in online. There are many difficulties in verifying the educational effectiveness with the traditional educational resources and supporting group learning.

Although there are various types of traditional learning resources, there is no research about measurement of the educational effects with those traditional learning resources.

3. System Overview

Students can use the various educational resources in many kinds of e-learning systems, and their learning history will be recorded by those systems.
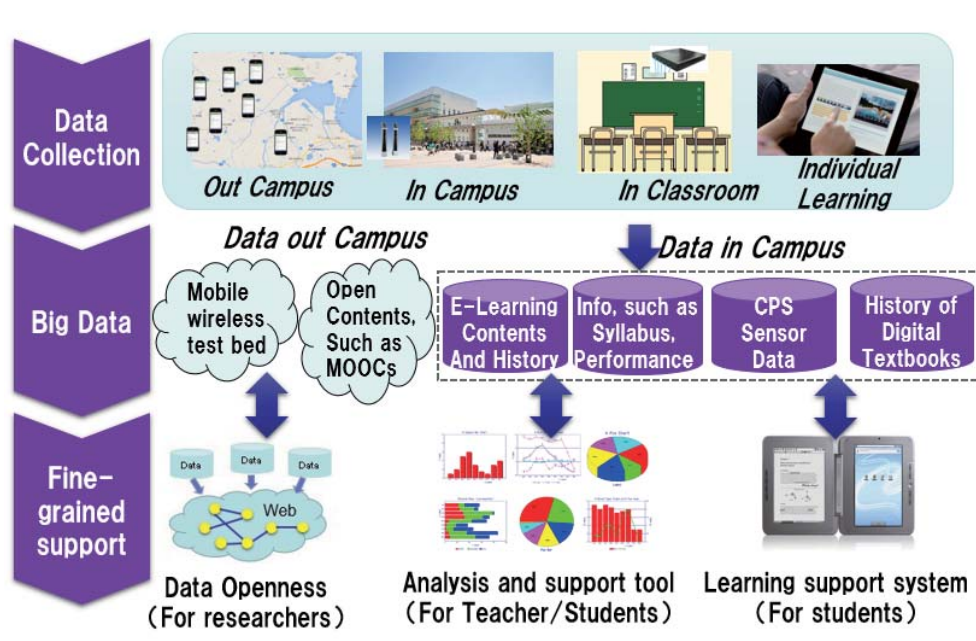

Fig 1. System overview.

As shown in the Fig. 1, many kinds of sensors are set in the campus of Kyushu University, in order to measure and visualize the learning effectiveness; our mobile system is used to collect and analyze various kinds of learning logs. Based on the analyzing results, the system provides recommendation and navigation for the users.

As for the experiment, we use not only the static data such as learning history and performance, but also the activity log such as the operation log of digital textbooks obtained from the camera or video sensors arranged on campus.

4. Scenario

Fig. 2 Underline

Fig3. Comment

Fig.4 Full text search

Mr. X is Japanese and he is studying Chinese in the classroom by using the digital textbooks. He can underline the important parts (Fig. 2), write his comment (Fig. 3), and carry out a full text search (Fig. 4). If he have some questions about Chinese language and need somebody to help him, he memorizes questions with the digital textbook. Then, the system searches a helper for him automatically; the system discovers some helpers who are good at Chinese finally. By using the data of the GPS sensor, the system recommends a closest helper Mr. Y who is in the 3rd floor of the same building for Mr. X. Then Mr. X can get help from Mr. Y.

5. Conclusion and Future Works

Mobile, wireless communication and ubiquitous computing technologies can provide learners and educators with active and adaptive support.

With the sensor technologies, learning systems can detect students' learning behaviors in the real world. Hence, educators and students can conduct more active and adaptive learning activities (Hwang, 2006).

In the paper, we proposed a mobile system with sensor network and digital textbooks. We can collect the educational data with this system in Kyushu University and give students suitable suggestions and supports by analyzing students' learning behaviors.

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