Chapter 14
An Understanding Information Management System for a Real-Time Interactive Distance Education Environment

Aiguo He
The University of Aizu, Japan

ABSTRACT

A real-time interactive distance lecture is a joint work that should be accomplished by the effort of the lecturer and his students in remote sites. It is important for the lecturer to get understanding information from the students which cannot be efficiently collected by only using video/audio channels between the lecturer and the students. This article proposes RIDEE-UIM (Understanding Information Management system for Real-time Interactive Distance Education Environment) for collecting understanding information from each participant to the lecturer during real time distance education activities. The usefulness of RIDEE-UIM has been confirmed by experiments. This article describes the basic idea, implementation and experiments of RIDEE-UIM.

INTRODUCTION

A distance education activity, such as a distance lecture, a distance exercise or distance seminar, is a joint work accomplished by the participants (the lecturer and his students), who interact by using audio/video communication equipment or computer support systems.

There are two kinds of computer system for supporting distance educational activities: asynchronous support system and synchronous support system. Asynchronous support system can be realized based on the normal Internet for providing learning resources to people who want to study by themselves and/or make asynchronous communication with their instructors by email, etc.. Moodle(Moodle home page, 2008) is a good example of asynchronous system. There are also systems based on SCORM(Advanced Distributed Learning. Sharable Content Object Reference Model, 2008) or other standard/methodology (Jardim, Neto, & Ribas, 2005) (Nordmann &
By the spread of high-speed computer communication network and audio/video technology, synchronous support system can be easily constructed (Erol & Li, 2005). Synchronous support systems allow real-time education activities to be performed between remote sites with high quality audio/video equipment and shared multimedia materials over broadband communication environment such as satellite communication systems (Araki, Yagi, Sugitani, & Minoh, 1999) (Suzuki et al., 2000) (Tanaka & Kondo, 1999) (Space Collaboration System Project, 2008) and high-speed network (Kohsaka, Nomura, & Shibata, 1997) (Segawa, Sugino, & Miyazaki, 2000) (Watanabe et al., 2000) (Yoshino & Munemori, 2002). Synchronous support system is important for people who want to study under real-time instructions from other person. By the audio/video channel between the lecturer and the students, interactive virtual classroom can be constructed (Deshpande & Hwang, 2001).

Researches were done about video data (Liu & Kender, 2004) and lecture materials (Wang, Ngo, & Pong, 2003).

But almost real time distance learning support systems only support the information flow from lecturer side to student side. The lecturer has to catch information from students only by the video picture from remote sites. A skilled lecturer can properly give questions to the students to collect information about their understanding situation, but this is not efficient for such students who do not want talk positively. Therefore, it is necessary to collect understanding information from the students efficiently.

In author’s university, a research project named "Real-time Interactive Distance Educational Environment (RIDEE for short)" has been promoted since 2000 (Cheng et al., 2000) (He et al., 2001). To solve the above-mentioned problem, we proposed an RIDEE-UIM (RIDEE Understanding Information Management system) (He & Cheng, 2004), the usefulness of which has been confirmed by experiments.

In the remainder of this paper, the outline of RIDEE and the basic idea of RIDEE-UIM are described in Section "RIDEE-UIM"; its detail design and its implementation are described in Section "Design and Implementation by Java"; its experimental evaluation is described in Section "Experiment and Evaluation".

RIDEE-UIM

RIDEE and RIDEE-SPS

RIDEE is a distributed computing platform for support of real-time distance education activities (He, Zhang, & Cheng, 2004). It realizes a virtual classroom consisting of more than one physical site, each of which can be a classroom or a studio, over high-speed network (Figure 1).

High-quality video/audio channels exist among the sites to support real-time interactive activities. All the sites are equipped with video cameras, projection screens, microphones and speakers for constructing the video/audio channels.

Every participant (lecturer or student) joins the computer supported activities using their own information processing equipment (at present, assuming they are personal computers); and the audio/video equipment can be remotely controlled from other sites.

By now, RIDEE has three subsystems developed by Java technology: RIDEE-CCP (RIDEE-Communication Control Platform) for Java object-based communication (He, Cheng, Huang, & Koyama, 2002), RIDEE-FCS (RIDEE-Floor Control System) for floor control in education activities (He, Cheng, Koyama, et al., 2002) and RIDEE-SPS (RIDEE Slide Presentation System).