PROVIDING A FEELING OF OTHER LEARNERS' PRESENCE IN AN ONLINE LEARNING ENVIRONMENT VIA REALTIME SONIFICATION OF THE ACCESS LOG

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ABSTRACT

When people learn using Web-based educational resources, they are sitting in front of their own computer at home and are often physically isolated from other online learners. In this study, an Open Sound Control based prototype system for sonification of the access log of Moodle, a popular e-learning system, has been developed as a way to provide a feeling of other learners' presence. To generate sound from access log in Moodle, we designed a mapping of the information of log files to sound parameters.

1. INTRODUCTION

When people learn using Web-based educational resources such as an LMS (Learning Management System) or other e-learning related systems, they are sitting in front of their own computer at home and are often physically isolated from other online learners. In some courses they are typically getting in touch online with each others for doing some particular group work assignments, but most of the time they must do their own learning tasks alone. In other courses simply the individual assignments and quizzes are provided, so the learners are alone all the time from the beginning until the end of the course.

In order to keep the learners' motivation, it helps to feel other learners doing the same learning activities and belonging to the same course. Communicating formally or informally with other learners via Social Networking Services or something is one way for learners to get such a feeling, though in a way it might sometimes disturb their learning. Sonification of the access log of the e-learning system could be another indirect way to provide such a feeling.

2. ACCESS LOG OF MOODLE

Moodle[1] is one of the most popular Web-based open-source systems used as online learning environments. Almost all the activities that a user made are recorded in a Moodle database table named `mdl_log`. The table includes the information about the every step of each user's activity such as :

- time stamp
- user ID number
- user's IP address
- course ID number
- module type
- action type
- accessed URL

etc, as shown in Table 1.

The method executed in Moodle for inserting those data into the log table is defined as `add_to_log()` in a Moodle system file of `lib/datalib.php`, so it is appropriate to add some triggering command for realtime sonification just before the line of `$DB->insert_record_raw('log', $log, false);` in `add_to_log()`.

3. SONIFICATION MAPPING OF LOG DATA

To generate sound from the access log in Moodle, we designed a mapping of the access log information to sound parameters of a note. The single note, an element of the sound, we are currently using is a sine wave oscillation. We used a mapping as follows:

- time stamp : note-on timing[1]
- user ID number : frequency
- user's IP addresses : pan
- module type, action type : frequency deviation[2]

To determine the frequency deviation, we calculated the degree of similarity of the module type and the action type compared to 'course view' (the most typical one as in the first line of Table 1) using `levenshtein()` [2], a PHP function to calculate Levenshtein distance between two strings. This function returns 0 if the two strings exactly match. The sound to be generated is designed so that the listeners (the online learners) can feel other online learners are also doing learning activities at the same time as they are, and also the sound is intended to be non-disturbing and soft to the users who are doing learning

[1] Only for sonification of the existing log data. For realtime sonfication, the sound notes are instantaneously triggered by users' Moodle operation.

[2] static small deviation from the frequecny determined by user ID number

id	time	userid	ip	course	module	cmid	action	url	info
87079	1350808027	6626	133.95.xx.yy	1	course	0	view	view.php?id=1	1
87080	1350808031	6626	133.95.xx.yy	5267	course	0	view	view.php?id=5267	5267
87081	1350808071	6626	133.95.xx.yy	5267	page	921	view	view.php?id=921	104
87082	1350808075	6626	133.95.xx.yy	5267	course	0	view	view.php?id=5267	5267
87083	1350808076	6626	133.95.xx.yy	5267	resource	917	view	view.php?id=917	149
87084	1350808076	6626	133.95.xx.yy	5267	resource	917	view	view.php?id=917	149
87085	1350808406	7446	117.55.xx.yy	8944	quiz	1159	view summary	summary.php?attempt=936	168
87086	1350808411	7446	117.55.xx.yy	8944	quiz	1159	close attempt	review.php?attempt=936	168
.....									

Table 1. Example of Moodle log in the database table

activities. The overlapping tones with different frequencies[3] imply that a number of leaners are actively using the learning management system. If a learner is simply viewing the content pages, the generated tone is a simple solid sinusoidal wave tone, but the learner is doing more interactive activities such as posting to an online discussion forum, or making an attempt at an online quiz, the generated sound is a mixture of sinusoidal wave tones with slightly different frequencies.

4. SENDING SOUND PARAMETERS VIA OSC

Csound[3, 4] is used for sound generation, and the values of sound parameters are sent via Open Sound Control[5] in real time from Moodle server to Csound. The sender is written in PHP using the class defined in `OSC.php`[6]. The receiver is written in Csound code using Opcodes like `OSClisten`[7].

5. CONCLUSION

An OSC-based prototype system for sonification of the access log of the e-learning system has been developed as a way to provide a feeling of other learners' presence. To generate sound from the access log in Moodle, we designed a mapping of the information in the log table to sound parameters. We will further investigate what kind of sonification is nice for learners to listen to by trying a variety of mapping of data to sound. For that we are planning to let online learners evaluate the generated sound from our system. The developed system is planned to be released on the Web[8].

6. REFERENCES

[1] Moodle.org
`https://moodle.org/`

[2] levenshtein() : PHP Manual
`http://jp.php.net/manual/en/function.levenshtein.php`

[3] Csound on Sourceforge
`http://csound.sourceforge.net/`

[4] Csounds.com `http://www.csounds.com/`

[5] The Open Sound Control
`http://opensoundcontrol.org/`

[6] Open Sound Control for PHP
`http://opensoundcontrol.org/implementation/open-sound-control-php`

[7] OSClisten
`http://www.csounds.com/manual/html/OSClisten.html`

[8] `http://tkita.net/paper/acmp2012/`

[3] ranges from 20Hz to 1200Hz

7. AUTHOR'S PROFILE

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Born in Nara in 1967. Withdrew from his doctoral program with certification accredited by his academic advisor, of Graduate School of Engineering, Kyoto University. Currently a professor at the Institute for e-Learning Development of Kumamoto University. Ph.D. in Engineering (Nagoya University, 2005). Fields of interest: e-learning systems, nonlinear systems, electronic music.

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