Liu, C.-C. et al. (Eds.) (2014). Proceedings of the 22nd International Conference on Computers in Education. Japan: Asia-Pacific Society for Computers in Education

Real-time Feedback Systems in a Foreign Language Teaching: A Case of Presentation Course

Yuichi ONO[a*], Manabu ISHIHARA[b] , Sachio HIROKAWA[c] & Mitsuo YAMASHIRO[d]
[a]*Foreign Language Center, University of Tsukuba, Japan*
[b]*Department of Electrical and Information Engineering, Oyama National College of Technology,Japan*
[c]*Research Institute for Information Technology, Kyushu University, Japan*
[d]*Department of Systems and Information Engineering, Ashikaga Institute of Technology, Japan*
*ono.yuichi.ga@u.tsukuba.ac.jp

Abstract: This paper is concerned with a new type of real-time feedback system in a classroom based on the text data collected from the audience. After reviewing two traditional approaches to real-time feedback; the Clicker Approach and the Forum Approach, it will be suggested that either of them is insufficient as a tool to motivate the learners in a case of presentation course. Instead, we propose two systems on the basis of text-mining technique to compensate for these insuffiencies. The first is a "Keyword and Frequency" system and the other is "Mind-mapping" system. In this paper, we describe the details of the systems. By being presented the keywords and data on frequency, the presenters can easily understand about the general feedback tendencies. In addition, the mind-map picture gives the presenters the opportunities of promoting a new awareness, various kinds of discoveries, and a deeper reflection about their works. Totally, our system can be incorporated into Learning Management System (LMS), and it has a large potential for further use in a distant learning environment to capture an overall reaction from the audience all over the world.

Keywords: real-time feedback, text-mining, keyword and frequency, mind-mapping, presentation course

1. Introduction

This paper is concerned with the implementation of text-based feedback system with focus on foreign language presentation course. The importance of feedback for learning has been mentioned in the literature, emphasizing its role in fostering meaningful interaction between students and instructional materials (Buchanan, 2000), its contribution to students' development and retention (Yorke, 2001) and students' participation and engagement in the class tasks and activities (Ono, Ishihara and Yamashiro, 2014).

This paper starts the review of the traditional approach to real-time feedback. There have been two proposals made in the literature: the "Clicker" approach and the "Forum" Approach. The former approach usually makes use of multiple-choice questions created by the instructor beforehand. In this sense, we can call it the "Quantitative" Approach. On the other hand, the latter utilizes the "Bulletin-board" usually incorporated into Learning Management System (LMS). The raters just make free comments on the board and it is reflected on the screen in the classroom. We can call this the "Qualitative" or "Bulletin Board" Approach in this sense. In a Moodle, a typical example of familiar Learning Management Systems, the bulletin-board mode, named "Forum", takes this role under the class management. As will be reviewed in the following section, these two traditional approaches are very popular. However, we would like to mention that either of them is insufficient in terms of presenters' motivation. Instead, we propose our text-mining approach to desired purposes.

2. Backgrounds

2.1 The Role of Real-time Feedback

It is commonly agreed that learning is more effective when interaction occurs between learners. (Hentea, Shea, & Pennington, 2003; Schmieder, 2008). In a case of foreign language teaching, making presentation provides students with an opportunity to reconsider their approaches to critical thinking, problem solving, collaborative learning, speaking, and writing. Instant feedback activities that engage the audience are one method of encouraging active learning for both presenters and their audience. By providing feedback immediately after a student completes his or her presentation, the experience is more authentic, and occurs precisely when he or she is the most receptive to criticism, coupled with the excitement of the reaction (Ono, Ishihara & Yamashiro, 2014: p.2). Improving the quality of instant feedback activities can motivate students to become more involved in the learning process. Various kinds of tools have been introduced in order to guarantee the "interactivity" and "quality" of the feedback in a large-size classroom. In the following subsection, we review two of such major tools for real-time feedback.

2.2 Traditional Approaches

There are two major approaches to real-time feedback system. One approach is "Quantitative" and the other is "Qualitative". In the first approach, the instructor or lecturer prepares a multiple-choice question that is displayed in the classroom. Students answer or click the number of their choice. Then, the statistic results (number, average, etc.) were shown on the screen. The second type is the use of bulletin-board. Recently, the use of Social Network Service (SNS) has been reported.

2.2.1 Quantitative Approach: Use of "Clicker"

A commonly-used device for this approach is "Clicker". It can be referred to as "Audience-Response Analyzer (ARA). This system involves multiple-choice questions created by the instructor beforehand. Even in non-wired classroom, the recent analyzer makes it possible to receive the responses from the audience by setting up teacher's PC, response receiver, and a lot of response senders. The picture of "Clicker", a sender and a receiver, is given in Figure 1, and that of its output of the system is given in Figure 2.

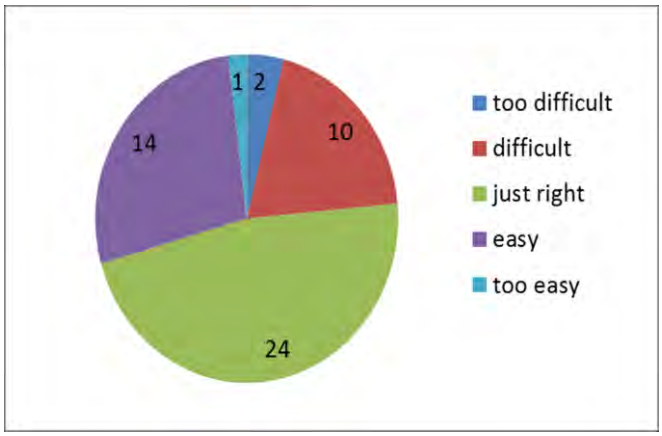

Figure 1. Picture of "Clicker"

Figure 2. Picture of Output

Although Clicker has been spread world-wide including Japanese classrooms, this approach tends to be based on highly quantitative output and its descriptive statistics. The question items for instant feedback tend to be multiple-choice questions, voting questions among, say, five candidates, or consciousness surveys on the five-point Likert scale. In the case of feedback of presentation course, clicker questions tend to be 5-point Likert questions like "Pronunciation is good", or "Visuals are helpful" and so on. The more deeply we need to know the results on the basis of assessment rubrics, the

more detailed question items we need to ask the audience. And students have to answer all of them in, say, three minutes.

2.2.2 Comment List Approach: Use of Bulletin Board

Here comes the role of open-ended questionnaire. Instead of showing the statistic ratings of each question items, the presenter can recognize what the audience felt about their presentation directly from their feedback comments. Actually, this is an easy way to do, because the common SNS or bulletin-boards installed in LMS are now available to instructors given net environment in the classroom. Since the concept of "Social Interaction" and the social learning approach has been widely spread, the use of SNS (Twitter, Facebook, Line, and so on) has become much easier for everybody including students and instructors. When we consider the effective feedback activity in a presentation course, it is reasonable to use this technology as an instant feedback tool (Hasegawa, Yasui & Yamaguchi, 2013).

However, if this is a large class, say, more than 100 students are enrolled in the course, using a large classrooms, the presenter have to take a look at 100 feedback comments one by one. It might be difficult to understand the general tendency about the presentation from a list of raw feedback comments. Uncontrolled feedback comments might appear on the screen. The instructor must give sufficient instruction on what kinds of comments should (not) be posted for feedback activity. The use of LMS can remove this risk, but it is not certain that the system can draw only acceptable text data from the audience. The point here is that we need to provide a certain level of analysis so that the whole comments can encourage the presenter to try for the next trial.

2.3 Proposal: Text-mining Approach

On the face with insufficiencies of two traditional real-time feedback approaches, we would like to propose an alternative feedback system on the basis of text-mining technology. The basic concepts of our proposal are given below:

. --- Real-time process of analyzing collected raw text data
--- Produce tendency graphs according to keywords or categories prepared by the instructor previously
--- The use of natural language processing (text-mining) method to pick up keywords
--- Reference to the original feedback comments by presenters

The first trial is for producing graphs of results on frequency of the given keywords. The schematic outline of the proposed system is described in Figure 3 below:

The analyzer has to recognize the dependency relations between words. CaboCha is a high-level free Japanese syntactic parser, which enables us to analyze syntactic dependency of Japanese sentences. CaboCha was employed in our system for analyzing dependency relation of a sentence. The process is driven with proc_open() function and the package is installed in the activity module of our Learning Management System (LMS); Moodle. This is shown in Figure 4.

Usually text-mining is conducted offline; a certain amount of time is spent after the class to analyze and derive important clusters of meaningful concepts from text data through statistical processes. Since our system is constructed with the intention that the feedback is given soon after the input by audience is finished. Therefore, we just concentrated on the use of descriptive aspects of statistics as an output of the system. The system is implemented in Moodle as one activity session. This makes the students work on this activity even outside the classroom. The students can refer to their results of text-mining since it is stored in DB. In addition, they can make reference to original text data the audience gave to the DB to make their points clearer.

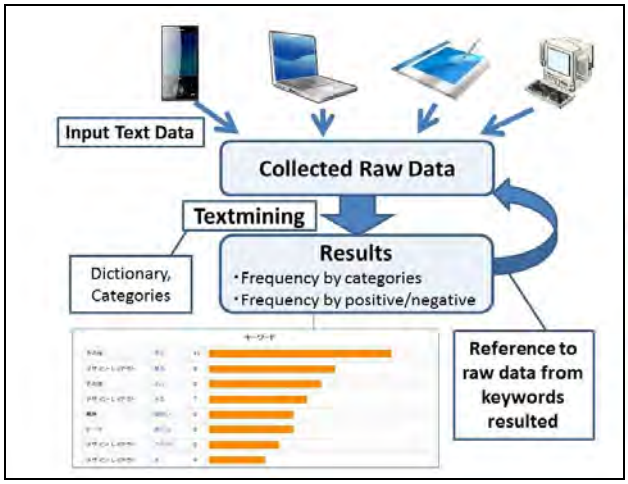

Figure 3. Outline of the System

Figure 4. System Structure

2.3.1 Keyword and Frequency Approach

In order to process text data for our purpose, the author created a dictionary for evaluation. For selecting lexical items, the actual text data collected when the pilot study was carried out previously were used. 50 students participated and made open-ended comments on each of ten presentations. After analyzing these data by CaboCha, around 410 lexical items were selected and two kinds of properties were given to each item. These properties were (i) properties on impression and (ii) properties of semantic categories like "design/layout", "interest", "English", "pronunciation", "citation", and "others". The file of our evaluation dictionary is shown in Figure 5. All the audience have to do is to write down. The picture of input box. The presenter was given the feedback output soon after the presentation is finished, as shown in Figure 6, where the results are shown in a graphs and a radar chart. The result of Figure 6 includes the ratio of positive/negative words appearances and number of frequency of each semantic category. In addition to this, the student (presenter) can make reference to the original text data by clicking the key words. This is shown in Figure7.

	A	B	C	D
37	英語・発音	聞き覚え	0	
38	英語・発音	語	0	
39	英語・発音	聞き取る	1	
40	英語・発音	発音	1	
41	英語・発音	英語	1	
42	英語・発音	聞く	1	
43	英語・発音	スピード	1	
44	英語・発音	声	1	
45	英語・発音	話す	1	
46	英語・発音	大きい	1	
47	英語・発音	話し方	1	
48	英語・発音	聞	1	
49	英語・発音	追える	1	
50	英語・発音	音声	1	
51	英語・発音	流暢	1	
52	英語・発音	丁寧	1	
53	興味	飽きる	-1	
54	興味	わむたい	-1	
55	興味	自分	0	
56	興味	作品	0	
57	興味	引く	1	
58	興味	良い	1	
59	興味	楽しい	1	
60	興味	面白い	1	
61	興味	いい	1	
62	興味	集中	1	
63	興味	おもしろい	1	

Pilot辞書

Figure 5. Evaluation Dictionary

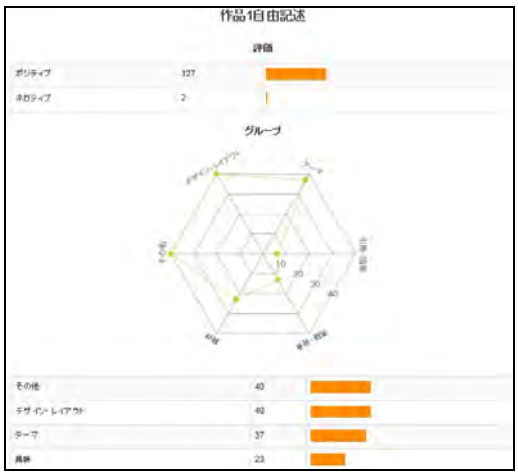

Figure 6. Feedback Graphs and Charts

Figure 7. Reference to Original Comments (Keywords Reference)

2.3.2 Mind-mapping Approach

The proposed keyword and frequency approach has an advantage of providing information of what kinds of keyword audience picked up about the presentation, not just as an average score of a question item. However, the output results of this system have no consideration on the relatedness among keywords or frequency of co-occurrence between words; our system just shows a frequency of the keywords themselves. The collected text data should be shown so that the concepts or ideas of the audience can be visualize schematically as a mind map. This might help instructors to have an insight into the audience's conceptual models from plain text comments.

According to Flanagan, Yin, Inokuchi & Hirokawa (2013), drawing a mind map can be thought of as a problem of searching one-by-one for related keywords, starting in the center with the keyword or image that is central to the concept. The related keywords or images are reiterated and expand in a radial pattern, linking back to the central concept through contextual relations. Our mind map of a word was constructed through the depth-first-search procedure. Given a word w, firstly we obtain the set of documents that contain the word w. Then, we extract the characteristic words of the documents set according to the relevance degree. In the present paper, we adopted the SMART measure by Salton & McGill (1983). The top K words are selected according to the measure. Each word u_i in the feature words is then used to "AND" search by "w u_i" and a new node with the label "u_i" is linked from the root whose label is "w". We repeat this process until the depth reaches the fixed parameter D. Note that a word is checked once it is used in search keyword. Thus, a word appears only once, and the graph becomes as a tree. A sample map is shown in Figure 8 below.

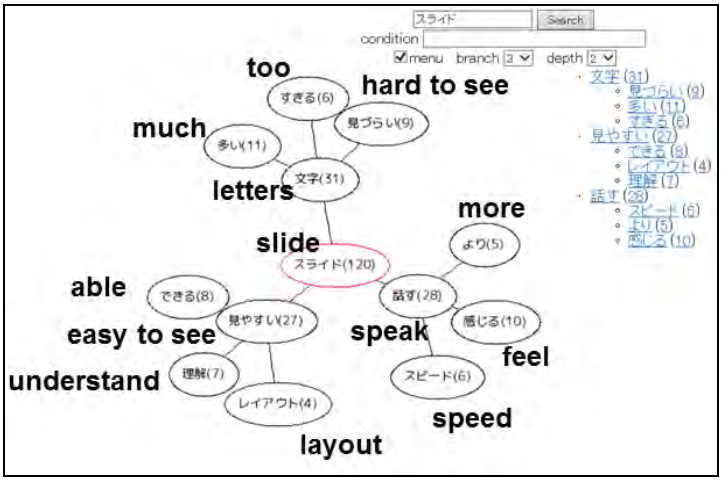

Figure 8. A Sample of Mind Map

In this sample, a presenter is interested in how his "slide", which is located at the center of the map, appeared in the feedback from the audience. The mind map output shows that the word "slide" is related to three words; "letters", "easy to see", and "speak". The last keyword "speak" might be a new finding for learners, since "slide" has a relationship with "speaking". This might be a striking suggestion

because they might not be aware that the speed of speech helps the audience have a focus on their slide. Conversely, the new finding might include that speaking too fast does not allow the audience to see their slides comfortably. This type of analysis is not brought about from the simple list of free comments unless several participants directly made comments this way.

3. Concluding Remarks

Since this new mind map feedback has an advantage over simple list of comments as in Forum approach or frequency based text mining feedback, the next step of this study is to examine how effectively the mind map can be integrated into the course or instructional design. Other issues involve the development of dictionary according to the topic to be presented. More and more keywords related to the topic of presentation must be stored in the dictionary. A longitudinal data collection will tells us the process of change of concepts behind the feedback. Topic effects and proficiency effects might be visualized in the form of change of structures in the mind maps. We would like to research on these issues one by one in the near future.

Acknowledgements

This study was partially supported by Grant-in-Aid for Scientific Research No. 26370656, No. 24500176, and No. 25350369 from the Japan Society for the Promotion of Science (JSPS).

References

Flanagan, B., Yin, C., Inokuchi, Y. & Hirokawa, S.(2013) Supporting interpersonal communication using mind maps, *Information and systems in education, 12*(1), 13–18.

Hasegawa, S., Yasui, A. & Yamagucgu, M. (2013) Educational Use of the Social Networking Service and Social Learning, *Research Report of Nagoya Bunri University, 13*, 51-58.

Hentea, M., Shea, M. J., & Pennington, L. (2003). A Perspective on Fulfilling the Expectations of Distance Education. Proceedings of the 4th conference on Information technology curriculum (pp. 160-167). Lafayette, Indiana, USA: ACM

Ono, Y., Ishihara, M., & Yamashiro, M. (2014). Instant Text-Based Feedback Systems: The Development of a Text-Based Feedback System and Its Potential Use in Foreign Language Teaching, *Journal of Information Technology and Application in Education (JITAE), 3*(1), 1-8

Salton, G., & McGill, M. J. (1983) *Introduction to Modern Information Retrieval*, McGraw-Hill

Schmieder, E. (2008) Communication: The tool to interact with and control your online classroom environment, International Journal of Instructional Technology and Distance Learning, 5(3), 39-50.

Yorke, M. (2001) Formative assessment and its relevance to retention, *Higher Education Research and Development*, *20*(2), 115-126