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An Answer Support Environment based on Grammar, Context and Situation for a Dialogue to Learner Agent on Japanese Dictogloss System

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Abstract: In this paper, we describe how to improve our Japanese dictogloss system to realize richer dialogue to pseudo learner's partner (called learner agent) and more usable operation using the system on the study. Our existing dictogloss system has some functions supporting learners' self-study with dictogloss activities. In preliminary evaluation of the existing system, we got the result that indicate the effectiveness using our dictogloss system. Finally, we report a simple evaluation results.

Keywords: Dictogloss, second/foreign language educations, dialogue to leaner agent

1. Introduction

In this paper, we report an improvement of a Japanese language dictogloss environment for nonnative speakers and an evaluation of the system. Dictogloss is a multiple skills collaborative activity proposed by Wajnyrb (1990). In a dictogloss activity, a teacher reads a short text to learners and the learners try to reconstruct the content of the text and the learners discuss the original text based on their own reconstructed text. This activity requires learners to exercise their own four skills: listening, reading, writing, and speaking. Learners cannot engage in this activity by themselves because this activity is a collaborative learning method and it needs some real learning partners and a teacher. So, we developed a dictogloss system which supported learners' self-study by using two intelligent agents as a learning partner (learner agent) and a teacher (teacher agent) (Kondo et al. 2012 and Tashiro et al. 2013). In preliminary evaluation of this system (Tashiro et al. 2013), we got the result that indicate the effectiveness using our dictogloss system. Furthermore, we obtain two improvement points: (1) we improve the system to make a learner become to discuss not only the presence or absence of a certain word but also the reason of the presence or absence of a certain word. In other words, a learner can discuss only whether the certain word exists or not using existing system and a learner can discuss why the certain word exists using proposed system in dialogue to a learner agent. (2) we improve the system to become more comfortable and more usable. We have improved the existing dictogloss system based on two improvement points and evaluate the proposed dictogloss system. We report a positive result from simple evaluation experiments.

2. Existing Dictogloss System

In existing dictogloss system (Tashiro et al. 2013), this system has three states. First, dictation stage is a phase in which learners listen to a short text and take notes about the text. A learner plays a sound file of the short text recorded by native speakers. The learner can listen to this sound up to five times. At the first listening, the learner focuses on listening to the sound without taking any notes. After that, the learner listens to the sound with writing down important words and phrases for reconstructing the original text. The learner inputs his/her own reconstructed text to the system after he/she finishes

listening. Second, reconstruction stage is a phase in which learners discuss the original text based on their own reconstructed texts. In this stage, the learner agent generates its own reconstructed text which leads the learner to identify his/her errors. The agent engages in discussion with the learner about the reconstructed texts. For reconstruction phase in this stage, the learner agent analyzes the learner's reconstructed text to recognize his/her errors based on the architecture of error detection proposed by Kondo et al. (2010). The learner agent generates its own reconstructed text based on a focus on form (FoF) approach. Accordingly, Kondo et al. (2012) divide forms in a dictogloss text into four categories: (C1) focused forms in a given dictogloss text, (C2) keywords in the text, (C3) FonF forms in the text, and (C4) other forms. Among these forms focused forms should be given the highest priority, and keywords should receive the second priority. Forms not belonging to these two categories are further divided into two groups. This is because some forms are suitable for FonF instruction but others are not (Kondo et al. 2010). The learner agent generates different texts depending on which of the four categories the learner's errors involve. The reconstructed texts by the learner agent are generated so that the learner would pay more attention to focused forms and keywords. For dialog phase in this stage, the learner makes the final reconstructed text through discussion with the learner agent. The learner compares his/her own reconstructed text with the agent's reconstructed text. The learner can ask the agent using the following prepared templates: (1) "Does *Sn* have *form*?", (2) "Does *Sn* not have *form*?" and (3) "Does *form1* is replaced with *form2* in *Sn*?". "*Sn*" stands for a sentence number, and "*form*" is replaced by a linguistic form of learner's choice. The learner agent asks the user questions about errors in the user's reconstructed text using the same templates when the agent recognizes user's errors. After finishing the discussion, the learner can submit the final reconstructed text to the system. Finally, in analysis and correction stage, the teacher agent shows the original text and a summary of the learner's errors. This system can recognize the some kinds of errors (Kondo et al. 2010). In the summary, the learner's errors in the reconstructed text and the corresponding arts in the original text are highlighted in different colors according to the types of errors. The summary emphasizes detailed information about focused forms and errors involving them. Other minor errors are also provided but they are hidden from the learner's view unless he/she requests them.

3. Proposed Method

The learner use various knowledge to discuss the correctness of each reconstructed text. So, we focus the knowledge for discussion of the each reconstructed text's correctness and handle three knowledge: grammatical, contextual and situational knowledge. We call grammatical knowledge in target form (included word surface, part-of-speech, conjugated form, etc.) "basis knowledge", and call contextual or situational knowledge "peripheral knowledge". A learner agent's wrong reconstructed text includes learning target forms. A teacher prepared learning each basis knowledge for each target forms in a teacher text. Basis knowledge has two important items: basis attribute and basis value. A basis attribute represents a role in the target form and a basis value represents a specific value for the basis attribute. Moreover, "peripheral knowledge" is knowledge required to accurately describe basis knowledge. For example that the learning target form is a reason causal using conjunction "*nanode*" ("*nanode*" is a Japanese conjunction word that means "because" in English), the learner should know the two sentences that have the relationship of reason causal, in other words, contextual knowledge ("peripheral knowledge") and use basis knowledge and those sentences to the learner agent for discussing the correctness of each conjunction word in learner and agent's reconstructed texts.

In the other hand, we obtain the improvement points from the subjects for system's usability in simple evaluation result (Tashiro et al. 2013). First point is that it is difficult for a learner to operate the system intuitively. We gave subjects the operation manual for using our system, but the subjects were puzzled often. Second point is that there are many number of times of operation for performing the dialogue to learner agent. In existing system, a learner was required three phases of the operation when a learner ask the presence or absence of the word to a learner agent. In first phase, a learner select the focus word in own or agent's reconstructed text. In next phase, a learner click right mouse button on selected word for right-click menu. In last phase, a learner selects a types of template sentence (described in Sec. 2) from right-click menu. So, we improved the system according to refine two points. For first point, the proposed system lead a learner to operate the system due to emphasize the possible area to operate. Moreover, for second point, a learner can operate the system by only one phase for same

discussion that required three phase in previous system. A learner click the word that a learner wish to focus according to using each reconstructed text's morphological analysis result that the system prepared in advance.

4. Preliminary Evaluation

The purpose of this preliminary evaluation is to evaluate whether our proposed dictogloss system has better usability than existing system or not. The subjects of the evaluation are four university students. Those subjects are Japanese graduate students. In the evaluation, each subject compares the usability of proposed system with existing system. In existing system, we show the video that we had recorded the instruction on existing system for previous evaluation because the environments running previous system was broken in addition backup environment. In proposed system, we gave subjects operation sequences prepared in advance, then, subjects observed the behavior of proposed system according to the prepared operations. 2 subjects (Group A) watched the video for previous system, then they observed the proposed system's behavior. The other 2 subjects (Group B) observed the proposed system's behavior, then they watched the video for previous system. When each experiment was finished, we asked the subject to answer a questionnaire for usability using from 1 to 5 points. As a results, we got more than 4 points of the average in the six items of seven items. In particular, we got five point in the item for ease of comparing own reconstructed text with agent's reconstructed text. This results shows that our improvement described in Sec. 3 is very important improvement for our system. In other hand, the points of two items for ease of playing the lesson speech and inputting reconstructed text for group B is about three point because the subject in group B shows the video for previous system after they show the behavior of proposed system. As a results of preliminary evaluation we got positive results but the subjects are Japanese student. For more detailed evaluation, we must evaluate the proposed system by the nonnative speaker who are learning the Japanese language as second language. Moreover, we must reproduce previous system for correctly comparing each system.

5. Conclusion

We report the improvement of the existing Japanese dictogloss environment. There are two improvements. First, we have improved the system to make a learner become to discuss not only the presence or absence of a certain word but also the reason of the presence or absence of a certain word in dialogue to a learner agent. Second, we have improved the system to become more comfortable and more usable. As improvements, a learner can discuss the agent the reason why there is a certain form or not. In evaluation of ease or usability, we got positive results. In the future, we expand honorific representation to discuss the reason, and we construct more robust dialogue to agent.

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References

Kondo, M., Kure, U., Daicho, Y., Kogure, S., Konishi, T. & Itoh, Y. (2010). *Form-Wise Error Detection in a FonF-Based Language Education System.* Proceedings of ICCE 2010, 9-16.

Kondo, M., Sano, R., Tashiro, A., Noguchi, Y., Kogure, S., Konishi, T. & Itoh, Y. (2012). *Development of a Dictogloss System Oriented for Focus on Form*. Proceedings of ICCE 2012, 1-8.

Tashiro, A., Noguchi, Y., Kogure, S., Kondo, M., Konishi, T. & Itoh, Y. (2013). *Evaluation of an Improved Dictogloss System Oriented for Focus on Form.* Proceedings of ICCE2013, 110-114.

Wajnryb, R. (1990). *Grammar Dictation*. Oxford: Oxford University Press.