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Development of a Japanese Pronunciation Learning Support System with Pronunciation Automatic Evaluation Function by Speech Recognition

Satoru MATSUNAGA[a*], Hisaharu TANAKA[a], Kenzi WATANABE[b] & Yasuhisa OKAZAKI[a]
[a]Graduate School of Science and Engineering, Saga University, Japan
[b]Graduate School of Education, Hiroshima University, Japan
*satoru@ai.is.saga-u.ac.jp

Abstract: In this research, we have developed a system which supports Japanese pronunciation learning for foreign students by using speech recognition software named Julius. We have realized automatic evaluation of learner's pronunciation by using speech recognition software. In our system, beginners can check their pronunciation without depending on a teacher. We have also implemented learning courses which meet the needs of learners. The learner can learn according to the level of own Japanese by the pronunciation learning course that corresponds to the level of the Japanese-Language Proficiency Test. In addition, the learner can learn one's weak pronunciation selectively by learning course according to the country in consideration of the native language interference.

Keywords: speech recognition, Japanese learning, learning courses

1. Introduction

A purpose of this study is to support the Japanese pronunciation learning of foreign students. Foreign students need communication with the Japanese in daily life (Furukawa et al. 2011). Tools supporting Japanese pronunciation learning are many teaching materials of CD, DVD and so on. However, a judgment is difficult whether one's pronunciation is right in the pronunciation learning using these teaching materials. Therefore it is necessary that the learner has a teacher hear one's pronunciation. Thus, the learner can not perform learning efficiently because the learner can not learn at own convenient time.

In this study, we focus on speech recognition and have developed a system which supports Japanese pronunciation learning by using automatic pronunciation evaluation function (Okazaki et al. 2010). Because the learner can learn the pronunciation by an automatic evaluation function without depending on a teacher, the learner can learn Japanese pronunciation at favorite time and easily.

2. System Overview

2.1 Operation of Our System

We show operation of our system in Figure 1. This system is composed of four modules. They are user interface, a speech recognition, a true-false judgment module and a question database. The user interface performs voice inputting, the display of question sentences, and the presentation of the judgment results. In addition, it sends input sound data to the speech recognition module. The speech recognition module sends recognition results to the true-false judgment module. The true-false judgment module compares the question sentence with the sent words from the speech recognition module. The question sentence database stores questions which set to a learner.

We show learning screen in Figure 2. Black sentences are question sentences. The sentences that the learner pronounced are displayed under them. The sentence that the learner pronounced is displayed by a blue letter if the pronunciation of the learner is right. Otherwise the sentence that the learner pronounced is displayed by a red letter. The question sentence is displayed by a hiragana when the learner clicks a yomigana button. Furthermore, the learner can erase the answer with Clear button or All Clear button.

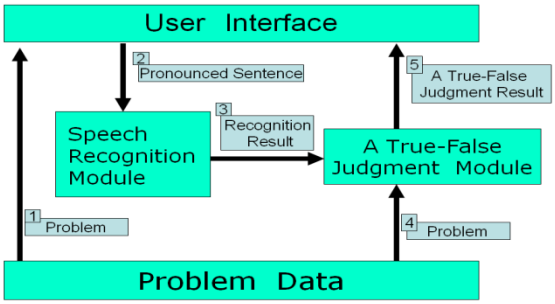

Figure 1. Operation of our system.

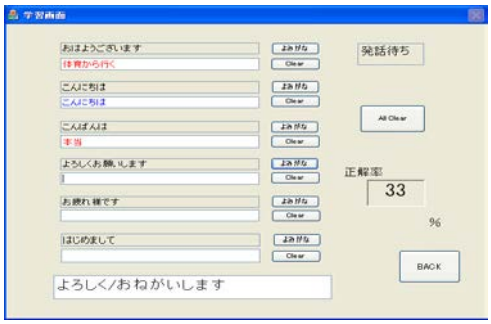

Figure 2. Learning screen.

2.2 Development Environment

We show development environment of our system in Table 1.

Table 1: Development Environment of our system .

OS	Windows XP Home Edition SP2
Speech Recognition Engine	Julius for SAPI 2.3
Speech Recognition Developer Tool	Speech SDK 5.1
Development Environment	Microsoft Visual Studio 2010
Using Language	C++

3. Automatic Pronunciation Evaluation Function

In this study, we have realized an automatic evaluation function using speech recognition software named Julius (Julius development team, 2013). Our system evaluates the pronunciation of the learner by comparing the question sentence with the result of the speech recognition. The automatic evaluation function enabled the learners to learn pronunciation by oneself. In addition, the learner can learn Japanese pronunciation exactly through frequent repetition receiving feedback.

4. Learning Courses

4.1 Learning course according to the level

The levels of foreign students who want to learn Japanese are various. In addition, Japanese has many kinds of letters and there are the various pronunciations corresponding to those combinations. Therefore it is necessary that the learner progressively perform pronunciation learning. The level of the Japanese-Language Proficiency Test is divided into five steps (N1-N5) for coping the stage of such the learner (JAPAN FOUNDATION, JAPAN EDUCATIONAL EXCHANGES and SERVICES, 2013).In this system, we have implemented the learning courses so that the learner can perform learning progressively in reference to a Japanese-Language Proficiency Test. We show examples of the question sentences of each course in Table 2.

Table 2: Examples of the question sentences in each course.

Basic Course	Standard Course	Advanced Course
新聞をとる I take a newspaper.	気温が変化する Temperature changes.	決勝戦を実況する I broadcast the final.
絵本を読む I read a picture book.	公園の案内をする I guide the park.	日記を出版する I publish a diary.
本屋に行く I go to the bookstore.	温泉に関心をもつ I am interested in the hot spring.	出張で出費がかさむ By a business trip expenditure increases.

4.2 Learning course according to the country

It is known that foreign student's weak points in pronunciation are different under the influence of the mother language. We have implemented the learning courses according to the mother language corresponding to it of nine countries. The leaner can learn one's weak points in pronunciation intensively by those courses. We show the weak points in pronunciation each of the mother language in Table 3.

Table 3: The weak points in pronunciation according to each mother language.

Weak Point / Country	The row of ざ(za)	Vowel Sound	つ(tsu)	The row of ら(ra)	Voiced Consonant
Bangladesh			○		○
Malaysia			○	○	
Korea	○	○	○	○	
India				○	○

5. Conclusions

In this study, we have developed a Japanese pronunciation learning support system for foreign students. In this system, we have realized evaluating Japanese pronunciation for foreign students by using the speech recognition engine. In addition, we have made the learning courses according to the level and according to the county. The learner can choose a learning course by one's level and the mother language.

As future work, we plan to implement model voice and learning history management. After that, we are going to evaluate the usability of our system on practical use.

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