Research Activities Report - 2019 Overseas Research Experience Program -

大阪工業大学 OSAKA INSTITUTE OF TECHNOLOGY

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Research Topic	Research on Optimization of Speech Synthesis Rules	**Graduate School of Robotics & Design**
Host University	Salamanca University / Salamanca / Spain	
Duration	From September 15 to November 17, 2019	**NAKAHARA Tomonori**

Summary of the Research Activities

I'm researching to optimize classical rule-based speech synthesis rules using machine learning. The classical rule base enables high-quality speech synthesis by converting speech features into data and setting them as rules. The benefits are personal adaptation and compact data. This is different from conventional speech synthesis. On the other hand, the disadvantage is that it is difficult to set rules manually. My research purpose is to set this disadvantage automatically by using machine learning. In addition to outputting values using machine learning, it is necessary to solve the black box problem, which is a problem of machine learning. So, I received advice from BISITE lab members while studying abroad.

At that time, the proposed method is a method called " Decision Tree". I worked on that approach. Decision trees are most suitable for data mining because the decision tree classification model can easily interpret the process leading to the classification. Decision trees are mathematical and computational methods that represent sets of data and help with classification and rulemaking. Therefore, I studied using this method because it is a method suitable for understanding the black-boxed speech synthesis rules, which is my tentative goal. There are two types of decision trees: regression trees and classification trees. Regression trees are used to approximate real-valued functions. Classification trees are used to identify data. My three consecutive vowel speech data was used for the experiment. A total nine data sets were collected and the first, second, and third formant frequencies of each vowel were analyzed. As for the experimental results,

125 three consecutive vowels were Classified with 95% accuracy.

From those results, I was able to observe the key features

of those vowels, which is very important for the high
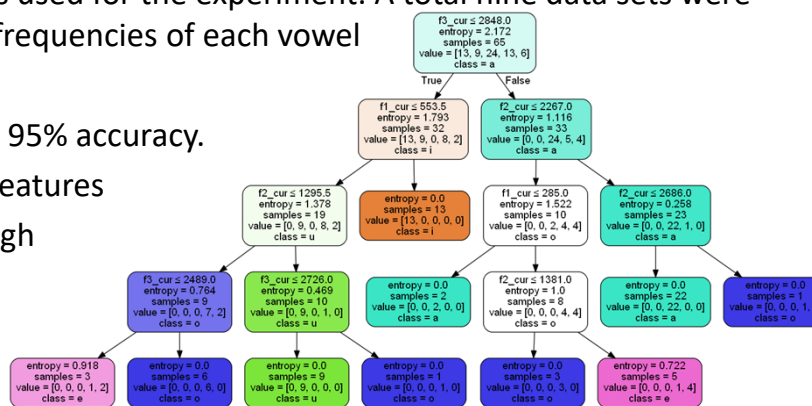
quality speech synthesis.

Fig.1 Vowel Classification Result by Decision Tree

College Life, and Friends

I stayed at the oldest university in Salamanca, Spain. University of Salamanca (USAL) has many international students from various countries including Japan. It was a nice experience to get together with various people.

I stayed at BISITE research center of USAL. BISITE conducts research in many fields including cutting-edge technologies. They were working hard and I was very inspired by that.
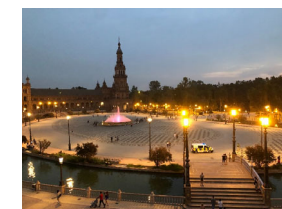
指導教員講評

BISITEで様々なAI技術を学び、サラマンカの文化もよく学べている。

指導教員氏名：松井 謙二