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Web-based English Pronunciation Simulator for ESL/EFL Learners

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Abstract

The KAEPS [Korean Accented English Pronunciation Simulator] system aims to design a Web-based English pronunciation simulator system whose input includes orthographic English words, phrases, or sentences, and whose output results in three types of English pronunciations in the IPA [International Phonetic Alphabet] symbols: 1) a phoneme-based English pronunciation, 2) a desirable allophone-based American English pronunciation, and 3) one or some possible Korean accented English pronunciation(s) based on the interlanguage (IL) phonology of Korean learners of English. It is written in PERL and its URL is http://epsilon3.georgetown.edu/~kimhk/cgi-bin/kaeps.

1. Introduction

Most typical English dictionaries provide only phoneme-based and word-based pronunciation information, which is insufficient for ESL/EFL [English as a Second / Foreign Language] learners who wish to obtain more accurate information about English pronunciation. For example, most dictionaries do not indicate the differences between aspirated [kʰ] in *key* vs. unaspirated [k] in *ski* and between light [l] in *late* vs. dark or velarized [ɫ] in *tale*. In addition, many phonological phenomena such as palatalization, as in *did you* [dɪʤu], apply not only within words but also across word boundaries. However, to my knowledge, there exists no dictionary which deals with the pronunciation of phrases or sentences. Most adult ESL/EFL learners have accents when speaking English. Such an interlanguage phonology is, in many cases, influenced by their native tongue. If the learners recognize the reason or source of their mispronunciation of English, they would have a better chance to improve their English pronunciation.

2. Architecture of KAPES

The system uses the CGI [Common Gateway Interface], which allows users to test the pronunciation of any English word, phrase or sentence on the Web.

The input is any English orthographic representation typed by the Web users. The Input Detector detects the input, separates punctuation from the words, puts a word boundary marker between words, and sends the string of words to the Phoneme Extractor.

The Phoneme Extractor dispatches the string of words to a CMU American English pronouncing dictionary and extracts ASCII-based phoneme symbols of each word.[1]

The English Allophone-based Pronunciation Generator takes the string of phonemes and generates appropriate allophones according to English phonology.[2]

The Korean-accented English Pronunciation Generator takes the same string of phonemes and generates possible Korean-accented English pronunciations according to Korean-to-English IL phonological constraints.[3]

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1 For instance, the pronunciation symbols for *crosstown* and *mistake* are / k r ao1 s t aw2 n / and / m ih0 s t ey1 k /, respectively.

2 The current KAPES system deals with English phonological phenomena such as aspiration cluster simplification, palatalization, tapping, and velarized /l/ (Kreidler, 1989).

3 The results are shown as wowel epenthesis (in consonant clusters or after some single coda consonant

Finally, the IPA Transformer converts ASCII-based symbols into IPA symbols, which are then displayed to the users. The following is an example of an output for an input such as " *Daddy, please pick me up at your company*."

(1) The phoneme-based pronunciation is
[ˈdædi ˈpliz ˈpɪk ˈmi ˈʌp ˈæt ˈjɔr ˈkʌmpəni]
An allophone-based pronunciation is
[ˈdæɾi ˈpʰliz ˈpʰɪk(ʰ)ˈmi ˈʌp(ʰ)ˈæt(ʰ)ˈjɔr ˈkʰʌmpəni] tapping (1) aspiration (6)
A possible Korean-Accented pronunciation is
[dɛdi pʰɯliʤɯ pʰiŋ mi ʌp ɛɲ ɲuʌ kʰʌmpʰʌni] epenthesis (2), voicing (3), /r/-deletion (1), /n/-insertion (1), nasalization (2)

3. Facilities and Limitation of KAPES

KAEPS has two systems: one is a rule-based system using feature geometry, and the other is an optimality theoretic constraint-based system (Kim, 1998) adopting Hammond (1997). The latter displays only Korean-accented English pronunciation symbols, but it shows all the processes how the phonological constraints eliminate all unnecessary candidates except an optimal (here, a possible Korean-accented English) form.

There are other subsidiary Web pages describing phonological background, IPA symbols tips, glossary, references, etc. to help the understanding of the common users. Some examples of waveforms and spectrograms linked to actual sounds are given, too.

Korean learners of English can be provided with information about possible Korean-accented English pronunciation and also about corresponding Korean phonology, so they may know why they tend to mispronounce some phrases in a certain way. In such a sense, KAEPS can lead to the development of a CALL [Computer Assisted Language Learning] program and would be useful to Korean learners of English, EFL teachers with Korean students, or IL phonology researchers.

There are some limitations with the current KAEPS system: 1) no speech technology such as speech recognition or speech synthesis is used, 2) only one possible pronunciation among various options in each category is displayed − it is impossible to display all different kinds of allophones or different levels of interlanguage pronunciations, but it would be more useful to display several possible cases 3) it will be more effective to use a syllabified English Pronunciation Dictionary[4] − that is being developed, 4) it is limited only to Korean-accented English − but easily expandable to other types of accented English.

4. Conclusion

The KAEPS system was designed to simulate allophone-based and Korean-accented English pronunciation, and is still being revised for more detailed information.

Reference

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which are voiced, coronal, or continuant and whose preceding vowel is long as in '*mind'* [maindɯ], '*act'* [ɛktʰɯ], '*fish'* [pʰiʃi], *'side'* [saidɯ]), /r/-deletion (in the coda position as in *car* [kʰa]), voicing (in an intervocalic position as in '*stop it'* [stɑbit]), stop nasalization (before a nasal as in '*pick me up'* [pʰiŋ mi ʌp]), /n/-insertion (between a stop and /j/ as in *'backyard'* [bɛŋɲɑdɯ]), etc.

[4] In English, syllabification plays an important role in the selection of suitable variants. Aspirated stops occur in a word initial or in a stressed syllable initial position. Without syllabification of *crosstown* or *mistake*, it might be hard to decide whether the /t/ is aspirated or not. In speech recognition, allophones can play an important role as cues in syllable parsing (Church, 1987). Likewise, syllabification can be used effectively in sound generation from the written text.