The LEP Learning System

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LEP is a software system for Learning English Pronunciation, which contains four major components: the environment, the learning element, the knowledge base, and the performance element.

The environment of LEP contains the pronouncing dictionary (PD) and the example selector. PD was derived from the NetTalk Corpus, the computer readable pronouncing dictionary created for the NetTalk text-to-speech system [SR87]. PD contains 20,000 English words (including 3723 one-syllable words), 132 graphemes, and 50 sound units. According to different learning tasks, the example selector provides examples to the learning element.

The learning element of LEP consists of four parts, which performs the following tasks: learning English grapheme segmentation, learning English syllabification rules, learning English stress for syllables, and learning English pronunciation for graphemes (LE-PG). The LE-PG learning element has been implemented using the Iterated Version Space Algorithm [HZ96a], which repeated applies the Modified Version Space Algorithm [HZ94] to handle disjunctive concepts and noise. Proposed algorithms for the other three learning elements are given in [ZHA95].

LE-PG was tested ten times using sets of one-syllable words. The correct International Phonetic Alphabet symbol for the pronunciation was produced for 95.65% of the unseen words and 98.79% of the graphemes in the unseen words. The usage of the pronunciation rules learned by LE-PG follows both the "80-20 rule" and the Bradford-Zipf distribution. That is, on average, the most frequently used 20% (186) of the rules are used 93% (11,732) of the time, and 5% (47) of the rules are used 80% (10,040) of the time [ZHA96].

LE-PG is an efficient concept learning system. It produces reliable pronunciation rules and obtains high accuracy when applied to unseen words. When compared to other text-to-speech systems, LE-PG provides rules with higher accuracy, and when compared to the C4.5 learning system, LE-PG shows better immunity to noise [HZ96b]. The success of experiments with LE-PG provides evidence that implementing the other components of LEP is worthwhile.

REFERENCES


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