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pp. 183–191

As prosodic features play an important role in human communication, learning prosodic patterns is essential to acquire English pronunciation. We present a Computer-Assisted English Prosody Learning System for Japanese students. Pronunciation evaluation is done by automatic detection of sentence stressed syllables which compose stress-timing rhythm. Syllable HMMs are categorized based on error patterns of the stress. The modeling makes it possible to generate effective error diagnosis and instruction. We also propose a method of multi-stage discrimination that reflects native speakers' perception as weights of acoustic features. The method achieves a stress detection rate of 95.1% and 84.1% for native speakers of American English and those of Japanese, respectively.

Functional imagery and onomatopoeic representation of auditory signals

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pp. 192–202

To obtain basic data for use in designing auditory signals that are easy to understand and memorize, we examined the functionary imagery and onomatopoeic representations that are associated with common auditory signals. Functional imagery was classified into 5 categories by principal component analysis: alarm versus operation feedback, attention, calling, warning, and ending. We found the following relationships between functional imagery, onomatopoeic representation and acoustical properties of auditory signals. Repeated sounds aroused functional imagery of alarm, and their onomatopoeic representations consisted of repeated syllables. Long sounds with low fundamental frequency and many harmonics also aroused imagery of alarm, and were represented by prolonged sounds containing voiced consonants and the vowel /u/. Short sounds were associated with operation feedback, and were represented by single syllables, sometimes with doubled consonants. Long-attack sounds aroused imagery of attention, and were represented by palatalized consonants. Fast-rate periodically modulated sounds evoked imagery of calling, and were represented by repeated flapping. Low-pitch sounds with many harmonics produced imagery of warning, and were represented by voiced consonants. Repeated signals with long duration or long-decay sounds were associated with ending, and were represented by repeatedly prolonged syllables or prolong sounds followed by syllabic nasals.

TECHNICAL REPORTS

Development of active mass damper to isolate vibration from rotating machine

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pp. 203–208

Active mass damper with a modified DXHS (Delayed-X Harmonics Synthesizer) algorithm has been developed to prevent the vibration from a rotating machine. In the new device, the vibration data is processed as a function of the phase angle using the rotation synchronized Fourier transform. The optimum shaking force to damp the vibration is synthesized by applying an adaptive algorithm to the processed data. The devices were applied to 3 MW/900 rpm gas engine generators. It was shown that were reduced by about 10 dB in the bandwidth of 22.5–97.1 Hz.

Effects of noise during short-term memory task: Psychological impression of annoyance and performance

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pp. 209–214

This paper describes the effects of meaningful and meaningless external noise, at various sound pressure level values, on participants during a mental task. That is, the authors focused on the psychological impression of 'annoyance' caused by noise, and 'performance,' indicated by factors such as the percentage of correct answers and reaction time. More specifically, the authors discussed how these two items depend on the sound pressure level value of noise, and how they change under the influence of meaningful or meaningless noise. Furthermore, an investigation was made into how the above items change in the case of aural or visual task presentations. A probe digit task was used, which is a short-term memory task. Consequently, the importance of reducing meaningful external noise at the low sound pressure level values was shown.