Multi-Mixture Stochastic Models of Spoken Korean Adapted for Use by Military Language Learners

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ABSTRACT:

Increasing the number of Gaussian mixtures in Hidden Markov Models (HMMs) of speech sounds increases the accuracy of speech recognition systems by capturing commonality in subsets of speech data. A related technique can be used to make HMMs derived from native speech more tolerant of non-native speech, such as that of language learners wishing to practice their speaking skills with a computer. Adaptation of speech recognition systems for groups of learners, such as military students of Arabic at Fort Bragg, allows systems to be successful at recognizing learner utterances and still be speaker-independent. This project involves a refined technique of combining Gaussian mixtures of HMMs derived from native Korean speech with mixtures comprising models of American English sounds derived from speech collected from cadets and faculty at West Point. The selection of which American English speech sound components are to be added to which Korean speech sound model is done automatically using a confusion matrix and forced alignment of Korean HMMs to digitized American English utterances. The weighting of the various components of the adapted models is computed using the confusion matrix entries.
A simple example of speech enabled Korean language learning courseware produced at West Point will be demonstrated.

KEY WORDS: Digital signal processing, Hidden Markov Models, Speech recognition, Adaptation techniques

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