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Detecting glides and their place of articulation using speech-related measurements in a feature-cue-based model

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ABSTRACT

An algorithm was developed for detecting glides (/w/, /j/, /r/, /l/, or /h/) in spoken English and detecting their place of articulation using an analysis of acoustic landmarks [Stevens 2002]. The system uses Gaussian mixture models (GMMs) trained on a subset of the TIMIT speech database annotated with acoustic landmarks. To characterize the glide tokens extracted from the speech samples, the following speech-related measurements were calculated: energy in four spectral bands (E1-E4), formant frequencies (F1-F4), and the time derivatives of E1-E4 (E1'-E4'); the fundamental frequency (F0) and magnitude difference of harmonics (H1-H2, H1-H4) were also included. GMMs were then trained on a subset of the tokens to learn the characteristics of each category for two distinct tasks: distinguishing glide landmarks from the set of all landmark types (identification task), and determining the place of articulation given a glide landmark (categorization task). The classifier used the maximum posterior probability of a speech sample conditioned on each of the trained GMMs. The performance of the algorithm was evaluated with median F-scores, and results suggest that the measurements at acoustic landmarks provide salient cues to glide detection and categorization.

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