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Abstract
3D virtual facial animation had been widely used in many applications and is very helpful to learning, especially hearing impaired children. It can be used to improve their language learning and communication abilities. In this paper, a 3D virtual facial animation including lip and tongue information is proposed to provide multi-model feedback such as speech signal, lip motion, and tongue motion. First, a two-stage speech segmentation is applied to estimate the duration of synthesis units for 3D facial animation in a synthesized speech. In two-stage speech segmentation, a sequential forward selection algorithm is applied to detect the boundaries of synthesis units form speech signal. Then, the boundaries for consonant following vowel and vowel following vowel are identified by Hotelling's T2 test and Bayesian information criterion, respectively. Finally, the duration model based on decision trees is integrated to improve the performance of segmentation. Secondary, integrating linguistic knowledge and 2D articulation animation, the tongue and lip parameter units can be developed. Moreover, parametric 3D tongue and lip movement models smoothed and interpolated by B-spline to eliminate the jerkiness. Integrating boundaries information, the speech-synching can be easily accomplished. The experimental results for speech segmentation and 3D virtual facial animation feedback show that the system is feasible.
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