HIDDEN MARKOV MODELLING OF MODERN STANDARD CHINESE TONES IN CONNECTED SPEECH

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ABSTRACT

This paper explores the possibilities of using Hidden Markov Models to represent, and to recognise, the tones in connected Modern Standard Chinese speech. The paper is based on data consisting of some 400 (currently being extended to 1000) syllables of connected speech by a single speaker. It has recently been shown (Yang et al. 1988) that HMM techniques can be used successfully to model the tones in isolated syllables, but the problem with the tones in connected speech is that they are subject to a good deal of variation. Syllable stress is one important conditioning factor involved in this variation. This paper calculates syllable stresses according to the formula given in Kratochvil 1974, and on this basis constructs a number of different HMM's of each tone, for different levels of stress. It is found that the recognisability of a tone depends on the degree of stress; for example, in one experiment, using two different levels of stress, it was found that low-stressed syllables had 67% of their tones correctly identified, while high-stressed syllables had 85% of their tones correctly identified; these figures reflect the way tonal contrasts tend to be neutralised with decreasing stress in Modern Standard Chinese.

Apart from stress, fundamental frequency contours on adjoining syllables are also a factor in the variation of tone contours, and it is hoped to extend the work to create models which also take this into account.

References
