AUTOMATIC DETECTION OF PROMINENCE IN THE DUTCH LANGUAGE

A.C.M. Rietveld and L. Boves, Institute of Phonetics, Katholieke Universiteit Nijmegen, Erasmuslaan 40, Nijmegen, The Netherlands

The procedures which will be described in this contribution aim at an automatic detection of prominence (sentence-stress) in Dutch. We regard this as the first step towards an automatic transcription of the intonation of this language. The physical correlates of prominence are essentially three pitch-movements with specific characteristics as has been shown by 't Hart and Collier (1975). The procedures which are going to be described have to detect those fragments of the Fo-curve which can be regarded as realizations of the prominence-lending movements mentioned above.

After the Fo-variations have been measured with an analog pitchmeter, the resulting curve is converted into a digital signal for further processing. First a correcting program smoothes out the comparatively irregular curve and rejects outliers. Then an approximation procedure transforms the curve into a series of straight lines by applying a Least Squares criterion, together with an "error" criterion in order to interrupt the approximation of a segment if the error exceeds a certain value.

A labeling program labels the resulting straight lines and tries to combine adjacent segments with similar characteristics into a smaller number of lines which are then given the same label. This program is partly based on the principles of linguistic pattern recognition.

The detection of prominence is carried out on the basis of three sources of information: the above mentioned labels, the syllable-structure, and the amplitude of the syllabic segments.

Preliminary tests with three short texts resulted in detection-scores of 71%, 75%, and 92%, respectively.

The description of our procedures is completed by some experiments in which relevance and value of the performance-criterion - stress-judgments - are examined. These experiments, which involved the manipulation of the Fo-contours of utterances, showed that listeners may "switch" from pitch to other acoustic cues when trying to determine prominence in monotonous speech. This result implies that listener-judgments are of limited use for the evaluation of the performance of our detection procedures.

Reference: 't Hart, J. and R. Collier (1975): "Integrating different levels of intonation analysis", JPh 3, 235-255.