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Landmark-based consonant voicing detection on multilingual corpora

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ABSTRACT

This study tests the hypothesis that distinctive feature classifiers anchored at phonetic landmarks can be transferred cross-lingually without loss of accuracy. Three consonant voicing classifiers were developed: (1) manually selected acoustic features anchored at a phonetic landmark, (2) MFCCs (either averaged across the segment or anchored at the landmark), and (3) acoustic features computed using a convolutional neural network (CNN). All detectors are trained on English data (TIMIT) and tested on English, Turkish, and Spanish (performance measured using F1 and accuracy).

Experiments demonstrate that manual features outperform all MFCC classifiers, while CNN features outperform both. MFCC-based classifiers suffer an overall error rate increase of up to 96.1% when generalized from English to other languages. Manual features suffer only an up to 35.2% relative error rate increase, and CNN features actually perform the best on Turkish and Spanish, demonstrating that features capable of representing long-term spectral dynamics (CNN and landmark-based features) are able to generalize cross-lingually with little or no loss of accuracy.

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