The set of logic context-based features for the classification of segmentation instants of speech signal

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Abstract

In this work, the problem of data driven speech signal segmentation is addressed. Our approach is based on the symbolic machine learning (rule induction) techniques and on the idea of two-level feature set. The idea of the two level feature set states that given some particular ML system any good feature set capable of adaptation to specificity of the domain should be constructed in two steps. The so called first-order features represent transformations of learning material resulting in characteristics relevant to all learning samples regardless of their class assignment. The second-order features are derivative characteristics of the first order features. They are built as to achieve optimum class discrimination.

In this paper, we present an overview of recognition systems based on the two level feature set approach that solve a variety of classification tasks including discrimination among geometrical figures, arithmetic objects, and segments of a vocal signal.

In this paper, the problem of speech signal segmentation is stated as a machine learning problem based on the two-level feature set. The set of the second order features describing candidate segment boundaries are *context-based*. It describes not only instantaneous (inside a frame) signal characteristics at a candidate time but include characteristics of some other time instants as well.

The system was tested on real acoustic data. The rule learning algorithm RIPPER*k* was used. Rule sets for discriminating voiced/unvoiced speech segments and for spotting silence present in speech recordings were built. Error rate varied between 9-14% for various parameter settings. The relevance of automatically induced rules is investigated. Future research directions and perspectives are discussed.

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