Towards Automatic Assessment of Voice Disorder: A clinical Approach

ABSTRACTS

Automatic detection and assessment of voice disorders is important in diagnosis and treatment planning of voice disorders. This work proposes an approach for automatic detection and assessment of voice disorders from a clinical perspective. To accomplish this, a multi-level classification approach was explored in which four binary classifiers were used for the assessment of voice disorders. The binary classifiers were trained using support vector machines with excitation source features, vocal-tract system features, and state-of-art OpenSMILE features. In this study source features namely, glottal parameters obtained from glottal flow waveform, perturbation measures obtained from epoch locations, and cepstral features obtained from linear prediction residual and zero frequency filtered signal were explored.

OBJECTIVE

The objective of this paper is to perform the assessment of voice disorders from clinical perspective. Four experiments were performed to understand the cause of voice disorders, so that it will be helpful . In first experiment voice disorder samples were classified from healthy samples, in the second experiment voice disorder samples were discriminated into organic and non-organic voice disorders. In the third experiment we have classified speech samples into structural and neurogenic voice disorders. In the fourth experiment non-organic disorders were further classified into functional and psychogenic voice disorders.

METHOD

Excitation source based features :
- Glottal features
- Intonation features

- Mel frequency cepstral coefficients of LP-residual, and ZFF signal (MFCC-Residual, MFCC-ZFF)
- State of the art features

  * Vocal-tract system features (MFCC and PLP)
  * OpenSMILE features

- Classifier : SVM with quadratic kernel
- Database: Saarbruecken voice disorder dataset (SVD)

RESULTS

Feature type	Exp. 1	Exp. 2	Exp. 3	Exp. 4
ComParE	**82.8**	71.7	**74.3**	**65.3**
eGeMAPS	76.0	70.1	67.3	57.5
MFCC	74.4	72.4	67.8	63.4
PLP	74.2	**72.7**	70.5	64.1
Glottal	67.4	64.8	59.9	58.3
Intonation	69.3	66.0	60.2	52.8
MFCC-Residual	67.4	70.8	64.3	61.0
MFCC-ZFF	68.5	69.2	66.4	64.2

Performance of voice disorder detection and assessment systems in terms of classification accuracy (in %) for individual feature set on SVD database.

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