

A hybrid expert system approach for telemonitoring of vocal fold pathology

Abstract

Acoustical parameters extracted from the recorded voice samples are actively pursued for accurate detection of vocal fold pathology. Most of the system for detection of vocal fold pathology uses high quality voice samples. This paper proposes a hybrid expert system approach to detect vocal fold pathology using the compressed/low quality voice samples which includes feature extraction using wavelet packet transform, clustering based feature weighting and classification. In order to improve the robustness and discrimination ability of the wavelet packet transform based features (raw features), we propose clustering based feature weighting methods including k-means clustering (KMC), fuzzy c-means (FCM) clustering and subtractive clustering (SBC). We have investigated the effectiveness of raw and weighted features (obtained after applying feature weighting methods) using four different classifiers: Least Square Support Vector Machine (LS-SVM) with radial basis kernel, k-means nearest neighbor (kNN) classifier, probabilistic neural network (PNN) and classification and regression tree (CART). The proposed hybrid expert system approach gives a promising classification accuracy of 100% using the feature weighting methods and also it has potential application in remote detection of vocal fold pathology.

Keywords

Classification; Compressed voice samples; Feature extraction; Feature weighting; Vocal fold pathology