

A new hybrid intelligent system for accurate detection of Parkinson's disease

Abstract

Elderly people are commonly affected by Parkinson's disease (PD) which is one of the most common neurodegenerative disorders due to the loss of dopamine-producing brain cells. People with PD's (PWP) may have difficulty in walking, talking or completing other simple tasks. Variety of medications is available to treat PD. Recently, researchers have found that voice signals recorded from the PWP is becoming a useful tool to differentiate them from healthy controls. Several dysphonia features, feature reduction/selection techniques and classification algorithms were proposed by researchers in the literature to detect PD. In this paper, hybrid intelligent system is proposed which includes feature pre-processing using Model-based clustering (Gaussian mixture model), feature reduction/selection using principal component analysis (PCA), linear discriminant analysis (LDA), sequential forward selection (SFS) and sequential backward selection (SBS), and classification using three supervised classifiers such as least-square support vector machine (LS-SVM), probabilistic neural network (PNN) and general regression neural network (GRNN). PD dataset was used from University of California-Irvine (UCI) machine learning database. The strength of the proposed method has been evaluated through several performance measures. The experimental results show that the combination of feature pre-processing, feature reduction/selection methods and classification gives a maximum classification accuracy of 100% for the Parkinson's dataset.

Keywords: Parkinson's disease, Dysphonia features, Feature weighting, Feature selection, Classification

