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Detection of Parkinson's Disease (PD) Based on Speech Recordings using Machine Learning Techniques

Abstract

There are some neurodegenerative diseases which are unable to cure such as Parkinson's disease (PD) and Hungtinton's disease due to the death of certain parts in the brain that is affecting older adult. PD is an appalling neurodegenerative health disorder that linked to the nervous system which exert influence on motor functions. PD also often known as idiopathic disorder, environmental and genetic factors related, and the causes of PD remain unidentified. To diagnose PD, the clinicians are required to take the history of brain condition for the patient and undergoes various of motor skills examination. Accurate detection of PD plays a crucial role in aiding and providing proper treatment to the patients. Nowadays, there has been recent interest in studying speech-based PD diagnosis. Extracted acoustic attributes are the most important requirement to predict the PD. The experiment was conducted on speech recording dataset consisting of 240 samples. This work studies on the feature selection method, Least Absolute Shrinkage and Selection Operator (LASSO) with multiple machine learnings such as Random Forest (RF), Deep Neural Network (DNN), Gradient Boosting Machine (GBM) and Support Vector Machine (SVM) as the classifier. Throughout this research, train test split method and k-fold cross validation were implemented to evaluate the performance of the classifiers. Through LASSO, Support Vector Machine Grid Search Cross Validation (SVM GSCV) outperformed other 7 models with 100.00 % accuracy, 97.87 % for recall, 65.00 % for specificity and 97.10 % of AUC for 10-fold cross validation. Finally, Graphical User Interface (GUI) was developed and validated through the prediction over UCI speech recording dataset which achieved 96.67 % accuracy for binary classification with 30 samples.

Keywords

Cross validation; Feature selection; Machine learnings; Parkinson's disease; Speech recordings