Literature Survey

The study [2] used the voice dataset from UCI Machine Learning repository, Orange v2.0b, and Weka v3.4.10 for analysis. SVM achieved 88.9% accuracy, Random Forest achieved 90.26% accuracy, and Naïve Bayes obtained an accuracy of 69.23%.

Speech signals from 252 subjects for PD diagnosis were used in [3] where significant differences were found in voice recordings of PD patients compared to healthy individuals. Deep neural networks were employed for voice data analysis. Ensemble of Classifiers achieved an accuracy of 95%, F1-score of 0.97 and Mathews Correlation Coefficient (MCC) of 0.87.

The study [4] highlights the importance of feature selection and algorithm choice in Parkinson's disease diagnosis. Performance evaluation of 20 ML algorithms for Parkinson's disease using acoustic datasets was compared. Different cross validation techniques like LOOCV and Stratified K-Fold cross validation and hyperparameter tuning techniques like Grid Search were used for evaluation. The dataset from UC Irvine ML Repository, consisting of 195 voice recordings and a dataset collected at Istanbul University, including 188 records from Parkinson's patients and 64 records from healthy individuals were used and an accuracy of 96.41% and 97.35% were obtained using ensemble voting classifiers.

EEG, MRI, handwriting, and speech data were used for classification in [5] and it was concluded that deep learning showed promising results. Future directions include integration of different data modalities for improved accuracy, longitudinal data analysis for disease progression forecasting, emphasis on explainable AI and federated learning for collaborative model training.

The study [9] introduces the use of three predictive models for Parkinson's disease: Fully Complex-Valued Radial Basis Function network (FC RBF), Meta-Cognitive Fully Complex-Valued Radial Basis Function network (Mc-FCRBF), and Extreme Learning Machine (ELM). These models predicted the severity of the disease using Unified Parkinson's Disease Rating Scale (UPDRS). For patients who have not received treatment, the UPDRS scale ranges from 0 to 176.

The dataset used in [10] comprised of 240 records with 46 acoustic features extracted from three voice recordings of 80 patients. Different machine learning models along with feature selection were applied and KNN classifier with wrapper – based feature selection achieved an accuracy of 88.33%.

Automated diagnostic models were developed in paper [11] using Multilayer Perceptron, , Random Forest, BayesNet and Boosted Logistic Regression. The study found that Boosted Logistic Regression provided the best performance, with an accuracy of 97.159% and an area under the ROC curve of 98.9%.

The study [12] proposes the use of various machine learning models and the processing speed of these models are also analysed, to understand their suitability for light weight mobile applications in the ubiquitous computing environment. The authors conclude that if the number of voice samples increase, the performance of the predictive models could further increase.

The proposed ensemble learning technique that uses stacking in [13] surpasses existing methods such as SVM, KNN, RF, DT, MLP, Stacking Classifier, and Logistic Regression with 94.87% accuracy, 81.99% Matthews Correlation Co-efficient (MCC), and 94.52% F1 score.

Voice data were collected through mPower containing data of both healthy and PD patients. Using an app from Iphone, a clinical observational study was conducted by Sage Bionetworks [17]. Here raw audio was cleaned with VoiceBox’s Voice Activation Detection (VAD) algorithm before applying machine learning algorithms.

The study [18] aimed to identify individuals who have high risk for PD by combining plasma proteins with clinical-demographic variables. Using data from the UK Biobank, researchers applied machine learning to select 22 plasma proteins and various clinical-demographic factors for predicting PD risk. The Light Gradient Boosting Machine model achieved an area under the curve (AUC) of 0.832, with key predictors including education, age, serum creatinine and past traumatic brain injury.

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