Detecting Parkinson's Disease using Machine Learning

Timothy J. Wroge, Yasin Özkanca, Cenk Demiroglu, Dong Si, David C. Atkins and Reza Hosseini Ghomi(2018) proposed the Parkinson's Disease Diagnosis Using Machine Learning and Voice which explores the effectiveness of using supervised classification algorithms, such as deep neural networks, to accurately diagnose individuals with the disease. The peak accuracy of 85% provided by the machine learning models exceeds the average clinical diagnosis accuracy of non-experts (73.8%) and average accuracy of79.6% without follow-up, 83.9% after follow-up.

R. Prashanth and Sumantra Dutta Roy(2018) suggested the early detection of Parkinson's disease through patient questionnaire and predictive modelling where the Patient Questionnaire portion from the widely used Movement Disorder Society-Unified Parkinson's Disease Rating Scale to develop prediction models that can classify early PD using machine learning techniques, observed that these techniques perform with high accuracy and high area under the ROC curve (both >95%) in classifying early PD and these prediction models have the potential to aid clinicians in the diagnostic process by joining the items of a questionnaire through machine learning.

Kemal Polat(2019) proposed a Hybrid Approach to Parkinson Disease Classification Using Speech Signal: The Combination of SMOTE and Random Forests where a novel method is proposed for the detection of Parkinson's disease with the features obtained from the speech signals. The proposed hybrid machine learning method consists of two stages: data pre-processing and classification. Only the random forests classification were classified as 87.037% while the proposed hybrid method achieved 94.89% classification success. Obtained results showed that promising resultshad been achieved in discrimination of the PD dataset with this hybrid method.

Ioannis G. Tsoulos, Georgia Mitsi, Athanassios Stavrakoudis and Spyros Papapetropoulos(2019) proposed the application of Machine Learning in a Parkinson's Disease Digital Biomarker Dataset Using Neural Network Construction Methodology Discriminates Patient Motor Status where the objective is to provide preliminary evidence that artificial intelligence systems may allow one to discriminate PD patients from and determine different features of the disease. The recently introduced Neural Network Construction technique was used here to classify data collected by a mobile application into two categories.The NNC algorithm discriminated individual PD patients from HVs with 93.11% accuracy and ON vs. OFF states with 76.5% accuracy.

F.M. Javed Mehedi Shamrat, Md. Asaduzzaman, A.K.M. Sazzadur Rahman, Raja Tariqul Hasan Tusher, Zarrin Tasnim(2019) suggested a Comparative Analysis Of Parkinson Disease Prediction Using Machine Learning Approaches where the primary objective of the study is to inspect the exhibition of three supervised algorithms for improving Parkinson disease using three AI methods for the detection of Parkinson disease datasets. SVM, KNN, and LR were utilised for the forecast of Parkinson Disease.SVM shows the accuracy level of 100% for Parkinson disease prediction. LR achieved the second-highest classification accuracy of 97%.

Carlo Ricciardi, Marianna Amboni, Chiara De Santis, Gianluca Ricciardelli, Giovanni Improta, Giovanni D'AddioSofia Cuoco, Marina Picillo, Paolo Barone and Mario Cesarelli(2020) suggested that Machine learning can detect the presence of Mild cognitive impairment in patients affected by Parkinson's Disease to differentiate PD patients with and without MCI using quantitative gait variables through a machine learning approach.DT achieved the highest accuracy (86.8%) using motor dual-task features, and the best sensitivity (88.2%), using gait and KNN (88.2% of sensitivity). KNN obtained the highest AUCROC (0.900) with the cognitive dual-task. DT with motor and cognitive dual-tasks and KNN with cognitive dual-task achieved the highest sensitivity (85.3%).

Zehra Karapinar Senturk(2020) suggested the Early diagnosis of Parkinson's disease using machine learning algorithms in which the method consists of feature selection and classification processes. Feature Importance and Recursive Feature Elimination methods were considered for the feature selection task. Classification and Regression Trees, Artificial Neural Networks, and Support Vector Machines were used for the classification of Parkinson's patients. Support Vector Machines with Recursive Feature Elimination was shown to perform better than the other methods. 93.84% accuracy was achieved with the least number of voice features for Parkinson's diagnosis.

S. Sharanyaa, P N. Renjith and K. Ramesh(2020) proposed the Classification of Parkinson's Disease using Speech Attributes with Parametric and Nonparametric Machine Learning Techniques which evaluate the performance of state of art algorithms to detect Parkinson's disease with higher classification accuracy. The performance is evaluated by pre-processing the data based on speech attributes. Various performance metrics are computed for all four machine learning techniques and the results show that nonparametric models produce higher classification accuracy of 87.2% and 90.2% compared to parametric models.

Nazmun Nahar, Ferdous Ara, Md. Arif Istiek Neloy, Anik Biswas, Mohammad Shahadat Hossain & Karl Andersson(2021) suggested the Feature Selection Based Machine Learning to Improve Prediction of Parkinson Disease where the feature selection and classification techniques are used in the proposed detection technique. Four classification algorithms are considered to detect Parkinson disease which are gradient boosting, extreme gradient boosting, bagging and Extra Tree Classifier. Bagging with recursive feature elimination was found to outperform the other methods. The lowest number of voice characteristics for the diagnosis in Parkinson attained 82.35% accuracy.

Luigi Borzì, Ivan Mazzetta, Alessandro Zampogna, Antonio Suppa, Gabriella Olmo and Fernanda Irrera(2021) proposed the Prediction of Freezing of Gait in Parkinson's Disease Using Wearables and Machine Learning the aim was to propose a wearable system able to catch the typical degradation of the walking pattern preceding FOG episodes, to achieve reliable FOG prediction using machine learning algorithms and verify whether dopaminergic therapy affects the ability of our system to detect and predict FOG. The classification model was trained with data from patients on (off) and tested on patients off (on) and found 84.0% (56.6%) sensitivity, 88.3% (92.5%) specificity and 87.4% (86.3%) accuracy.