Detecting Parkinson's Disease using Machine Learning

Literature survey:

S.No	Title	Author and year of Publications	Proposed work	Limitations
1.	Early Detection of Parkinson's Disease Using Deep Learning and Machine Learning	Wu Wang1 et al[1] [2017]	This paper states that predicting Parkinson's disease at an early stage of the patient is better to treat the disease in a better and efficient way. For this model the important attributes that were considered were Rapid Eye Movement and olfactory loss, Cerebrospinal fluid data, and dopaminergic imaging markers. With these the model was able to predict with the accuracy score of 96.4%.	Though this was able to predict Parkinson's disease at early stage but when it became to mid stage it showed poor accuracy.
2.	High-Accuracy Detection of Early Parkinson's Disease through Multimodal Features and Machine Learning.	R. Prashanth et al[2][2020]	This paper shares the information on predicting Parkinson's disease at an early stage of the patient. By the time PD occurs, the manifestation of clinical symptoms occur, more than 60% of the dopaminergic neurons have already been lost. So in order to treat it at an early stage by analyzing sleep Behavior Disorder (RBD) and olfactory loss. In this paper, we use the nonmotor features of RBD and olfactory loss.	The accuracy that was able to achieve by the model is comparatively very low.

3.	A Comparative Study of Existing Machine Learning Approaches for Parkinson's Disease Detection.	Gunjan Pahuja et al[3][2018]	The focus of this research paper is to provide an insightful survey and compare the existing computational intelligence techniques used for PD detection. To save time and increase treatment efficiency, classification has found its place in PD detection. The existing knowledge review indicates that many classification algorithms have been used to achieve better results, but the problem is to identify the most efficient classifier for PD detection. The challenge in identifying the most appropriate classification algorithm lies in their application on local dataset.	Using ANN Levenberg–Marquardt algorithm was found to be the classification accuracy (95.89%). It is still low comparatively.
4.	A Deep Learning Based Method for Parkinson’s Disease Detection Using Dynamic Features of Speech.	Changqin Quan et al[4][2020]	The author proposes an alternative view on detecting parkinson’s disease from the patient.it is that by analyzing voice changes of the peoples. Using time series data and applying LSTM it could be able to predict Parkinson's disease.	Using voice notes alone from the patient is not at all sufficient to predict Parkinson's disease with high accuracy.
5.	Machine Learning Approaches for Detecting Parkinson’s Disease from EEG Analysis: A Systematic Review.	Ana María Maitín et al[5][2020]	The author proposes they analyzed studies that used machine learning (ML) techniques to diagnose PD through resting state or motor activation electroencephalography (EEG) tests. Methods:	The accuracy that was able to be achieved is low. When it comes to health care the accuracy has to be at least 99%.

			The review process was performed following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines	
6.	A hybrid system for Parkinson's disease diagnosis using machine learning techniques.	Rohit Lamba et al[6][2021]	The author proposes that Parkinson's disease is a neurodegenerative disorder that progresses slowly and its symptoms appear over time.The authors have tested several combinations of feature selection approaches and classification algorithms and designed the model with the best combination. To formulate various combinations, three feature selection methods such as mutual information gain, extra tree, and genetic algorithm and three classifiers namely naive bayes, k-nearest-neighbors, and random forest have been used.	The accuracy the model was able to achieve is 95.58% which is not best in the field of health care analyzing.
7.	Machine learning Ensemble for the Parkinson's disease using protein sequences.	Priya Arora et al[7][2022]	The author demonstrates the comparison of multiple classification methods to identify Parkinson's disease using hydrophobicity and Amino Acid Composition as feature extraction methods. Classification methods are then combined to propose a 2-level ensemble method based on the false	There are other model that are available to perform this at 10 fold cross validation but this model performs the task at 5 fold cross validation.

			prediction rate.	
8.	Detection of Parkinson's Disease using Machine Learning Algorithm.	Shikha Singh et al[8][2022].	The author proposes speech features were used to classify this condition in this study. Jitter, shimmer, basic frequency parameters, harmonicity parameters, Recurrence Period Density Entropy (RPDE), Detrended Fluctuation Analysis (DFA), and Pitch Period Entropy are some of the most well-known speech aspects employed in PD research (PPE). Those characteristics were dubbed baseline characteristics.	This model only predicts Parkinson's disease using speech attributes and the variation of data from it. The accuracy that the model is able to achieve is high but not consistent for all the tests.
9.	Deep learning-based scheme to diagnose Parkinson's disease.	Tarjni Vyas et al[9][2021]	The author proposes to use brain images from magnetic resonance imaging (MRI) technique. A deeper level of feature detection in MRI can identify biomarkers that can be used to know how the disease spreads, leading to a cure in the future. With these motives, we have presented two novel approaches using deep learning (DL) techniques. 2D and 3D convolution neural networks (CNN) are used, which are trained on MRI scans in the axial plane.	Though the idea for developing a model and predicting the PD from MRI images was highly improvisational from other existing models, the accuracy it was able to achieve is very low which is 72.22%.
10.	Machine Learning for Detecting Parkinson's	Dafa Shi et al[10][2022]	The author proposes by applying amplitude of low-frequency fluctuation (ALFF)-based radiomics	The highest accuracy that the model was able to achieve

	Disease by Resting-State Functional Magnetic Resonance Imaging: A Multicenter Radiomics Analysis		method to extract radiomics features (including first- and high-order features). Subsequently, t-test and least absolute shrinkage and selection operator (LASSO) were harnessed for feature selection and data dimensionality reduction, and grid search method and nested 10-fold cross-validation were applied to determine the optimal hyper-parameter λ of LASSO and evaluate the performance of the model.	was 81.45% which is comparatively low compared to all other existing models.