**Parkinson’s Disease Prediction**

Using

Machine Learning

**Related Work Submission**

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| --- | --- | --- | --- | --- | --- |
| **Reference**  **(Author’s Name)** | **Name of the Research Paper** | **Methodology**  **used** | **Data set**  **used** | **Performance**  **Parameters** | **About/Limitations** |
| [1]/ Xinyue Liu[1] Lei Guo[2] Weiwei Liu[3] | MNC-Net: Multi-task graph structure learning based on node clustering. | Data preprocessing, Graph construction, Multi-task learning, Graph structure learning, Node clustering, Evaluation | Parkinson's Progression Markers Initiative (PPMI) Database. | Overall Accuracy - 88.8%,  Sensitivity -86.2%,  Specificity - 90.4%, and  AUC - 0.929 | The model learns a graph structure based on node clustering to capture the relationships between different features of the disease, including motor symptoms, cognitive impairments, and behavioural abnormalities.  The model achieves competitive performance compared to state-of-the-art methods on a publicly available Dataset. |
| [2]/ Mohammadreza Balouchestani[1] Sohrab Saeb[2] Mohammad Mehdi Baghersalimi[3] | Deep Learning Techniques Based Parkinson's Disease Recognition Methods Employing Clinical Data. | Methodology used in this paper involves a systematic and comprehensive review of the existing literature. | Parkinson's Progression Markers Initiative (PPMI) dataset, the Parkinson's Disease Digital Biomarker DREAM Challenge (PDDBDC) dataset, and the MDSGene dataset. | N/A | This survey examines the use of deep learning techniques for Parkinson's disease recognition using clinical data, including speech, gait, and handwriting. The paper provides an overview of various deep learning models and their performance, highlighting the need for standardized datasets and further validation. |
| [3]/  Ahmad Chaddad[1]  Mehrdad J. Gangeh[2] Mahmoud I. Kamel[3] | Deep Transfer Learning Based Parkinson’s Disease Detection Using Optimized Feature Selection. | Data Collection, Feature Selection, Preprocessing, Deep Transfer Learning, Performance Evaluation. | The Parkinson's Progression Markers Initiative (PPMI) dataset and the Japanese dataset of Parkinson's disease (JDDP) dataset. | PPMI dataset  Accuracy - 96.15%  JDDP dataset Accuracy - 91.81%. | The model uses a pre-trained convolutional neural network (CNN) and optimizes the feature selection process using a genetic algorithm |
| [4]/  Alok Sharma[1]  R. K. Agrawal[2] Akshay Dabholkar[3] | Early Warning Signs of Parkinson's Disease Prediction. | various machine learning algorithms, including decision trees and random forests | N/A | Highest Accuracy – 0.93  Decision Tree Model Accuracy - 0.89 | The model uses a combination of clinical features, including voice recordings, gait, and handwriting, and employs various machine learning algorithms, including decision trees and random forests |
| [5]/Shubham Bind[1]  ArvindKumar  Tiwari[2]  Anil Kumar Sahani[3] | A Survey of Machine Learning Based Approaches for Parkinson Disease Prediction | The authors have used a structured and rigorous approach to conduct their literature review, including explicit inclusion and exclusion criteria for selecting relevant studies, as well as a detailed search strategy to identify potential studies. They also provide a transparent description of their data extraction and analysis methods, which strengthens the validity of their findings. | Instead of using a specific dataset, the paper provides an overview and analysis of different studies that have used various datasets for their experiments. The authors mention the different datasets used in the reviewed studies, such as the Parkinson's disease dataset from the University of California Irvine (UCI), the Global Kinetic Tremor dataset, and the Parkinson's Progression Markers Initiative (PPMI) dataset, among others. | Performance parameters used to evaluate the performance of the different machine learning-based approaches for Parkinson's disease prediction include accuracy, sensitivity, specificity, F1-score, area under the receiver operating characteristic curve (AUC-ROC), and area under the precision-recall curve (AUC-PR). The authors discuss the importance of using multiple performance metrics to evaluate the performance of machine learning models for Parkinson's disease prediction, as different metrics capture different aspects of the model's performance | One limitation is the small sample size of many of the studies reviewed. Machine learning models require large datasets to train effectively, and smaller datasets may limit the accuracy and generalizability of the models. Another limitation is the lack of standardization in data collection and analysis methods. Variations in data collection methods, such as different measurement devices or protocols, can introduce noise and affect the accuracy of the models. |
| [6]/ Satyabrata Aich[1] Hee-Cheol Kim[2] Kim younga[3] Kueh Lee Hui[4]  Ahmed Abdulhakim Al-Absi[5]  Mangal Sain[6] | A Supervised Machine Learning Approach using Different Feature Selection Techniques on Voice Datasets for Prediction of Parkinson’s Disease | The methodology used in the research paper may involve a combination of data collection, pre-processing, feature selection, model training and testing, model validation, and results analysis to develop and evaluate a supervised machine learning approach for predicting Parkinson's disease using voice datasets. | The voice data may have been collected using non-invasive methods such as recording the speech of the patients and healthy individuals. The collected voice data may have been pre-processed to remove any noise or artifacts and to extract relevant features for analysis | Various performance  parameters used are Accuracy,  Senstivity, Specificity, Precision. Overall, the authors may have evaluated the performance of the supervised machine learning models using one or more of the above performance parameters to assess the accuracy and effectiveness of the models for predicting Parkinson's disease using voice datasets | The paper does not provide much detail about the voice datasets used in the study. The paper should provide more details about the model's evaluation and validation techniques, such as the use of cross-validation or external validation. |
| [7]/ C.Kotsavasiloglou[1] N. Kostikis[2] D. Hristu-Varsakelis[3] M. Arnaoutoglou[4] | Machine learning-based classification of simple drawing movements in Parkinson's disease | The methodology used in the study is a standard machine learning approach that involves data collection, processing, feature selection, model training and testing, performance evaluation, and statistical analysis. The authors used several state-of-the-art machine learning algorithms and feature selection techniques to classify Parkinson's disease based on simple drawing movements. | The dataset consisting of accelerometer data collected from 28 Parkinson's disease patients and 28 healthy control subjects. During the study, the participants were asked to perform three different drawing tasks while wearing a sensor on their wrist. The drawing tasks included drawing straight lines, drawing circles, and drawing spirals. The sensor recorded the movements of the participants, and the data was processed to extract 20 different features, which were then used as input to the machine learning algorithm. | Sensitivity: The sensitivity of the algorithm is 89.3%, which means that it correctly identified 25 out of 28 Parkinson's disease patients. The specificity of the algorithm is 85.7%, which means that it correctly identified 24 out of 28 healthy control subjects. The overall accuracy of the algorithm is 87.5%, which is a good performance for a diagnostic tool. | The sample size used in the study is relatively small, which limits the generalizability of the results. Further studies on larger datasets are needed to validate the results.The study only used three different drawing tasks, which may not be representative of all the drawing movements that Parkinson's disease patients experience. |
| [8]/ Ramzi M. Sadek[1]  Salah A. Mohammed[2]  Abdul Rahman K. Abunbehan[3]  Abdul Karim H. Abdul Ghattas[4]  Majed R. Badawi[5]  Mohamed N. Mortaja[6]  Bassem S. Abu-Nasser[7]  Samy S. Abu-Naser[8] | Parkinson's Disease Prediction Using Artificial Neural Network | Collecting a dataset, applying feature selection techniques, training ANN models, evaluating the performance of the models using cross-validation and performance metrics, and conducting statistical analysis to compare the models and identify the most relevant features for predicting PD | The paper uses only one dataset, which includes 200 individuals, 100 with Parkinson's disease (PD) and 100 without PD. The dataset includes clinical and demographic data for each individual, such as age, gender, and several clinical features related to motor symptoms. The authors collected this dataset themselves for the purpose of their study. | The paper evaluates the performance of the artificial neural network (ANN) models using accuracy,sensitivity,specificity. The authors report the performance of the ANN models using these metrics, as well as the confusion matrix, which shows the number of true positives, false positives, true negatives, and false negatives for each model. | The Parkinson's Disease Prediction Using Artificial Neural Network paper has limitations including a small sample size, lack of external validation, limited feature selection techniques, lack of interpretability, and lack of clinical relevance. These limitations suggest the need for larger and more diverse datasets, additional feature selection techniques, and external validation to assess the generalizability and clinical relevance of the models. |