Literature Survey

Detecting Parkison's Disease using Machine Learning

INTRODUCTION

With the growing number of the aged population, the number of Parkinson's disease (PD) affected people is also mounting. Unfortunately, due to insufficient resources and awareness in underdeveloped countries, proper and timely PD detection is highly challenged. Besides, all PD patients' symptoms are neither the same nor they all become pronounced at the same stage of the illness. Therefore, this work aims to combine more than one symptom by collecting data and detecting PD with the help of a cloud-based machine learning system for monitoring the PD patients in the developing countries.

ALGORITHMS

To anticipate the value of neural, behavioral, and physiological systems of the brain ,algorithms like Linear kernel SVM, ANN, KNN with K-fold cross validation; K = 10, Naïve Bayes, Logistic regression, SVM (RBF and Linear), Random Forest, MLP, AdaBoostM1, Bagging CART, SVM, Boosted C5.0 have been used in various reference papers and an accuracy of 90 - 96% has been achieved.
Also considering various spiral and wave images, an expert system is made for training and testing. The model thus developed is used to exhibit high performance.

Reference: Arti Rana, Ankur Dumka, Rajesh Singh, Manoj Kumar Panda, Neeraj Priyadarshi and Bhekisipho Twala, "Imperative Role of Machine Learning Algorithm for Detection of Parkinson's Disease: Review, Challenges and Recommendations", 2022

REFERENCES

Anitha R, Nandhini T, Sathish Raj S, Nikitha V, "Early detection of Parkinson's Disease using Machine Learning", 2020

This proposed system is solved with minimal error rate. The voice dataset of Parkinson's disease from the UCI Machine learning library is used as input. Also proposed system provides accurate results by integrating spiral drawing inputs of normal and Parkinson's affected patients. We propose a hybrid and accurate results analyzing patient both voice and spiral drawing data. Thus combining both the results, the doctor can conclude normality or abnormality and prescribe the medicine based on the affected stage.
The predicted output for voice data analysis based on clustering and classification is with an accuracy of 88% .Thus our hybrid architecture, integrating image processing (spiral drawing analyzing) using image processing technique, the predicted output based on Random forest Classification and confusion matrix is with an accuracy of 83%. Also it produces real-time accurate results by giving a person's spiral drawing as an input to the OpenCV function, that indicates whether a person is healthy or affected by Parkinson's.

Md. SakiburRahman Sajal, Md. Tanvir Ehsan, Ravi VaidyaNathan, Shouyan Wang, Tpu Aziz and Khondaker Abdullah Al Mamun, "Telemonitoring Parkinson's Disease using Machine Learning by combining Tremor and Voice Analysis", 2020

This proposed system receives rest tremor and vowel phonation data acquired by smartphones with built-in accelerometer and voice recorder sensors. The data are primarily collected from diagnosed PD patients and healthy people for building and optimizing machine learning models that exhibit higher performance. After that, data from newly suspected PD patients are collected, and the trained algorithms are evaluated to detect PD. Based on the majority-vote from those algorithms, PD-detected patients are connected with a nearby neurologist for consultation. Also, the system requests the detected patients periodically to upload new data to track their disease progress.

The highest accuracy in PD detection using offline data was 98.3% from voice data and 98.5% from tremor data when used separately. In both cases, k-nearest neighbors (kNN) gave the highest accuracy over support vector machine (SVM) and naive Bayes (NB).

Jaichandran R, Leelavathy S , Usha Kiruthika S , Goutham Krishna , Mevin John Mathew and Jomon Baiju, "Machine Learning technique based Parkinson's Diseases Detection from Spiral and Voice Inputs", 2020

The proposed methodology was used to predict Parkinson's disease using patients' voices and spiral drawings. RStudio and Jupiter based python script was used for analysis. A hybrid architecture with voice and spiral drawing dataset information analysis was made to predict Parkinson disease in an easy manner and feasible one. The proposed predictive analytics framework wass a combination of K-means clustering and Decision Tree classification algorithm to predict PD from the patients. Parkinson's disease voice dataset from UCI Machine learning repository is used as input. Thus experimental results will show early detection of disease will facilitate clinical monitoring of elderly people and increase the chances of their life span and improved lifestyle to lead a peaceful life. The proposed system provides accurate results by integrating spiral drawing inputs of normal and parkinson's affected patients. From these drawings principal component analysis (PCA) algorithm for feature extraction from the spiral drawings. From the spiral drawings : X ; Y; Z; Pressure; GripAngle; Timestamp; Test ID values are extracted which are matched with the trained database using machine learning techniques and results are produced. Finally linear regression was used for identifying Parkinson disease or not.

Radouani Laila, Lagdali Salwa, Rziza Mohammed, "Detection of voice impairment for Parkinson's disease using machine learning tools", 2021.

In this paper, it proposes that Parkinson's disease (PD) is a disabling disease that affects the quality of life. It happens due to the death of cells that produce dopamine in the substantia nigra part of the central nervous system (CNS) which affects the human body. People who have Parkinson's disease feel difficulty in doing activities like speaking, writing, and walking. Speech analysis is the most considered technique to be used. Researches have shown that 90% of the people who suffer from Parkinson's disease have speech disorders. With the increase in the severity of the disease, the patient's voice gets more and more deteriorated. The proper interpretation of speech signals is one of the important classification problems for Parkinson's disease diagnosis. The main purpose of this paper is to contemplate the survey work of the machine learning techniques and deep learning procedures used for Parkinson's disease classification.

C K Gomathy, B.Varshini, B.Varsha, B.Dheeraj Kumar Reddy, "The Parkinson's Disease Detection using Machine Learning Techniques.", 2021.

Parkinson's disease is progressive neuro degenerative disorder that affects only people significantly affecting their quality of life. It mostly affects the motor functions of humans. The main motor symptoms are called "parkinsonism" or "parkinsonian syndrome". The symptoms of Parkinson's disease will occur slowly, the symptoms include shaking, rigidity, slowness of movement and difficulty with walking, Thinking and behavior change, Depression and anxiety are also common. There is a model for detecting Parkinson's using voice. The deflections in the voice will confirm the symptoms of Parkinson's disease. This project showed 73.8% efficiency. In this model, a huge amount of data is collected from the normal person and previously affected person by Parkinson's disease. these data are trained using machine learning algorithms. From the whole data 60% is used for training and 40% is used for testing. The data of any person can be entered in db to check whether the person is affected by Parkinson's disease or not.