Machine Learning Algorithms for Detection of Parkinson's Disease using Motor Symptoms: Speech and Tremor

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Abstract- Generally, the diseases are classified into communicable and non-communicable. The communicable disease is that, which can be spread easily from humans to humans while non-communicable disease does not spread. In this paper, we discuss about Parkinson's disease and its analysis using machine learning algorithms. The analysis of data is done using supervised machine learning approach. This paper concentrates and briefs about various supervised learning algorithms and its analysis.

Keywords: Prediction Rate, Death Rate, Support Vector Machine, Data Analysis.

I. INTRODUCTION

There are several kinds of diseases and the main classification in the disease is communicable and non-communicable disease. Mostly all the diseases can be cured, but some of the diseases still do not have any treatment. In this paper, we discuss about Parkinson's disease. Nearly 11 million people are affected by this disease worldwide. Many researches have been conducted to find a better result to cure the disease. In this paper, we propose the machine learning technique and collect data to analyse the disease. The pharmacy has to take steps to find the presence of the disease in the human and the methods to cure it. Based on the result we can predict the disease at the initial stage.

The machine learning is the analysis of past data to find a better solution for the future. The program we write will play a major role in this technology. The machine learning is the part of the Artificial Intelligence which uses the python code to perform the function.

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The machine learning algorithms can be categorized into 3 different types that are Supervised learning algorithms, unsupervised learning algorithms, Reinforcement learning algorithms. The unsupervised learning technique can collect the input data and it has no labels. It can simply collect the given data. The supervised learning technique can collect the input data and it has the labels for the data to be learned by the human being.

The reinforcement learning technique can collect positive, negative and neutral feedback to improve the system. The data is collected in the sets and the analysing part can be made using the Supervised Machine Learning Technique. The data scientist can divide the algorithm into two parts based upon the learning technisque supervised and unsupervised learning. In machine learning input can be provided as X and the output variable is Y. The data analysis can be done using the different algorithms and the data separation, data cleaning, and data preparation can be made using the Supervised Machine Learning Technique.

II. LITERATURE SURVEY

We assessed a large number of papers from some renowned journals. Some of the papers are reviewed in this survey. Tao Liu et., al. [1], proposed that several treatments are there to cure the different types of disease but one treatment cannot cure all the diseases. Likewise, this paper mainly shows the Parkinson's disease. For this disease, no treatments hand to cure it. In this paper, we propose by stylostixis treatment. It can measure the mechanical measurements to measure the parameters of the body. The parameters can give the result of the wealth of the human. Whether the wellness or the unwellness of the patient. The mechanical measurements can calculate the giant values of the variable disease. The stylostixis one of the treatments which can be found by the scientist under several types of research by using the machine learning technology. The measured data can be updated in the data set. The record has been maintained about the parameters of the disease affected patient. Based on the patient parameters the treatment proceeds. Stylostixis treatment can be used to control Parkinson's disease. The parameters can show the healthy or unhealthy of the person. The Reinforcement algorithm is used which can collect the positive and the negative feedback by the patient result and it gathers the result and it improves the efficiency for the performances.

Chen Liu et., al. [2], proposed the Parkinson's disease can be characterized by the beta oscillation. The deep brain stimulation is made in this paper. The main disorder of Parkinson's disease is to embrace thalamic ventral intermediate nucleus and striatum. The movement of this kind of part is getting static it can cause the disease. This paper proposes a machine model to predict oscillation. The machine learning technology is implemented to predict the parameters of the body in the current situation. The algorithm is formulated to predict the brain wave movement. The main disorder of Parkinson's disease is the deficiency in nutrients and stress. The stress which can affect the corpus striatum neurons of the brain will lead to the disease. The simulation can be carried out using the python language this can monitor the brain wave in the deep sense. Based upon the beta oscillation of the brain wave the percentage of the disease affect the human is measured. This can give a practical analysis of the disease in humans.

Marcos L. Carneiro et., al. [3], proposed to predict Parkinson's and diagnose the disease by the automatic system with the use of machine learning technology. It can spot the unhealthy person and healthy patients can separate them. The separation can be made by several victimizations such as the stride gap, stand path, swing gap, double support intervals. The double support victims can use the footstep calculation which can be measured using the pressure sensor. It can calculate the force-sensitive of the foot. The dynamic position can be determined at every step by using the machine learning algorithm. The python language can be implemented to predict the presence of the disease and to find the unhealthy person by automation technique. This approach is compared with the five different algorithms such as support vector machine, K- means method, Navies Bayes, Linear discriminate analysis and the call tree. The data is collected in the sets using the Supervised Machine Learning Technique algorithm. The record has been maintained using machine learning technology to collect all the data and maintain the record. The statistic interval can be made at the peak to peak. This method can predict the disease automatically and diagnose it within a limited period.

Christian Herff et., al. [4], proposed the main cause of Parkinson's disease is affecting the deep brain in the major part. So, to predict the beta oscillation of the brain wave. The fluctuation has been made using the motor at a regular interval of time. The nervous disorder is the main problem for this kind of disease. The levodopa disorder between 5-10 years. The fluctuation of the motor can be divided into two sections ON state and OFF state. The ON state refers to the motor symptoms are treated well and the OFF state refers to the motor treatment are not effective. The effective operation of the ON and OFF of the motor can provide a better result. With the help of the motor fluctuation the deep brain wave graphical representation is monitored. The neural region of the brain part can give a better result. The fluctuation of the motor can vary the dopaminergic distortion. This method can undergo various researches to predict the exact result of brain wave monitoring.

Ancy Carshia S et., al. [5], proposed the comparison of the brain wave patterns of Parkinson's disease and Alzheimer's disease. The static and dynamic stages of both diseases are compared. By comparison, unhealthy can be predicted. The brain fluctuation can be made using the motor. The motor ON and OFF state data are recorded in the database. The brain network can be implanted to monitor every stage of the brain wave. The graphical pattern is obtained by the neural topology system. The motor region and the memory region are compared in both the disease. The neural region of both diseases is compared in the step by step manner using the ON and OFF state. The ON state refers to the motor symptoms are treated well and the OFF state refers to the motor treatment are not effective. The effective operation of the ON and OFF of the motor can provide a better result. It can continuously provide the continuation state of the wellness of the health condition. The neural network is used to predict the motor state fluctuation is made according to it. This system gives continuous details of the brain wave pattern.

Igor Škrjanc et., al. [6], proposed the learning methodology is to determine the presence of the disease. The nursing progressive learning method is implemented to determine the healthiness of the patient. The pharmacy can determine the presence of the disease or not at the initial stage of the prediction. By using machine learning technology. Based upon the nurse data the analysis has been made. The data can give the range of the disease and the activation of the brain part. The neural region can be affected in the major area which can result in Parkinson's disease. The brain wave pattern can be determined using the beta oscillation. The β level of the mathematical function to operate the hyper rectangular types in a dynamic atmosphere. The pattern designed by the granular path. The nursing report helps to analyse the disease deeply and it plays a vital role in the prediction of the disease. Several types of research have been made to control the disease and to protect the people who are getting affected by the disease. In this research, machine learning can give the major hands to provide better treatment and to control the disease.

Jack W. Judy et., al. [7], proposed the Parkinson's disease can affect the patient in the major part. It affects the locomotion of the patient. The gait episodic motor system is employed for the movement of the patient. We can easily learn an algorithm that is supported in the monitoring of locomotion. The machine learning algorithm is employed before employed it faces several challenges to make the data set more proper. The locomotion record of each patient can be monitored and updated in the database. The waveform is generated for each movement and the framework of the movement is made. The k- nearest neighbour is used to classify the data in the sets. The design can be formulated by the self-mapping technology method which can give the appropriate result. Sevinc Ilhan Omurca et., al. [8], proposed to cure Parkinson's disease several measures have been taken place to overcome the disease. For this several algorithms have been used to predict the better result.

The outcome of each algorithm is compared to one another. The main algorithms are logistic regression, Support vector machine, Gradient boosting, Random forest and tree mapping. These algorithms cannot meet the desired outcome. So the machine learning algorithm is proposed it can select the unwellness of the patient from a healthy person. The 1397 speech sets have been considering and the twenty-five options can be obtained by the Parkinson's patient. The large set of maps is created for the data analyzation, data classification and data formulation to attain the expected outcome.

Yanan Zhang et., al. [9], proposed the classification has been made among the patient who is affected by the Parkinson's disease.

The machine learning algorithm is used for the classification of the disease. The main thing of most of Parkinson's disease is the gait disorder. By using the data clustering technology, the main sort of gait disorder is found. Based upon the data gathering the preventive measures have been suggested to control the disease. The parameters of the Parkinson's disease are gathered in the separate data set. This method can categorize gait disorder into five parts.

Mangal Sain et., al [10]., proposed before some years the researches have been made for Parkinson's disease. Several methods were tried but it did not give the desired feedback. But to date, nobody compared the merits of each algorithm with one another. The classification has been made which is linear and nonlinear, this can support the voice knowledge. The proposed new technology approach by using a different algorithm which is the genetic feature-based control algorithm. It can analyse the data on whether the disease can be moved from generation to generation through the gene. Depends upon the disorder in the health this disease will affect. The research has been carried out about the genetic transformation. The machine learning can be bits of help in the research to provide a better solution.

III. PROPOSED METHOD OF GUI BASED PREDICTION OF PARKINSON DISEASE USING MACHINE LEARNING APPROACH

In this paper, we mainly say about Parkinson's disease. Most of the people in the world are affected by the disease. So, to find a better solution to cure the disease and predict the disease in the initial stage the machine learning algorithm is carried out. We can spot the unwellness of the people and we analyse the body parameters. The medical data are uploaded in the database. The data can be gathered and analysed and formulated using the Supervised Machine Learning Technique. This method can provide an effective outcome to treat the disease. The simulation has been carried which is tested by the neural region which is shown in Fig 1.
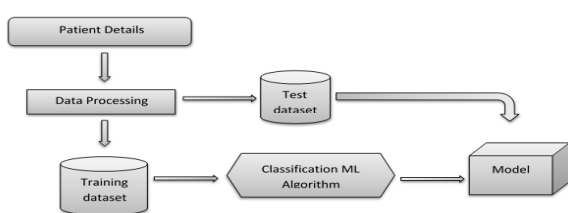

Fig 1 Block Diagram of prediction of Parkinson Disease using machine learning approach

IV. RESULTS

Here in this project, we are going to collect the patient details from datasets. These details will be of various forms of parameters such as age, height, weight, walking gait, etc.
Speech dataset: The Multi-Dimensional Voice Program (MDVP) is a well-established software program used for quantitative acoustic signal assessment of voice quality. The MDVP calculates a number of acoustic parameters including shimmer, short-term perturbations of the amplitude, and jitter, short-term perturbations of the frequency. Here we have used data of 195 patients.

MDVP: The Multi-Dimensional Voice Program (MDVP) is a computer program that can calculate as many as 33 acoustic parameters from a voice sample. It is standard software for acoustic assessment which is widely used by many researchers in the voice field for being very comprehensive. The MDVP appears to have potential for rapid quantitative assessments of voice in both research and clinical applications it diagnosis of pediatric vocal cord dysfunction. Dysphonia is a phonation disorder with the difficulty in the voice production. Dysphonia can be observed with hoarse, harsh, or breathy vowel sounds, as a result of impaired ability of the vocal folds to properly vibrate during exhalation. Here we have used data of 77 patients. These datasets will have all patients' details according to our need. We need to mine the data from the set of given data. Here the concept of machine learning is been used. Here the input data are being pre-processed according to our need, Parkinson's affected people are been tabulated and using machine learning algorithm we are predicting how patients are being affected. The below graph Fig 2 is the graph that represents the accuracy rate using different algorithms and speech datasets for detection of Parkinson's disease. Fig 3 shows the accuracy rate using different algorithms and tremor datasets for detection of Parkinson's disease.
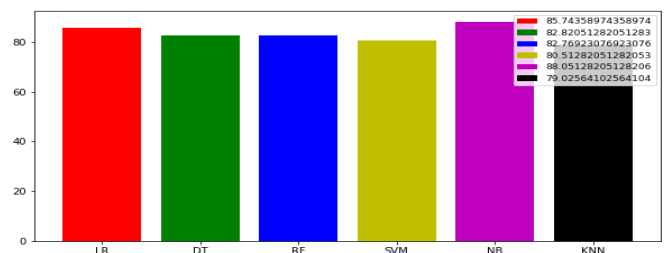

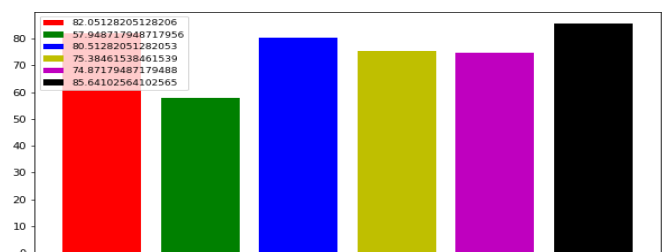**Fig 2: Accuracy rate of Parkinson's disease using speech dataset**

Fig 3: Accuracy rate of Parkinson's disease using tremor dataset

V. CONCLUSION

The main aim of our project is to build an efficient machine learning algorithm for the early prediction of Parkinson's disease. This is a major neurodegenerative disease which is affecting nearly a large amount of people in the entire world. This method of predicting the early stages of the disease will help in knowing the keen knowledge of those diseases and how to eradicate it in the future to improve the lifetime of every human in the entire world.

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