Software Requirement Specification

Machine-learning based diagnosis of Paralysis Agitans.

Under the guidance of

Mrs.S.RASHIKA

(Assistant Professor)

Presented By

D.Shekar – 207Z1A0531

D.BhanuPrakash– 207Z1A0541

D.Agastiya– 207Z1A0542

1.Introduction

Parkinson's disease is a progressive neurodegenerative disorder affecting motor control. Machine learning plays a vital role in understanding and diagnosing the disease. By analyzing extensive datasets, machine learning algorithms can uncover hidden patterns and correlations, aiding in early detection and personalized treatment planning. These models utilize various risk factors such as age, genetics, and environmental exposure to predict the likelihood of developing Parkinson's disease. Additionally, machine learning techniques can monitor and assess disease progression by analyzing movement patterns and other data, providing objective measures of symptom severity. This technology holds great promise in improving patient outcomes, facilitating accurate staging, and evaluating the effectiveness of interventions in Parkinson's disease.

1.1 Purpose

The purpose of XGBoost is to specify the requirements for a machine learning-based system for detecting Parkinson's disease.

1.2 Scope

The XGBoost will take input data from individuals, analyze it using machine learning algorithms, and provide a prediction regarding the presence or absence of Parkinson's disease.

1.3 Overview

Machine learning techniques, including algorithms like XGBoost, can be used to analyze data related to Parkinson's disease. By training models on relevant datasets, machine learning can help identify patterns and predict the presence or progression of Parkinson's disease. These models utilize various data inputs such as demographic information, genetic data, clinical scores, and biomarkers to provide valuable insights for diagnosis, risk assessment, and personalized treatment approaches.

1. General Description

Parkinson's disease is a neurodegenerative disorder that affects the central nervous system. It is characterized by a progressive loss of dopamine-producing cells in the brain, leading to motor symptoms such as tremors, stiffness, and impaired balance. Machine learning techniques have been employed to aid In the diagnosis and management of Parkinson's disease. By analyzing large datasets of clinical and imaging data, machine learning algorithms can identify patterns and markers that are indicative of the disease. These algorithms can assist in early detection, prediction of disease progression, and response to treatment. Moreover, machine learning models can contribute to personalized medicine by tailoring treatment plans to individual patients based on their unique characteristics and needs. While machine learning has shown promise in Parkinson's disease research, further advancements and validation are still necessary to fully realize its potential in clinical practice.

2. System Features and Requirements

2.1 Functional Requirements

2.1.1 Data Collection

- The data collection allow users to input relevant data, such as motor symptoms, voice recordings, and demographic information.
- The data collection provide mechanisms to ensure data privacy and comply with relevant data protection regulations.

2.1.2 Preprocessing

- The preprocessing preprocess the input data to handle missing values, normalize or scale features, and encode categorical variables if applicable.

2.1.3 Feature Extraction

- The feature extraction extract relevant features from the input data, such as tremor intensity, voice characteristics, and gait patterns.

2.1.4 Model Training

- Utilize machine learning algorithms, such as XGBoost, to train a predictive model using a labeled dataset consisting of individuals with and without Parkinson's disease.
- Implement techniques like cross-validation to assess the performance and generalization ability of the trained model.

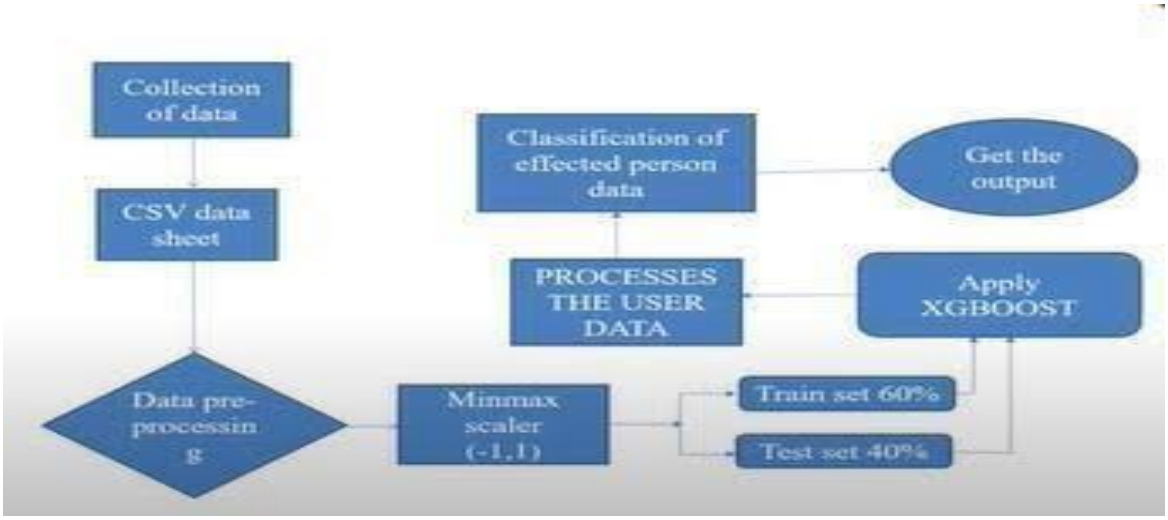
2.1.5 Model Testing and Evaluation

- Evaluate the trained model using a separate testing dataset, measuring metrics such as accuracy, precision, recall, and F1-score.
- Provide mechanisms to validate the model's performance and robustness, including statistical analysis and comparison with existing diagnostic methods.

2.1.6 Model Deployment

- Allow the trained model to be deployed and utilized to make predictions on new, unseen data.
- Provide a user-friendly interface or API to accept input data, process it using the trained model, and present the prediction results.

2.1.7 System Environment diagram



2.2 Non-Functional Requirements

2.2.1 Performance

- Respond to user inputs and provide predictions within an acceptable timeframe, ensuring realtime or near-real-time performance.
- Handle a large volume of input data and be scalable to accommodate a growing user base.

2.2.2 Accuracy and Reliability

- Strive for high accuracy in predicting the presence or absence of Parkinson's disease, minimizing false positives and false negatives
- Undergo rigorous testing and validation to ensure reliable and consistent performance across different datasets.

2.2.3 Security and Privacy

- Implement appropriate security measures to protect user data from unauthorized access or breaches.
- Comply with applicable data protection and privacy regulations, ensuring the anonymisation and confidentiality of user data.

2.2.4 Constraints

- The system's performance and accuracy are dependent on the quality and representativeness of the input data.
- The system requires access to a sufficient amount of labeled data for training and testing purposes.
- The system's success rate may vary depending on the stage and severity of Parkinson's disease in individuals.

2.2.5 Future Enhancements

- The system can be enhanced by incorporating additional data sources, such as wearable devices or smartphone sensors, to capture real-time movement and behavioral patterns.

- The system can integrate with electronic health records or other medical systems to provide a comprehensive diagnostic solution.
- The system can be expanded to detect other neurological disorders or diseases with similar symptom.

3. External Interface Requirements

3.1 Software Requirements

- Processor : Intel i3 and above
- RAM : 4GB and Higher
- Hard Disk : 1 GB: Minimum

3.2 Hardware Requirements

- Programming Language : Python
- IDE : pycharm/jupyter

4. Appendices

- 1.Mahlknecht, P.; Krismer, F.; Poewe, W.; Seppi, K. MetaAnalysis of Dorsolateral Nigral
- Hyperintensity on Magnetic Resonance Imaging as a Marker for Parkinson’s Disease. Mov. Disord. 2017, 32, 619–623.
- Dickson, D.W. Neuropathology of Parkinson disease. Parkinsonism Relat. Disord. 2018, 46 (Suppl. 1), S30–S33.
- Kalia, L.V.; Lang, A.E. Parkinson’s Disease. Lancet 2015, 386, 896–912.
- D. Heisters, "Parkinson's: symptoms treatments and research", vol. 20, no. 9, pp. 548-554, 2011.