

Parkinson's Disease progression prediction using Deep Learning & Securing data using Blockchain

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INTRODUCTION

- Parkinson's disease (PD) is one of the neurological disorders which affects our central nervous system especially our motor system.
- Early detection and prior care may help patients to improve their quality of life.
- Unfortunately, there is no cure known yet for this neurodegenerative disease has no known cure.
- Global estimates in 2019 showed over 8.5 million individuals with PD. Current estimates suggest that, in 2019, PD resulted in 5.8 million disability-adjusted life years, an increase of 81% since 2000, and caused 329 000 deaths, an increase of over 100% since 2000[1]
- The numbers of Parkinson's disease patients indicate that a need for predicting progression of Parkinson's disease is really very important.
- So in the proposed study, protein and peptide abnormalities are tracked down for the prediction of the course of Parkinson's disease in the patients.

COMMON TYPES OF SPEECH DISORDERS

- **Stuttering:** Stuttering refers to a speech disorder that interrupts the flow of speech in which a person may repeat some vowels , words or sounds , may stretch a word, or experience difficulty in making necessary speech sound
- **Apraxia:** Apraxia of speech, or verbal apraxia, refers specifically to the impairment of motor skills that affect an individual's ability to form the sounds of speech correctly, even when they know which words they want to say.
- **Dysarthria:** People having dysarthria may experience the symptoms like slurred speech , mumbling, speaking too slow or too fast, soft or quiet speech, difficulty in moving tongue or mouth.
- **Articulation errors.:** This happens when children can't form speech sounds because they have trouble placing their tongue in the right position. Lispering is an example of an articulation error.
- **Tongue-tie (ankyloglossia):** This is a physical condition that makes it hard for children to move their tongues.
- **Selective mutism:** This condition happens when children become so anxious about being in certain places and situations that they can't speak.

LITERATURE REVIEW

- Many studies have been conducted on the prediction of Parkinson's Disease.
- Wang et al [4] used an innovative deep-learning technique to early uncover whether an individual is affected with PD or not based on premotor features.
- In another study [5], Adaptive Crow Search Algorithm (ACSA) and Deep Learning (DL)–based optimal feature selection method are introduced. The proposed model is the combination of CROW Search and Deep learning (CROWD) stack sparse autoencoder neural network.
- Sivaranjini S. et al [6] classified the MR images of healthy control and Parkinson's disease subjects using deep learning neural network. The Convolutional Neural Network architecture AlexNet is used to refine the diagnosis of Parkinson's disease. The MR images are trained by the transfer learned network and tested to give the accuracy measures. An accuracy of 88.9% is achieved with the proposed system.
- In [7], novel efficient common spatial pattern-based approaches for detecting Parkinson's disease in two cases, off–medication and on–medication, are proposed. First, the EEG signals are preprocessed to remove major artifacts before spatial filtering using a common spatial pattern.

LITERATURE REVIEW

- Dadu, Anant, et al [8] used unsupervised and supervised machine learning methods on comprehensive, longitudinal clinical data from the Parkinson's Disease Progression Marker Initiative (n = 294 cases) to identify patient subtypes and to predict disease progression.
- PK Mall et al [9] suggested technique beats other techniques. The suggested model outperforms existing machine learning approaches such as SVM (support vector machine), KNN (K-nearest neighbour), RF(Random-Forest), DT(Decision-Tree), MLP (multilayer perceptron), (SC)StackingClassifier, (LR)Logistic-Regression. when accuracy, matthews correlation coefficient (MCC), and f1score are calculated.
- In [10] Martinez et al evaluated 9 algorithms for discriminating PD patients from controls using a wide collection of non-motor clinical PD features from two databases: Biocrucis (96 subjects) and PPMI (687 subjects).

Research Objectives

- The prediction of progression of Parkinson's disease is a very complex task, so an automated system is needed to avoid any kind of risk associated with it so deep learning is used to track down the progress of Parkinson's disease in a patient.
- The goal is to develop a deep learning model that can be used to predict the progression of Parkinson's disease in a patient.
- To develop a model trained on data of protein and peptide levels over time in subjects with Parkinson's disease versus normal age-matched control subjects. The Model will predict MDS-UPDR scores, which measure progression in patients with Parkinson's disease
- To provide important clues for the development of new pharmacotherapies to slow the progression or cure Parkinson's disease.

Research Objectives

- Some researchers have proposed using blockchain to create decentralized systems for managing patient information and providing personalized care for people with Parkinson's disease.
- For example, one study simulated a blockchain-based platform that would allow patients to share their health data with doctors and researchers, and receive feedback and recommendations.
- Another study suggested integrating blockchain with artificial intelligence and wearable devices to monitor and analyze the symptoms of Parkinson's disease in real time.
- A third study used blockchain and deep learning to distinguish between essential tremor and Parkinson's tremor based on accelerometer data

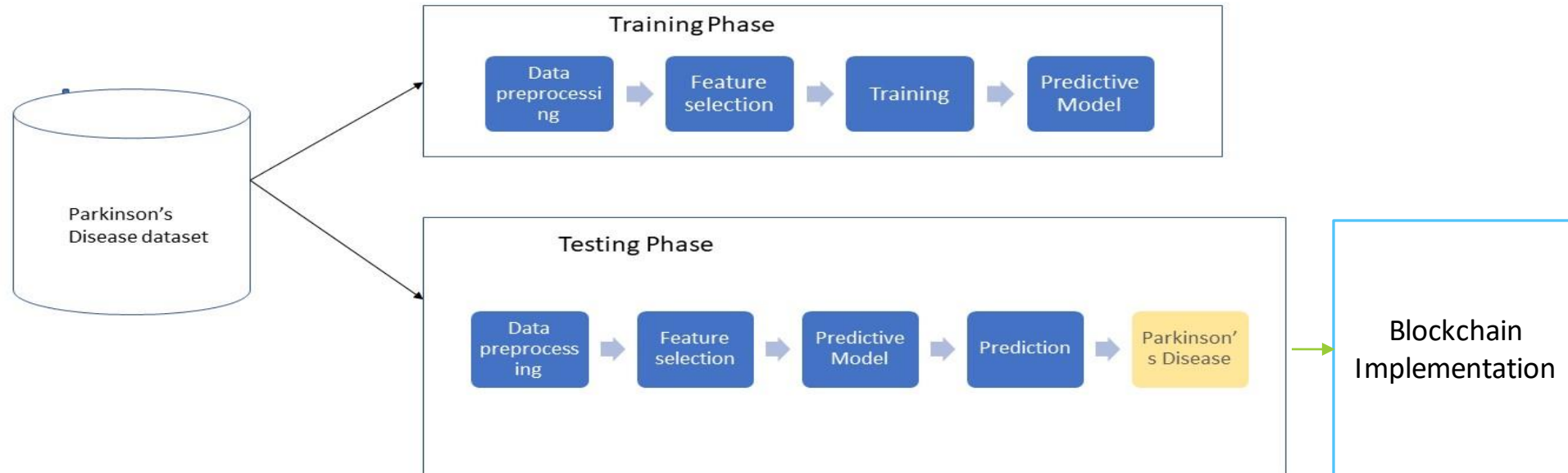
Research GAP

- Parkinson's disease (PD) is a disabling brain disorder that affects movements, cognition, sleep, and other normal functions. Unfortunately, there is no current cure—and the disease worsens over time. To detect it at an early stage is still a challenge.
- Current efforts have resulted in complex clinical and neurobiological data on over 10,000 subjects for broad sharing with the research community. A number of important findings have been published using this data, but clear biomarkers or cures are still lacking.
- The proposed system could help in the prediction of the progression of Parkinson's disease in patients so that proper treatment can be given to them, which would alleviate the substantial suffering and medical care costs of patients with this disease.
- The proposed system using blockchain to create decentralized systems for managing patient information and providing personalized care for people with Parkinson's disease.

Proposed System

- The proposed system will work on an ensembled machine learning model that can help in prediction of the progress of Parkinson's disease accurately.
- First step is the preprocessing of the data from the dataset. This step will include data cleaning, data integration, data transformation and dimension reduction.
- In second section , feature selection will be done from the available dataset.
- Next step is the model building by using boosting and bagging algorithm for fast and accurate results.
- The last step includes training , testing and validation of the proposed model on the dataset.
- Finally the proposed model will be used to predict MDS-UPDR scores, which measure progression in patients with Parkinson's disease.

Workflow Of Proposed System



Result Analysis and Interpretation

- Finally, the data analysis and interpretation will be done. That is to find:
- How well the model is able to predict the progress of Parkinson's disease in patients?
- How efficient and effective the model is in terms of different metrics like accuracy and loss?
- How the proposed model is better than the state-of-the-art methods that are available in the literature?
- How amalgamation of Blockchain helps to maintain a decentralized data of patients securely?

CONCLUSION

- Parkinson's disease (PD) is a disabling brain disorder that affects movements, cognition, sleep, and other normal functions. Unfortunately, there is no current cure—and the disease worsens over time.
- It's estimated that by 2037, 1.6 million people in the U.S. will have Parkinson's disease, at an economic cost approaching \$80 billion.
- Research indicates that protein or peptide abnormalities play a key role in the onset and worsening of this disease.
- Gaining a better understanding of this—with the help of data science—could provide important clues for the development of new pharmacotherapies to slow the progression or cure Parkinson's disease.
- The purpose of this work is to develop a model that could help in the search for a cure for Parkinson's disease, which would alleviate the substantial suffering and medical care costs of patients with this disease.

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