**Parkinson disease diagnosis using Machine Learning Techniques**

**Abstract:**

Parkinson’s Disease (PD) is a prevalent neurological condition characterized by motor and cognitive impairments, typically manifesting around the age of 50 and presenting symptoms such as gait difficulties and speech impairments. Although a cure remains elusive, symptom management through medication is possible. Timely detection is pivotal for effective disease management. In this project, we leverage Machine Learning (ML) and Deep Learning (DL) techniques, specifically K-Nearest Neighbor (KNN) and Feed-forward Neural Network (FNN) models, to differentiate between individuals with PD and healthy individuals based on voice signal characteristics. Our dataset, sourced from the University of California at Irvine (UCI), comprises 195 voice recordings collected from 31 patients. To optimize model performance, we employ various strategies including Synthetic Minority Over-sampling Technique (SMOTE) for addressing class imbalance, Feature Selection to identify the most relevant features, and hyperparameter tuning using Randomized SearchCV. Our experimentation reveals that the FNN and KSVM models, trained on an 80–20 split of the dataset for training and testing respectively, yield the most promising results. The model is evaluated based on different parameters like accuracy, recall, precision, and f1-score. Overall, our project showcases the efficacy of ML and DL techniques in accurately identifying PD from voice signals, underscoring the potential for these approaches to contribute significantly to early diagnosis and intervention strategies for Parkinson’s Disease.

**Block Diagram:**

