

## **LITERATURE SURVEY FOR DETECTING PARKINSON'S DISEASE USING MACHINE LEARNING**

### **PAPER 1:**

**NAME:** Parkinson's disease prediction using machine learning approaches

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**PUBLICATION YEAR:** December 2013

**CHARACTERISTICS:** Fully Complex-Valued Radial Basis Function network (FC-RBF), Meta-Cognitive Fully Complex-Valued Radial Basis Function network (Mc-FCRBF) and Extreme Learning Machine (ELM)

This paper proposes the application of a Fully Complex-Valued Radial Basis Function network (FC-RBF), Meta-Cognitive Fully Complex-Valued Radial Basis Function network (Mc-FCRBF) and Extreme Learning Machine (ELM) for the prediction of Parkinson's disease. With the help of Unified Parkinson's Disease Rating Scale (UPDRS), the severity of the Parkinson's disease is predicted and for untreated patients, the UPDRS scale spans the range (0-176). The FC-RBF network uses a fully complex valued activation function  $\text{sech}$ , which maps  $c_n \rightarrow c$ . The performance of the complex RBF network depends on the number of neurons and initialization of network parameters. The implementation of the self-regulatory learning mechanism in the FC-RBF network results in Mc-FCRBF network. It has two components: a cognitive component and a meta-cognitive component. The meta-cognitive component decides how to learn, what to learn and when to learn based on the knowledge acquired by the FC-RBF network. Extreme learning mechanism uses sigmoid activation function and it works with fast speed. In ELM network, the real valued inputs and targets are applied to the network. The result indicates that the Mc-FCRBF network has good prediction accuracy than ELM and FC-RBF network.

**PAPER 2:****NAME:**Parkinson's disease detection using ensemble techniques and genetic algorithm**AUTHORS:**Najmeh Fayyaifar,Najmeh Samadiani**PUBLICATION YEAR:**October 2017**CHARACTERISTICS:**AdaBoost and Bagging algorithms

Parkinson's disease (PD) is a neurological disorder which progress by time. People suffering from PD experience shortage of Dopamine which is a chemical present in brain nerve cells. The symptoms of PD are tremor, rigidity, and slowness of movements and people with PD experience more severity by time progress. Therefore, the automation in early detection of PD is an important issue. In the literature, different classification methods have been proposed. Also, due to the high dimension of extracted features of voice, many feature selection algorithms have been developed. In this paper, they aim to propose a method for early detection of PD from voice recordings. The Genetic algorithm is used to select the optimal set of features which can reduce feature vector dimension from 22 to 6 features.they have achieved 96.55% and 98.28% detection rate by employing AdaBoost and Bagging algorithms for classification process, respectively.

**PAPER 3:****NAME:**LSTM Siamese Network for Parkinson's Disease Detection from Speech**AUTHORS:**Saurabhchand Bhati,Laureano Moro Velazquez,Jesus villalba**PUBLICATION YEAR:**November 2019**CHARACTERISTICS:**LSTM, Siamese Network

In this work, they propose a two-step strategy to use machine learning methods for PD detection. In the first step,they use Long Short-Term Memory (LSTM)-based siamese networks to learn feature representations that highlight the information related to speech articulation and prosody relevant for PD detection. Siamese networks are trained on data pairs employing a Spanish corpus containing 52 patients and 56 control subjects. In the second step, they train a classifier to make decisions about the presence or absence of PD employing the features provided by the LSTM networks. We achieve an EER of 1.9% in the detection by combining the scores of different text-dependent models. Preliminary experiments show the efficacy of the proposed method and prove the usefulness of LSTM for PD detection from speech.