LITERATURE SURVEY

DETECTING PARKINSONS DISEASE USING MACHINE LEARNING

1.Sakshi Jadhav, Seema Thorat, Sakshi Fokane, Rahul Chakre, "Classification of Parkinson's disease using Machine Learning Techniques",2022.

The concepts of Deep Learning are discussed in this paper, while the application in Parkinson prediction is focused. To avoid the drawbacks of the conventional methods, new age deep learning techniques were proposed in this review paper. The included studies showed that Deep Learning techniques have significant impact on early detection of Parkinson with high accuracy rate. However, most of the proposed methods are still in development and not tested in a clinical setting. The work is mainly focusing on advancement of predictive models to achieve good accuracy in predicting valid disease outcomes using deep learning methods like prediction based on Artificial Neural Network (ANN). Deep Learning techniques are proposed for the prediction of Parkinson Disease in early stage in this paper.

2.Jie Mei et al. "Machine learning for the diagnosis of Parkinson's disease",2021.

This paper used all basic algorithms of deep learning techniques for the detection of PD like SVM, RF, Decision Tree, ANN, KNN, Radial Basis Function Networks (RBF) and Deep Belief Networks (DBN) etc. The early identification of Parkinson's disease is critical so the identification can be performed with the use of a data mining technique. Techniques for detecting PD, such as Naive Bayes, support vector machine, multilayer perceptron neural network, and decision tree, are theoretically explained. This study used speech input from acoustic devices to predict Parkinson's disease. People from various areas and speech factors are investigated in this article in order to predict Parkinson's disease among various patients. The speech datasets was used to recognize Parkinson's illness using Multi - layer Perceptron and Logistic Regression (LR) frameworks.

3. Atiqur Rahman, Sanam Shahla Rizvi, Aurangzeb Khan, et al. "Parkinson's Disease Diagnosis in Cepstral Domain Using MFCC and Dimensionality Reduction with SVM Classifier",2021.

In this paper, considered the challenge of PD detection based on multiple types of voice signals. Numerical features were extracted using mel-frequency cepstral coefficients (MFCCs). In order to obtain better PD detection performance,

projected the MFCC features to lower dimensional space using linear discriminant analysis (LDA) approach. Through performance analysis, noticed that MFCC-LDA-SVM method and support vector machine with linear and radial basis function (RBF) kernels provide optimal performance. Extracted MFFC features are dimensionality reduced in this system through the application of the linear discriminant analysis (LDA) model. Performance comparison was carried out using different evaluation criteria-classification accuracy, area under the curve (AUC), and receiver operating characteristics curve. The proposed method produced overall of AUC-87%, PD detection accuracy-78.5%, sensitivity-73.33%, and specificity-80%. The proposed system was simulated on the various publicly available dataset.

4.Mosarrat Rumman, Abu Nayeem Tasneemet et al. "Early detection of Parkinson's disease using image processing and artificial neural network",2019.

The paper is based on Image Processing and Artificial Neural Network (ANN) classification algorithm. According to ANN(Artificial Neural Network) prediction, if value closer to 1 suggests PD and value closer to 0 suggest normal. Parkinson disease(PD) is a global public health issue. Machine learning technique would be a best solution to classify individuals and individuals with Parkinson's sickness (PD). This paper gives an entire overview for the forecast of Parkinson disease by utilizing the machine learning based methodologies. A concise description of varied computational system based methodologies utilized for the forecast of Parkinson disease are introduced. This paper likewise displays the outline of results acquired by different scientists from accessible information to predict the Parkinson disease.

5.Mahima Thakur, Harisudha Kuresan, Samiappan Dhanalakshmi et al. "Soft Attention Based DenseNet Model for Parkinson's Disease Classification Using SPECT Images",2022.

In this paper, the study combined a total of 1,390 DaTscan imaging groups with PD and normal classes. The architecture of DenseNet-121 were leveraged with a soft-attention block added before the final classification layer for visually analyzing the region of interest (ROI) from the images after classification. Here Soft Attention Maps and feature maps representation are also used. This model obtained an overall accuracy of 99.2% and AUC-ROC score of 99%. A sensitivity of 99.2%, specificity of 99.4% and f1-score of 99.1% have been achieved that surpasses all prior research findings. Soft-attention map and feature map representation aid in highlighting the region of interest (ROI), with a specific attention on the putamen and caudate regions. With the deep learning framework adopted, DaTscan images reveals the putamen and caudate areas of the brain,

which aid in the distinguishing of normal and PD cohorts with high accuracy and sensitivity.

6.Ankit kurmi, Shreya Biswas, Ram Sarkar et al. “An Ensemble of CNN Models for Parkinson’s Disease Detection Using DaTscan Images”,2022.

This paper have proposed an ensemble of DL models to predict Parkinson’s disease effectively using the PPMI DaTscan images. Designed a fuzzy ensemble model, called FRLF, which is applied on the confidence scores of four classic DL models- VGG16, ResNet50, Inception-V3, and Xception to enhance the overall results of the model. From the results reported, it ensures that the proposed model achieves state-of-the-art performance. Recognition accuracy, Precision, Sensitivity, Specificity, F1-score of the proposed model using DaTscan are 98.45%, 98.84%, 98.84%, 97.67%, and 98.84% respectively. Also incorporated this model in a GUI-based software tool for public use that instantly detects Parkinson’s disease in DaTscan images given to it as inputs. This played a significant role in detecting Parkinson’s disease in real-time. System is primarily based on DaTscan images. But this have not yet extended the system to MRI scans or CT scans.

7. Sumeet Shinde , Shweta Prasad , Yash Saboo et al. “Predictive markers for Parkinson's disease using deep neural nets on neuromelanin sensitive MRI”,2019.

In this paper, system has established a computer-based analysis technique that uses convolutional neural networks (CNNs) to create prognostic and diagnostic biomarkers of PD from NMS-MRI. This technique also proposed that not only performs with a superior testing accuracy (80%) as compared to contrast ratio-based classification (56.5% testing accuracy) and radiomics classifier (60.3% testing accuracy), but also supports discriminating PD from atypical parkinsonian syndromes (85.7% test accuracy). Moreover, it also has the capability to locate the most discriminative regions on the neuromelanin contrast images. These discriminative activations demonstrate that the left substantia nigra pars compacta (SNc) plays a key role in the classification in comparison to the right SNc, and are in agreement with the concept of asymmetry in PD. Overall, the technique has the potential to support radiological diagnosis of PD while facilitating deeper understanding into the abnormalities in substantia nigra pars compacta (SNc).

8. Zhennao Cai, Jianhua Gu, Caiyun Wen, Dong Zhao et al. “An Intelligent Parkinson’s Disease Diagnostic System Based on a Chaotic Bacterial Foraging Optimization Enhanced Fuzzy KNN Approach”,2018.

In this paper, an enhanced fuzzy *k*-nearest neighbor (FKNN) method for the early detection of PD based upon vocal measurements was developed as a proposed system. An evolutionary instance-based learning approach termed CBFO-FKNN, was developed with coupling chaotic bacterial foraging optimization with Gauss mutation (CBFO) approach with fuzzy *k*-nearest neighbor (FKNN). The integration of the CBFO technique efficiently resolved the parameter tuning issues of the fuzzy *k*-nearest neighbor (FKNN) that caused variation in accuracy. The effectiveness of the CBFO-FKNN method was compared to those of the PD datasets in terms of classification accuracy, specificity, and AUC (area under the receiver operating characteristic curve) and resulted with good accuracy. The simulation results indicated this approach outperformed the other five FKNN models based on BFO, particle swarm optimization, Genetic algorithms, fruit fly optimization, and firefly algorithm, as well as three advanced machine learning methods including support vector machine (SVM) with local learning-based feature selection, and kernel extreme learning machine in a 10-fold cross-validation (CV) scheme. The method presented in this paper has a very good prospect, greater convenience to the clinics to make a better decision in the clinical diagnosis.