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**Hybrid CNN-LSTM Model with Efficient Hyper parameter Tuning for Prediction of Parkinson's disease****Umesh Kumar Lilhore***Chandigarh University, Punjab, India*

The patients' vocal Parkinson's disease (PD) changes could be identified early on, allowing for management before physically incapacitating symptoms appear. In this work, static as well as dynamic speech characteristics that are relevant to PD identification are examined. Speech changes or communication issues are among the challenges that Parkinson's individuals may encounter. As a result, avoiding the potential consequences of speech difficulties brought on by the condition depends on getting the appropriate diagnosis early. PD patients' speech signals change significantly from those of healthy individuals. This research presents a hybrid model utilizing improved speech signals with dynamic feature breakdown using CNN and LSTM. The proposed hybrid model employs a new, pre-trained CNN with LSTM to recognize PD in linguistic features utilizing Mel-spectrograms derived from normalized voice signal and dynamic Mode Decomposition (DMD). The proposed Hybrid model works in various phases, which include Noise removal, extraction of Mel-spectrograms, feature extraction using pre-trained CNN model ResNet50, and the final stage is applied for classification. An experimental analysis was performed using the PC-GITA disease dataset. The proposed hybrid model is compared with traditional NN and well-known machine learning-based CART and SVM & X-Boost models. The accuracy level achieved in Neural Network, CART, SVM, and X-Boost models is 72.69%, 84.21%, 73.51%, and 90.81%. The results show that under these four machine approaches of 10-fold cross-validation and dataset splitting without samples overlapping one individual, the proposed hybrid model achieves an accuracy of 93.51%, significantly outperforming traditional ML models utilizing static features in detecting Parkinson's disease.

**Biography**

Umesh Kumar Lilhore research area includes Machine learning, IoT; Cloud computing, AI, Computer Security, Computational Intelligence and Information Science..