Using Telemonitoring Data and Machine Learning Models to Predict Parkinson's Disease Severity for Remote Healthcare Services During the COVID-19 Epidemic

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Abstract

Parkinson's disease (PD) is a degenerative neurological disorder affecting around 1 percent of the earth's population above 60 years old. The COVID-19 outbreak has highlighted the need for distant medical care, such as remote patient monitoring, to manage chronic disorders like PD. This study aims to develop machine learning (ML) algorithms for predicting PD severity using a speech dataset collected from the UCI repository for the unified PD rating scale (UPDRS). ML algorithms and principal component analysis were employed to reduce the size and complexity of the model and assess the prediction accuracy using various models for PD severity prediction. ML was employed to investigate the relationship between PD patients' voices and PD severity. The dataset comprised 5,875 voice recording features of 42 PD patients who volunteered in the treatment study for 6 months. The suggested PCA model optimized the model and obtained a RMSE of 1.78 with an R2 of 0.97 for estimating the total UPDRS, and an RMSE of 1.78 with an R2 of 0.95 for estimating the motor UPDRS. This study can provide a basis for distant healthcare for PD and other chronic diseases, which can be beneficial throughout epidemics as well as other circumstances where the accessibility to conventional medical care may be restricted.

Keywords: *Teleconsultation, Parkinson's disease, Regression models, Supervised Machine Learning, Feature extraction, Complexity reduction*

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