Accurate, Low-Cost Diagnosis and Monitoring of Parkinson's Disease by Detecting Dysphonic Features through a Machine-Learning Algorithm

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The objective of this project was to make an efficient diagnostic and telemonitoring tool for Parkinson's disease through a mobile application - aimed at providing accessibility to everyone, including those who do not have access to proper medical facilities. We built a mobile iOS application where users submit audio recordings vocalizing the vowel sound /a/, process this recording through our unique machine learning algorithm, and then display the results as a true positive indicator of Parkinson's affliction back to the user. The application takes the .WAV audio file and uploads the file via Amazon Web Services to a feature extraction program: PRAAT. PRAAT extracts 16 linear and nonlinear dysphonic features and runs them through multiple trained machine-learning learning algorithms. These machine-learning algorithms serve as a classifier to determine the onset of Parkinson's in a patient. We trained the machine-learning algorithm via 196 unique voice samples from the NCVS (National Center for Voice and Speech) database. The application then displays the results of the voice recordings to the user via the mobile app. Additionally, the usage of data mining and unsupervised learning algorithms, coupled with advanced noise cancellation algorithms could drastically increase efficiency and usability. The algorithm, at this time, has a fairly high accuracy of 90% (obtained via k-fold cross-evaluation); however, we believe that the implementation of even more dysphonic features and predictor/feature extraction algorithms could eventually lead to a near perfect accuracy (99%).

Awards Won:

Fourth Award of $500

Samvid Education Foundation: Geno Second Place Award of $500