VAST (Voice and Spiral Tool): A Novel Multimodal Machine Learning Method To Detect Parkinson's Disease and Assess Severity

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Parkinson’s disease (PD) is a neurodegenerative disorder primarily prominent in individuals 65 years and older (the elderly population). Despite advances in the medical field, the diagnosis of PD requires examination by a trained neurologist in a clinical setting. However, due to the ongoing coronavirus pandemic in the United States (January 2020-present), requesting individuals to visit their local clinic can place them at potential risk for coronavirus. A literature search with Google Scholar and PubMed databases from January 2020 to January 2023 determined that currently, no machine learning model (n=0/202) has an accuracy of 90% or higher in detecting PD or assessing disease severity from voice and handwriting features. We propose VAST, the Voice and Spiral Tool, as a virtual diagnostic tool for the screening of patients with PD. Clinical specialists have a reported average accuracy of 79.6% to 83.9%. VAST is a state-of-the-art computational tool that validates the use of vocal features and demonstrates a 96% accuracy rate for PD diagnosis and assessment of disease severity (mild or severe) in individuals based on the ‘Ah’ test (92% accuracy for diagnosis) and hand-drawn Archimedes spirals (100% accuracy for severity). Project VAST is successful in providing an accurate and effective method for PD diagnosis in a clinical or virtual setting through vocal and handwriting feature-based machine learning models. VAST may ultimately aid in accelerating PD diagnosis, resulting in improved clinical outcomes.

Awards Won:

Second Award of $2,000

Acoustical Society of America: Honorable Mention