Evaluation of Neurological Diseases by Means of Speech Processing and Multimodal Analysis

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Abstract:

Neurological diseases manifest in multiple motor and non-motor signs, readily observed in clinical practice for diagnosis or to evaluate disease progression. These observations consist in the analysis of multiple signs including a perceptual assessment of speech articulation, eye movements and hand-drawing-related movements. This practice entails long evaluation periods of up to two years in order to reach a reliable diagnosis.

Our purpose is to propose clinical objective biomarkers gleaned mainly from signal processing of speech, but also from eye movements and drawing movements to diagnose and differentiate different neurological diseases, allowing likewise a reliable assessment of the evolution of the patient and her/his response to the treatment. Additionally, the combination of the postulated biomarkers via machine learning and artificial intelligence techniques will provide new multimodal automated classification systems to differentiate between healthy control subjects and patients suffering from different diseases such as Parkinson's Disease and atypical Parkinsonism. These new biomarkers and systems can be critical to facilitate the earlier detection of Parkinsonism and have the promise of ready distribution by cloud-based platforms to expedite access to underserved populations.

Biography:

Najim Dehak received his PhD from School of Advanced Technology, Montreal in 2009. During his PhD studies, he worked with the Computer Research Institute of Montreal, Canada. He is well known as a leading developer of the I-vector representation for speaker recognition. He first introduced this method, which has become the state-of-the-art in this field, during the 2008 summer Center for Language and Speech Processing workshop at Johns Hopkins University. This approach has become one of most known speech representations in the entire speech community.

Dr. Dehak is currently a faculty member of the Department of Electrical & Computer Engineering at Johns Hopkins University. Prior to joining Johns Hopkins, he was a research scientist in the Spoken Language Systems Group at the MIT Computer Science and Artificial Intelligence Laboratory. His research interests are in machine learning approaches applied to speech processing, audio classification and health applications. He is a senior member of IEEE and member of the IEEE Speech and Language Technical Committee.