Automated Extraction of Digital Biomarkers for Parkinson's Disease using A Hierarchy of Convolutional Recurrent Attentive Neural Networks

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Publication Date: 2017

Permanent Link: https://doi.org/10.3929/ethz-b-000224487

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Automated Extraction of Digital Biomarkers for Parkinson’s Disease

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Abstract

Obtaining an accurate diagnosis for Parkinson’s disease, which is characterised by a slow degeneration of motor skills, is notoriously difficult and often takes months. By monitoring a user’s movements through integrated sensors, the now ubiquitous smartphones could potentially become a tool to identify digital biomarkers that are indicative of Parkinson’s disease. In order to extract such digital biomarkers from smartphone sensor data, we present an automated machine learning method based on training a hierarchy of convolutional recurrent attentive neural networks to recognise predictive features in a movement task that includes segments of walking, resting and turning. The features extracted by our approach outperform several frequency-based baselines and yield a per-record classification accuracy of 83.20% on a held-out validation set (n = 10,080) in diagnosing Parkinson’s disease. In addition, our method is highly interpretable through the use of a neural attention mechanism (Schwab et al. (2017)), which we are currently investigating to gain further insights into what digital biomarkers our networks focus on to decide that a user is likely to have Parkinson’s disease.

Abstract presented at  
Acknowledgments

This work was partially funded by the Swiss National Science Foundation (SNSF) project No. 167302 within the National Research Program (NRP) 75 “Big Data” and SNSF project No. 150640.

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