

Using Multi-Feature Fusion for Detecting Freezing of Gait Episodes in Patients with Parkinson's Disease

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Abstract

This paper proposes a model for detecting Freezing of Gait (FoG) episodes in patients with Parkinson's Disease (PD) using multi-feature fusion. The first one is domain statistical feature engineering and the second one is spectrogram-based time-frequency analysis by Convolutional Neural Network (CNN) feature learning. The two extracted feature sets are fused with applying Principal Component Analysis (PCA) algorithm for dimensionality reduction. Benchmark dataset of three tri-axial accelerometer sensors for patients with PD is tested in both principle-axes and angular-axes. Moreover, performance of the proposed approach is characterized on experiments considering several Machine Learning (ML) algorithms. Experimental results show that using multi-feature fusion with PCA dimensionality reduction outperforms using typical single feature sets. The performance of FoG episodes detection. Index Terms: Freezing of Gait (FoG), Parkinson's Disease (PD), Machine Learning, Convolutional Neural Network (CNN), Angular-axes, Spectrogram, Principal Component Analysis (PCA), Multi-Feature Fusion

2020 International Conference on Innovative Trends in Communication and Computer Engineering (ITCE) 2020, February