Gait feature detection in Parkinson’s Disease

Background:
Parkinson’s disease (PD) is second most common neurodegenerative diseases affecting about 15’000 patients in Switzerland alone. The cardinal PD symptoms are movement-related, including resting tremor, rigidity, bradykinesia, postural instability and freezing of gait. Existing medication mainly aims at symptom suppression, while the effect on the symptoms decreases in the long run. Hence, there is a strong clinical need for objective and continuous monitoring of motor performance in PD for improving therapeutic regiments and for assessment in clinical trials. In recent years, there has been a lot of progress in the area of symptom identification in PD patients. Most of the developed systems are based on a set of wearable sensors which classify the symptoms using a variety of machine learning algorithms and signal processing techniques.

Aim:
Gait feature detection from analysis of wearable sensor data collected from PD patients.

Materials and Methods:
In a first step, the Daphnet dataset will be explored. The Daphnet dataset is gyroscope/acceleration data from sensor placed on the foot/shoe of the participants. Durations of steady walk and unstable gait will be the first steps in analysis. Later, gait parameters such as step frequency will be used to detect stride-to-stride variability. Different algorithms will be be tested, compared and evaluated against the Daphnet dataset. The best three performance algorithms will be then applied on to data collected from the PD patient. PD patients will wear accelerometers on wrist, belt and ankle for a four-week period.

Nature of the Thesis:
Conceptual Work: 20%
Software and Data Analysis: 60%
Writing: 20%

Requirements:
Programming skills
Mathematics (Analysis, Fourier Transform)

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