



Parkinson's Severity Classification From Wearable Devices

Summer Student Lightning Talks

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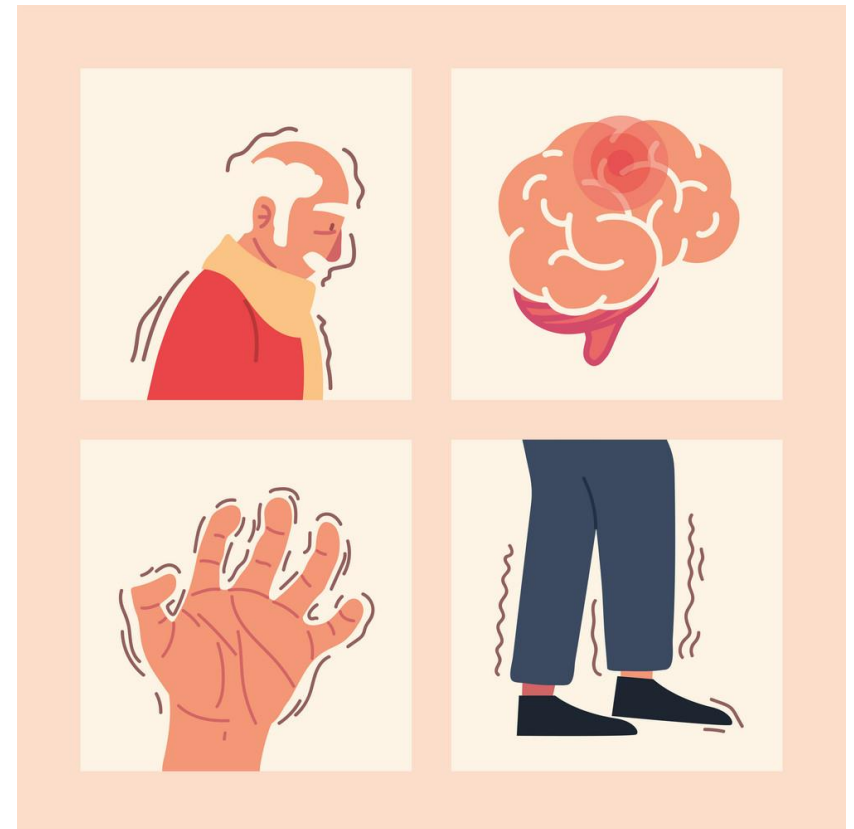
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Background

- Ageing societies and Parkinson's Disease (PD)
- PD significantly reduces patients' quality of lives. Helpful to medical treatments if diagnosed at early stages
- Day-to-day monitoring and the sustainability of the healthcare system



Source: <https://uweconsoc.com/understanding-ageing-population-and-how-it-can-impact-an-economy/>



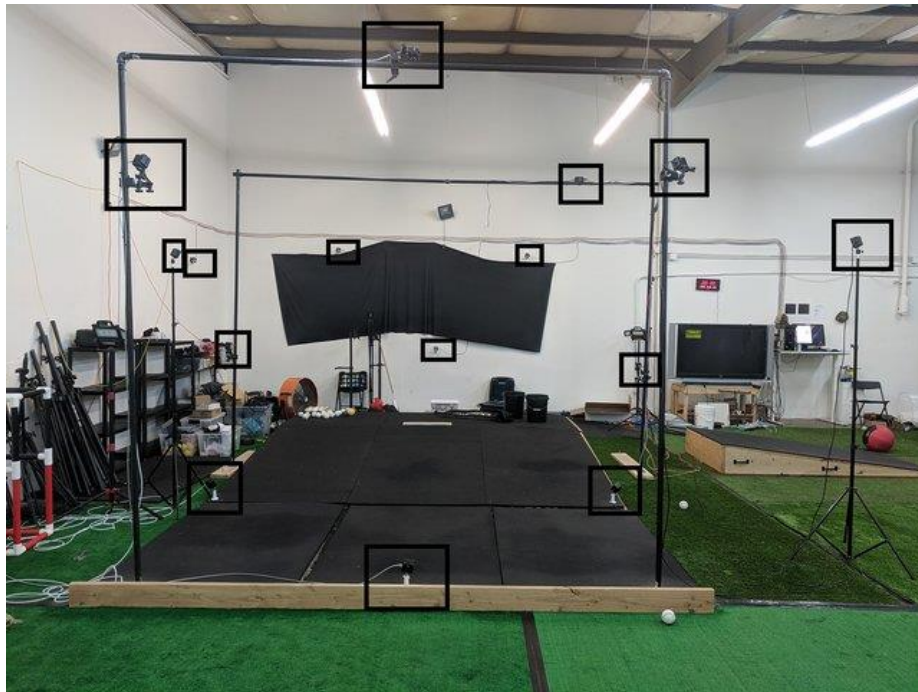
Wearable Sensors and PD

- Nowadays, smart devices are accessible.
- Sensors in wearables can monitor and record human activity data.
- These techniques can be applied to PD monitoring.



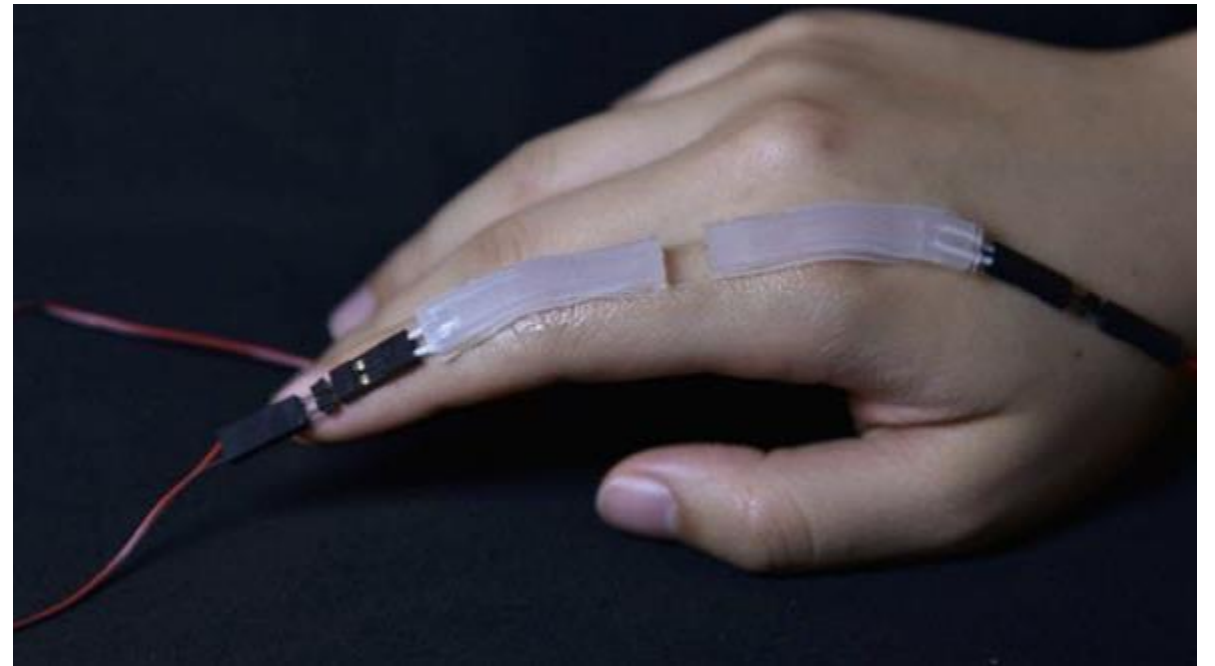
Previous Work

- Research works on human activities in PD study has begun quite some time ago.



motion capture system with cameras.

Source:
https://www.researchgate.net/publication/330599748_Exploring_wearable_sensors_as_an_alternative_to_marker-based_motion_capture_in_the_pitching_delivery/figures?lo=1

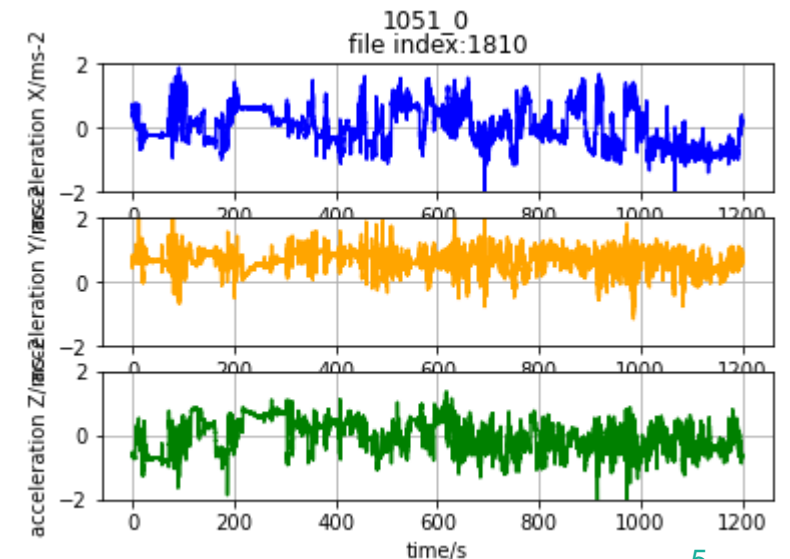
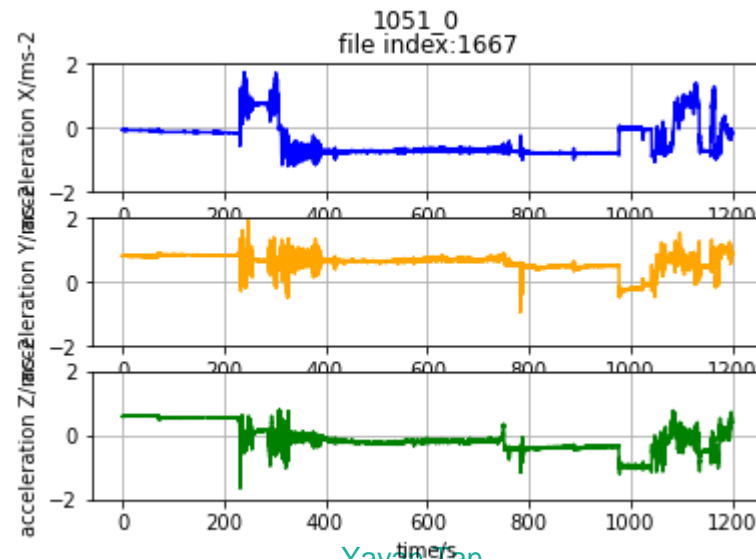
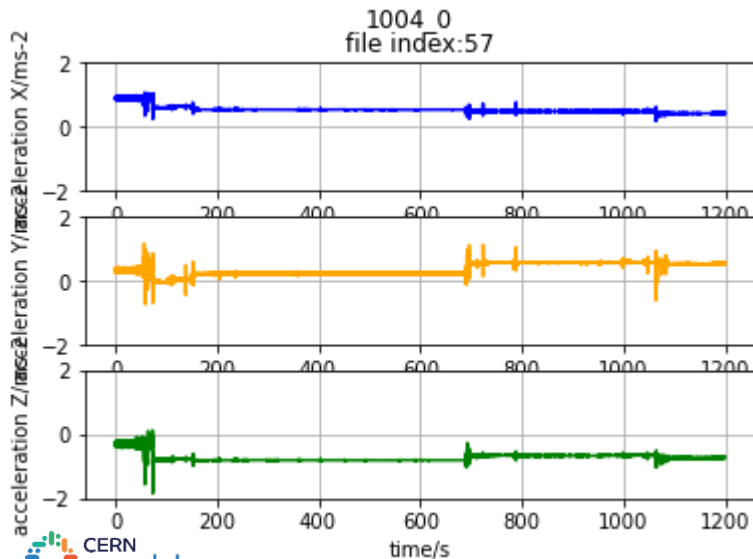


Specially designed sensors collecting data in laboratories.

Source: <https://www.labmanager.com/news/a-safe-wearable-soft-sensor-2907>

Challenges

- Monitoring of PD remotely i.e. in an uncontrolled environment.
- Understanding how data can be processed in an uncontrolled environment. Body movements of PD patients are less predictable*.
- Finding best practices to perform data pre-processing.
- Classifying PD severities using machine-learning techniques with small labelled dataset.




Aim of this Project


- Monitoring and classifying PD severities using wearable devices in daily-life.
- Defining best practices to improve the quality of data in pre-processing in an uncontrolled environment.
- Investigating most recent machine-learning techniques for remote monitoring of PD severities based on small labelled dataset

Methods

Data cleaning – data have been displayed and manually selected based on the overall signal shape



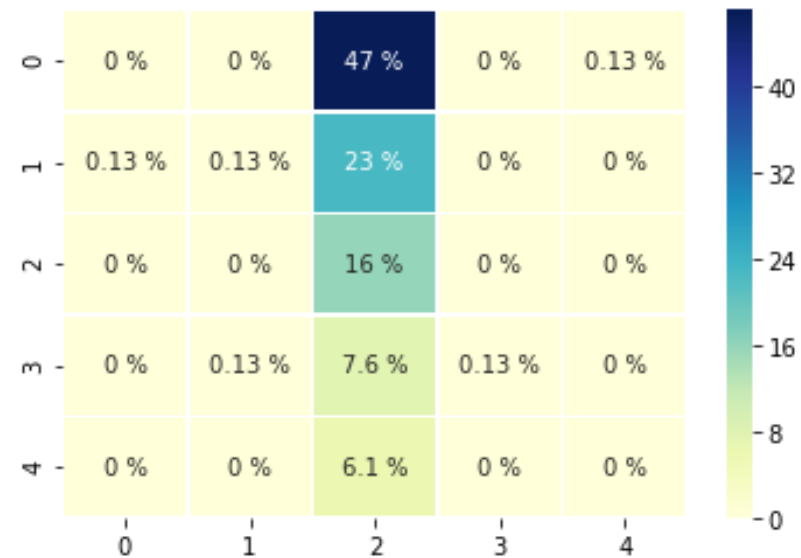
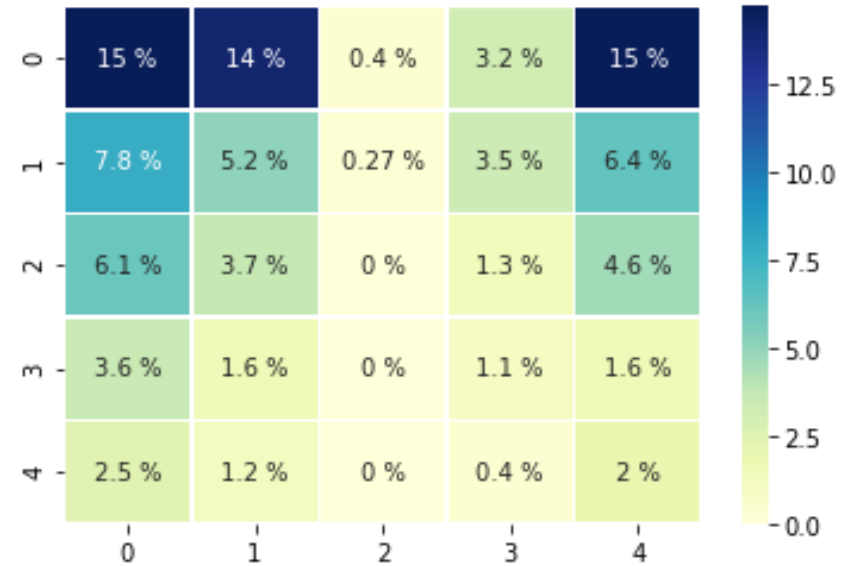
Data preprocessing – different signal filtering pre-processing methods to improve the data quality. The accuracy of the K-means clustering has been used to analyse the pre-processing performance.



PD severity classification – Considering techniques such as Self-Supervised Learning

Results

- Data preprocessing: No evidence showing best filtering practice
- PD severity classification work in progress





QUESTIONS?

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