

MSc thesis Computer Science:

Machine learning for prediction of anxiety symptoms from movement data

Background: Persons with high subclinical anxiety are characterised by subtle movement features. The goal of this thesis is to expand this finding in a data-driven approach by leveraging modern ML techniques to (a) identify further predictive features in the data, and (b) improve the prediction itself. As in many biomedical scenarios, the challenge of this $N \ll p$ problem setting is the high dimensionality of the data and the comparably small number of individuals.

Approach: To handle the problem setting, the focus of the thesis will be on domain-informed feature engineering, non-linear dimensionality reduction, regularisation and nested cross-validation. We have data from around $N = 250$ persons with continuous densely sampled multi-joint movement trajectories in a virtual reality task. The thesis focuses on analysis of an existing dataset; no data collection is required.

Requirements: Strong Python programming skills and familiarity with NumPy and PyTorch. Background and first practical experience with machine learning/data science/explainable AI, preferably in a relevant lab. Domain knowledge is not required – you will be advised by our movement specialists.

Learning goals: You will learn how to solve a typical biomedical AI problem in the area of disease prediction and biomarker identification. Expected outcomes include a reproducible ML pipeline, quantitative evaluation, and interpretation of predictive features. A publication may be possible depending on results.

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