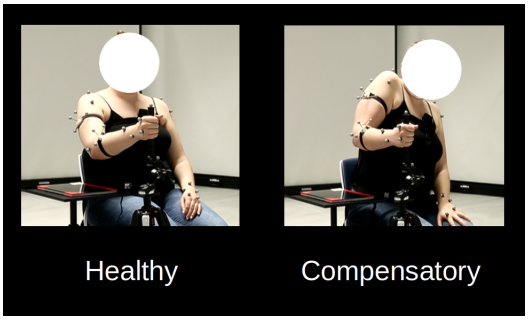
TECHNISCHE UNIVERSITÄT MÜNCHEN
LEHRSTUHL FÜR INFORMATIONSTECHNISCHE REGELUNG
ORDINARIA: UNIV.-PROF. DR.-ING. SANDRA HIRCHE

MASTER'S THESIS

Learning Latent Spaces for Probabilistic Movement Primitives

Problem description:

Stroke survivors often compensate for the loss of motor function in their distal joints by over utilization of other joints and body segments. This can however be detrimental to the rehabilitation process. Such unusual motor effects should be detected and communicated to the patients, so that they can correct them. However, performance measures such as end-effector trajectory error are unable to detect such behavior.



The goal of this thesis will be to detect abnormal motor patterns by learning the distribution of healthy joint trajectories generalized across people and possibly similar tasks. For achieving such a generalization, variational methods for learning latent structures that can encode similar behaviors will be leveraged. These methods will be combined with techniques like probabilistic movement primitives that are able to represent trajectories of multi-DOF systems with a small number of parameters.

Tasks:

- Literature research on movement primitives that can learn a latent structure.
- Design of an architecture for encoding the probability of healthy motions.
- Evaluation of detection - Does the method generalize across people and tasks?

Bibliography:

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[3] Karl, M., Soelch, M., Bayer, J., & Van der Smagt, P. (2016). Deep variational bayes filters: Unsupervised learning of state space models from raw data. *International Conference on Learning Representations (ICLR)*.

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