



The Faculty of Computer Science at the University of Vienna cordially invites you to the

Colloquium

Classification of small and heterogeneous data in BCI

with **Dr. Michael Tangermann**

Albert-Ludwigs-Universität Freiburg, Brain State Decoding Lab, Deutschland

When? 11th of December, from 11:00 am

Where? Seminar room 5 (SR 5), UG, Faculty of Computer Science
Währinger Straße 29, A-1090 Vienna

Abstract

Real-time interaction with the brain in closed-loop systems such as brain-computer interfaces (BCIs) would not be possible without machine learning methods capable to decode noisy brain signal recordings like the electroencephalogram (EEG). A widely-used experimental paradigm requires the user to attend to specific stimuli and ignore others, leading to so-called target and non-target event-related responses (ERP) in the EEG.

The training of e.g. a classification model is challenged specifically by two aspects: first, the training data sets can be very small. This problem arises specifically when working with patients, where the duration of a single BCI session can be extremely limited for reasons, which are beyond the influence of the experimenter. Second, the data may violate i.i.d. assumptions made specifically by model classes of low complexity, which are specifically suitable to deal with small training data sets. An example of such a violation is the presence of subgroups in the ERP responses of both, the target and the non-target class, or non-stationary feature distributions.

In my talk, I will provide examples of such data derived from an auditory oddball paradigm and from a recent visual ERP paradigm, where the user's interacts directly with the environment instead of via an additional user interface. I will also propose two different algorithmic mitigations for the above challenges. Both are based on variations of the standard LDA classifier and make use of transfer learning and data augmentation.