DAY 2 – OPEN PROBLEM SESSION:

On day two of the HPAD, the workshop’s contributors joined for a discussion-breakfast to report about open problems that have emerged as eminent and related during the previous day’s presentations. The goal is to share these emerged thoughts with the goal to exchange expert-knowledge, references to prior work and research motivation among the contributors and the audience.

J. Antoch: Realizing of interpretability of Change Point Detection.
Problem: In several lectures (See abstracts of Lectures 1, 3, and 6, below) the need to interpret the prognosis of an anomaly detection model was mentioned.

Proposed Solutions: How CPD in various situations can help has been discussed. Namely, for
i. CPD and non-parametric, especially Bootstrapping Methods [1],
ii. CPD for signals that are not independently distributed [2],
iii. CPD and techniques involving permutation of the sample [3],
iv. CPD of multiple CPs [4].


Problem: The explainability of deep learning methods for anomaly detection has often the drawback of lacking the ability to backtrack detections to relevant features.

Proposed Solution: Using so called HONU’s (Higher Order Neural Units [5]) as the building blocks of deep learning architectures has the advantage that due to the injective nature of the activation functions used, intrinsic invertibility of single neurons allows for a higher reverse engineering capability.


F. Sobieczky: Extending linear regression with the help of AI-models.
Problem: By analyzing the Clementinum Temperature data, Prof. Antoch showed in his lecture that the higher degrees of freedom of less complex regression models induces an ambiguity in the interpretation of ‘epochs’ (which can be abused in political contexts). Similar ambiguities may arise in AI-assisted regression models [6].

Proposed Solution: By introducing ‘Void Space regression’, the usual segmented regression models, as well as many Off-Line CPD techniques, may be augmented by allowing for void spaces between segments – which make ambiguities between changes of epochs impossible.