**Forecast and Simulation** **Summer Semester 2025**
http://ml3.leuphana.de/lectures/summer25/FS/
Machine Learning Group, Leuphana University of Lüneburg

Ulf Brefeld (brefeld@leuphana.de)
Soham Majumder (soham.majumder@leuphana.de)

---

# Exercise 2

## Discussion date: 12.05.2025

## HMM for Named Entity Recognition

Named Entity Recognition (NER) is a Natural Language Processing (NLP) task that consists of identifying and classifying names of entities (people, location, companies, among others) in a given sentence. Build upon the provided code in *exercise-02-NER.ipynb* where we explain the setup, data and evaluation and have implemented a simple baseline.

i) As in Task 2, you are asked to implement the algorithm for supervised training of an HMM. You should then be able to evaluate predictions for latent states made by the Viterbi algorithm. Evaluate the model on the evaluation (dev) set alike the evaluation of the baseline, report the obtained results and compare them to the baseline.

ii) In [Rabiner, 1989, Section III.B] there is another method discussed for predicting latent states. Implement this approach and compare the evaluation against the results with the baseline and with the Viterbi algorithm. Prepare to discuss your findings in class.

## References

[Rabiner, 1989] Rabiner, L. R. (1989). A tutorial on hidden markov models and selected applications in speech recognition. *Proceedings of the IEEE*, 77(2):257–286.