

Extended Memory Networks

Hebbian Memory Networks (H-Mems) have been introduced in [1] and constitute biologically plausible implementation of transformers. The core idea is that the network solves sequential tasks by storing past information in a synaptic weight matrix (the memory unit). The initial model utilized just one central memory unit for inference.

In this project, we will investigate more elaborate network structures based on the H-Mem architecture. In particular, we will consider deep and hierarchical H-Mems. Code for the basic H-mem model is available.

Goals & Tasks

- Review literature on memory networks.
- Implement deep and hierarchical versions of H-mem.
- Train these models on benchmark tasks.
- Compare and analyze results.

Qualifications

- Prior knowledge in deep learning.
- Experience with Python and Tensorflow or PyTorch.
- Course Deep Learning or equivalent.
- Registered to one of the following:

Bachelor Thesis

- ✓ **Seminar Project**
- ✓ **Master Thesis**

Contact

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[1] Limbacher, T., & Legenstein, R. (2020). H-mem: Harnessing synaptic plasticity with hebbian memory networks. *Advances in Neural Information Processing Systems*, 33, 21627-21637.