Using Hopfield Layers for Natural Language Processing

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Summary: Hopfield Layers [1] have recently been proposed as a way of integrating a modern Hopfield network into deep learning architectures to allow the storage of and access to raw input data, intermediate results, or learned prototypes. The aim of the thesis is to gain an understanding of Hopfield networks [2] and layers, think about what NLP tasks they could be applied to and hopefully implement a model using the codebase provided by the authors [3]. One possible application would be in the adaptation of this paper [4] to a simple NLP task, another is integrating Hopfield layers with BERT.

Prerequisites: experience in pytorch/huggingface and NLP, enthusiasm for and/or basic background in mathematics

References:

[1] https://arxiv.org/pdf/2008.02217.pdf

[2] pnas00447-0135.pdf (nih.gov)

[3] ml-jku/hopfield-layers: Hopfield Networks is All You Need (github.com)

[4] AHA! an `Artificial Hippocampal Algorithm' for Episodic Machine Learning (arxiv.org)