

Tensor Networks for Machine Learning

Proseminar

Tensor networks are typically used to represent and analyze quantum states of many-body systems in physics. However, they have gained increasing interest for application in machine learning, because they can be used to represent data in a structured and highly compressed form.

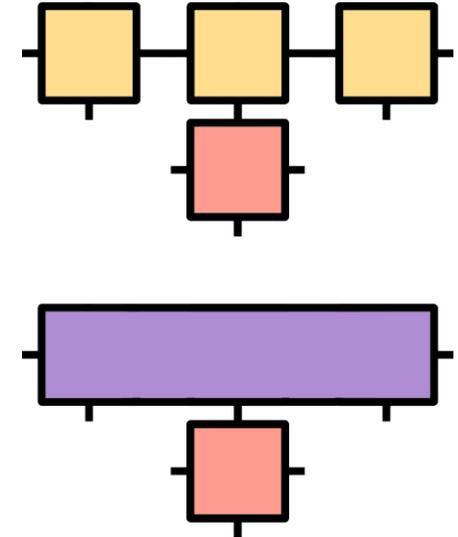
The goal of this work is to illustrate the idea and concept of tensor networks and how they can be used in the context of machine learning. The report must be written in English. Meetings during the project can be in English or German.

Requirements:

- Must: strong mathematical understanding, linear algebra
Beneficial: some knowledge of machine learning algorithms

Your tasks will be:

- Present the idea and concept of tensor networks
- Present an overview of different tensor network algorithms
- Illustrate how tensor networks are used in ML (especially for neural networks and Gaussian processes/kernel methods)
- Evaluate, compare and present the results



By AtellK,
https://commons.wikimedia.org/wiki/File:Tensor_network_contraction_example.png

References:

- [1] <https://www.tensors.net/>
- [2] R. Sengupta, S. Adhikary, I. Oseledets, J. Biamonte. Tensor networks in machine learning. <https://arxiv.org/abs/2207.02851>
- [3] <https://tensornetwork.org/>

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