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UNIVERSITÄT
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Mathematisch-Naturwissenschaftliche Fakultät
Fachbereich Informatik
Kognitive Systeme (Prof. A. Zell)

Bachelorarbeit

Accelerating DNN Training Using Weight Extrapolation

Nowadays, the Backpropagation Algorithm (BP) has proven to be a robust tool for training deep neural networks (DNNs). However, training times of DNNs grow larger and larger due to increasing data set sizes. Many optimization routines have been proposed recently. Most of these focus on improving stochastic-gradient-descent and momentum terms. Looking at the underlying dynamics of weight evolutions can be regarded as an orthogonal approach to these methods that only recently has been looked at again [1].

In this thesis, the student should explore an accelerating technique based on weight extrapolations. In particular, different ways of how extrapolations can be applied and their effects on various modern DNN architectures shall be studied. For this thesis, it suffices to study simplified versions of the old method in [2]. However, other approaches can be tested out as well. The method should be benchmarked on multiple modern image data sets and an statistically sound evaluation should be done.

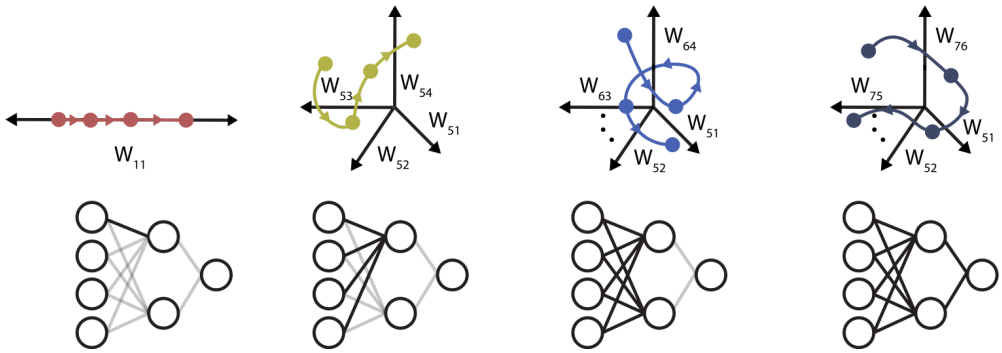

Illustration 1: Optimizing neural networks via Koopman operator theory [1].

[1] Dogra, A. S., & Redman, W. T. (2020). Optimizing neural networks via Koopman operator theory. *arXiv preprint arXiv:2006.02361*.
[2] Kamarthi, Pittner, et al. "Accelerating neural network training using weight extrapolations." Neural networks, 12(9), 1285-1299.

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