

Deep Learning on SpiNNaker

Formerly: A Tensorflow Backend to SpiNNaker

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SpiNNaker

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[SpiNNaker is] a platform for high-performance massively parallel [and energy efficient] processing appropriate for the simulation of large-scale [spiking] neural networks [Spi20]

Motivation

SpiNNaker as a target for training DNNs



- Amount of computation in training DNNs increases exponentially (double every 3.4 months) [Dar19]

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- We'll run out of available computation (and energy) eventually
- Massively parallel, energy efficient and scalable systems are optimal for training DNNs

Tensorflow

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- Basically: abstraction over various hardware and software libraries and APIs
- “Easiest” way to add new tensorflow backend? XLA (<https://www.tensorflow.org/xla>)
- Instead: implement deep learning directly on SpiNNaker

Challenges

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- Writing programs for embedded hardware is hard

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- Writing scientific programs is hard
- Writing programs for embedded hardware is hard
- Both together? ...

Overcoming them

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- Prepare myself well

Overcoming them



- Prepare myself well
- Taking stimulants and don't sleep for three months



References

- [Dar19] Dario Amodei, Danny Hernandez, Girish Sastry, Jack Clark, Greg Brockman, Ilya Sutskever. AI and Compute. <https://openai.com/blog/ai-and-compute/>, 2019.
- [Mar15] Martın Abadi et al. Tensorflow: Large-Scale Machine Learning on Heterogenous Distributed Systems. <http://download.tensorflow.org/paper/whitepaper2015.pdf>, 2015.
- [Spi20] SpiNNaker Team. SpiNNaker Project. <http://apt.cs.manchester.ac.uk/projects/SpiNNaker/project/>, 2020.