

## Posudek oponenta diplomové práce

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Název práce: Deep neural networks and their implementation

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### Vlastní text:

Main goal of the thesis is focused on an implementation of three deep neural network models. Author follows strictly requirements for the thesis. In the first part he gives a substantial description of back-propagation model, convolutional neural network and deep belief neural network. Second part is based on a thorough choice of the deployment architecture and development tools as long as on the command line and data structure. Last part covers testing and comparison to other existing frameworks.

Theoretical introduction to mentioned models is sufficiently detailed and does suffer just from only rare inaccuracies like

- p.7 last line - all output neurons have exactly one output,
- p.10 line 5 - implication admitting empty layers,
- p.29 line 21 - RBM layer is initialized with input data representing potentials.

Implementation chapter provides insight into parallel computing platforms based on graphics processing units. Author decides in favor of the NVIDIA hardware and presents significant tools and libraries to use. Later he describes the implementation. The documentation is well planned and usually appropriately balanced but occasionally too brief like in case of memory allocation (p.47).

Testing part of the thesis exhibits good methodology and tremendous efforts to exploit the implementation. Starting from a plain XOR set author shortly heads to more interesting MNIST dataset. He compares his results to two important deep learning frameworks, Caffe and Theano. While his implementation wins over Caffe, it is comparable to Theano. Unfortunately, more data or tasks are wanted in order to prove such results.

The work is written in nice and rich English but author uses flowery speech too extensively, e.g. astonishing achievements, to revolutionize transportation etc. Also starting from 1943 and by dendrites is quite annoying. Author states that the thesis consists of three chapters. In fact they are four and thus following links are rather misleading. We can also find improper use of citation like reference to paper [33] with no relationship to the thesis.

However, the bottom line is that author shows excellent theoretical background and programmer skills and that the thesis meets the conditions prescribed.

### Doporučení k obhajobě:

Z výše uvedených důvodů práci doporučuji k obhajobě.

Vynikající práce vhodná pro soutěž studentských prací

ANO

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V Praze dne: 1.6.2016

Podpis: