

Nizhny Novgorod State University
Institute of Information Technologies, Mathematics and Mechanics
Department of Computer Software and Supercomputer Technologies

Educational course
«Introduction to deep learning
using the Intel® neon™ Framework»

Lecture №8
The Intel® nGraph™ overview

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1 Abstract

The goal of this lecture is to introduce the listener to the Intel® nGraph™ (nGraph) [4 – 7]. The framework allows to make the work of data analysts, algorithm developers, software engineers and programmers portable, adaptable and deployable for the most advanced hardware available today for solving the problems of machine learning [4].

The nGraph is based on the idea of representing a deep neural network model in the form of *a data-flow graph*. Based on this representation, the nGraph library contains framework bridges, transformer ops and graph shaping elements. The lecture discusses in more detail the conceptual issues of the nGraph.

There are two ways of working with nGraph: building a third-party deep learning tool to work with nGraph and then training a deep model, converting the trained model to the Open Neural Network Format Format (ONNX) [8] to execute on the hardware supported by nGraph. The lecture considers the first version of nGraph using the Intel® neon™ Framework. The procedure for building and installing nGraph, as well as Neon for working with nGraph [9] is given. An example of training and testing a fully-connected network for solving the problem of handwritten digit recognition is considered. There differences from the examples examined in the course are represented.

2 Literature

2.1 Books

1. Haykin S. Neural Networks: A Comprehensive Foundation. – Prentice Hall PTR Upper Saddle River, NJ, USA. – 1998.
2. Osofsky S. Neural networks for information processing. – 2002.
3. Goodfellow I., Bengio Y., Courville A. Deep Learning. – MIT Press. – 2016. – [<http://www.deeplearningbook.org>].

2.2 References

4. Intel® nGraph™ Documentation [<http://ngraph.nervanasys.com/docs/latest>].
5. Intel® nGraph™ [<https://github.com/NervanaSystems/ngraph>].
6. Intel AI Academy [<https://ai.intel.com/ngraph-a-new-open-source-compiler-for-deep-learning-systems>].
7. Intel® nGraph™. An Intermediate Representation, Compiler, and Executor for Deep Learning [<https://arxiv.org/pdf/1801.08058.pdf>].
8. Open Neural Network Exchange Format (ONNX) [<http://onnx.ai>].
9. A Deep Learning framework powered by Intel® nGraph [<https://github.com/NervanaSystems/ngraph-neon>].