



THESIS ASSIGNMENT

Name and Surname: Bc. Peter Csiba
Study programme: Computer Science (Single degree study, master II. deg., full time form)
Field of Study: 9.2.1. Computer Science, Informatics
Type of Thesis: Diploma Thesis
Language of Thesis: English
Secondary language: Slovak

Title: Theoretical and computational analysis of the generalized recirculation-based learning algorithm in bidirectional neural network

Aim:

1. Study the literature on general recirculation-based learning algorithms in neural networks and write the state-of-the art of the topic (including deep learning).
2. Implement the GeneRec learning algorithm and test its properties using selected data sets.
3. Consider suitable modifications of the algorithm aimed at improving the network performance.

Literature: O'Reilly, R.C. (1996). Biologically plausible error-driven learning using local activation differences: The Generalized Recirculation algorithm. *Neural Computation*, 8, 895-938.
Bengio, Y. (2009). Learning deep architectures for AI. In: *Foundations and Trends in Machine Learning*, 2:1, 1-127.
Hinton, G. E. et al. (2012) Improving neural networks by preventing co-adaptation of feature detectors <http://arxiv.org/abs/1207.0580>

Annotation: The advantage of the GeneRec algorithm resides in its biological plausibility, as opposed to the well-known error backpropagation. Deep learning is a recent popular research strand that turned as a viable approach for solving complex mapping tasks. It has not been tested in case of GeneRec network, neither has been the recent algorithm by Hinton et al (2012).

Keywords: supervised learning, neural network, classification, heteroassociative mapping

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