RTG 2224

KoMSO

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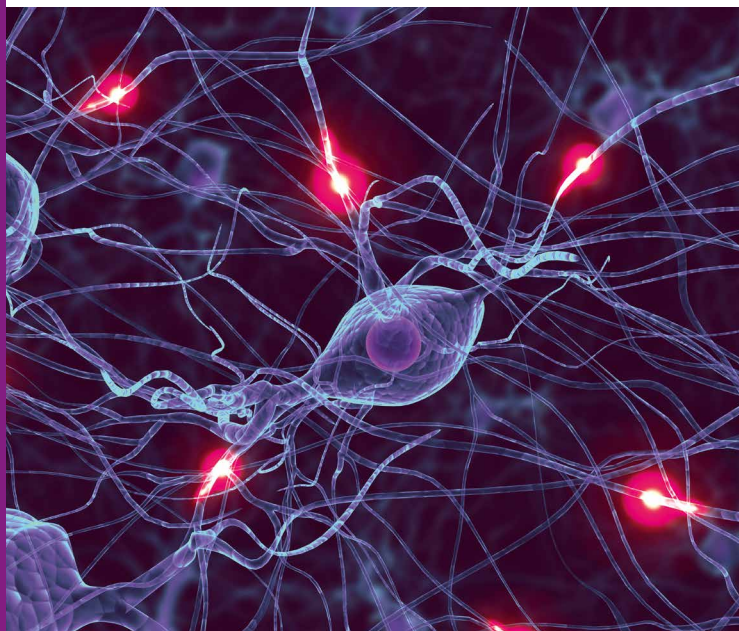
A Simulation Environment for Deep Neural Networks: Theory and Practice

Dr. Ralph Grothmann (Siemens AG)

April 06 – 07, 2017 • 9 AM – 5 PM

University of Bremen
Bibliothekstraße 5, Building MZH, Room 0240, 28359 Bremen
For registration please send an email to: jbehrmann@uni-bremen.de
www.KoMSO.org or www.math.uni-bremen.de/rtg-pi3



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A Simulation Environment for Deep Neural Networks: Theory and Practice

The tutorial deals with the implementation of neural networks in our simulation and development environment, short SENN. We will introduce the theory of simple and deep feedforward neural networks and show how to implement these models in our software platform SENN. We address the topic of data preprocessing for neural networks and the configuration of the learning algorithm, which is error back propagation together with a stochastic learning rule.

The guideline for implementing neural networks in SENN is the correspondence principle between equations, architectures and local algorithms. The equations of a neural network can be represented by an architecture. Local algorithms, like error backpropagation, that work on the architecture allow for the training of the model, i.e. fitting it to data. Besides (deep) feedfoward neural networks we will also deal with time-delay recurrent neural network architectures, where deepness is a natural feature when non-algorithmic learning techniques like error backpropagation through time are used.
Simple recurrent neural networks, long-short term memory networks (LSTM), echo state networks and large recurrent neural networks are popular examples.

We implement all neural network models in SENN using a typical application example, energy load forecasting. Here, we also deal with the different modeling steps, i.e. data preprocessing, learning the model and regularizing it. This also allows us to compare the different modeling lines.

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