NTNU
Norwegian University of
Science and Technology

Faculty of Information technology,
Mathematics and Electrical Engineering
Department of Engineering Cybernetics

Term Project Assignment

Student's name: Per Leikanger

Field: Engineering Cybernetics

Title (Norwegian): Utvikling og evaluering av en ny modell for kunstige nevrale nettverk

Title (English): Development and assessment of a novel model for artificial neural networks

Description:

In most artificial neural networks (ANN), a neuron's output variable can be said to represent the time varying firing rate (i.e. number of action potentials per time unit) of its biological equivalent.
In this domain, there is no representation of firing time and other aspects related to causality and stability that appear to be central to the learning process in a biological neural network.

In this project, you will develop a new concept for ANN that takes into consideration both firing rate and firing time, and compare it with the existing model known as Spiking ANN (SANN).

1) Give an overview of existing ANN models that represents both firing rate and firing time. Emphasis should be put on factors that can be related to stability for synaptic plasticity (learning) and/or feedback ("recurrent ANN").

2) Describe the new ANN concept, and point out how this differs qualitatively from previous models.

3) Compare the new concept with competing methods. The evaluation may be based on a number of specific scenarios (with respect to input data etc.).

Supervisors: Øyvind Stavdahl, Associate Professor, Department of Engineering Cybernetics, NTNU
Professor Gaute Einevoll, Department of Mathematical Sciences and Technology, Norwegian University of Life Sciences.

Trondheim, 30.06.2011

Øyvind Stavdahl
Supervisor