Reinforcement Learning – A comparison Study with Spike and Rate Based Neurons

BACKGROUND
Nowadays AI neural networks mostly rely on rate based neuron information processing, however the human brain encodes information in spikes. In frame of the Human Brain Project we develop the Neurorobotics Platform, a robotic simulation environment to investigate embodied learning with biological and robotic models learning in interaction with a virtual environment.

YOUR TASK
Various algorithms and toolboxes such as Keras have been developed for Reinforcement Learning. You will research on spiking implementations for Reinforcement Learning in the NEST simulator. You will implement a benchmark experiment in the Neurorobotic Platform, performing a reaching experiment of a musculoskeletal robot with spiking neural network. Performance criteria shall be defined and results compared to rate based learning approaches in evaluation experiments in the same environment.

REQUIRED SKILLS
- Python
- Experience with Reinforcement Learning / Machine Learning
- Knowledge in Rate Based and Spiking Neural Networks is a plus

FURTHER READING
www.neurorobotics.net
http://www.nest-simulator.org/
https://github.com/keras-rl/keras-rl

CONTACT
Benedikt Feldotto
feldotto@in.tum.de
Technical University of Munich
Faculty of Informatics
Chair of Robotics, AI and Real-Time Systems
www6.in.tum.de