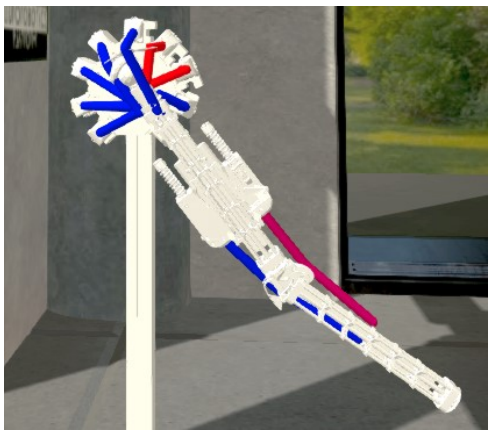
Robotics, Artificial Intelligence and Embedded Systems

Human Brain Project

Bachelor Thesis, Master Thesis

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 Reinforcment 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

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