Learning a Robot Model with Hierarchical Temporal Memory

BACKGROUND

Biomimetic musculoskeletal robotic actuators like the Myorobotics toolkit [1] are inspired by the musculoskeletal system of vertebrates. Unlike in standard robots, actuation is based on antagonistic pairs of artificial muscles, each of which is only able to contract in one direction. This special mechanical setup allows for reproducing many features of biological musculoskeletal systems like varying stiffness through muscle co-contraction. While biomimetic actuation is a promising approach towards inherently safe and compliant robots, the modelling and control of these actuators is still an open research question. In neurorobotics [2], researchers address this challenge by controlling robots based on simulated brain models like Hierarchical Temporal Memory (HTM). HTM was developed by Numenta as a high-level model which captures information processing principles in the mammalian neocortex.

YOUR TASK

HTM is freely available as part of the Numenta Platform for Intelligent Computing (NuPIC) [3]. In this project, you will first make yourself acquainted with HTM and implement an interface between NuPIC and a musculoskeletal tendon-driven robotic arm. Using this interface, you will then use the NuPIC framework to learn a model of the robot.

REQUIRED SKILLS

- Good knowledge of C/C++ and Python
- Basic knowledge in robotics
- Basic experience in modeling and control

FURTHER READING


CONTACT

Florian Walter
florian.walter@tum.de

Technische Universität München
Fakultät für Informatik
Lehrstuhl für Echtzeitsysteme und Robotik
www6.in.tum.de