

Bio-Inspired Artificial Intelligence - EMATM0029

Exercises - Embodiment and Morphological Computation

The sections ***Digging deeper** are optional. These are for the ones who want to learn more about the topic.

Central Pattern Generation

Matlab

Download the Matlab code for the simulation of the mass-spring-damper systems from this GitHub [\[link\]](#). It implements the simulations described in the lecture.

1. Read Section 1 and 2 of `README_MC_toolbox.pdf`.
2. Go through Section 3 and run the various Matlab scripts. Read the comments in the code to understand what is going on. Compare that to the slides on Blackboard describing the implementation of the learning process.
3. Use the functions `step_response.m` and `plot_graph.m` to see the response of the network in its high dimensional state space. Try this with different randomly initialized networks and compare them.
4. Compare in a figure the performance (for the NARMA and Volterra tasks) to the case when no morphology (i.e. no body) is available i.e. only linear regression is used without the computational power of the morphology. You can use the function `learn_linear_model.m`.

***Digging deeper**

- In Section 4 of the help file you can find many more tasks for the Matlab simulations.
- If you want to know more about morphosis, watch my talk on last years ShanghAI lectures [\[link\]](#).
- In general, the ShanghAI webpage is a great source for talks on the topic of Artificial Intelligence. You can search for specific topics or speakers via this [\[link\]](#). NB: You can also find Sabine's talks there as well.

- In the context of this lecture, the talks at the [International Workshop on Soft Robotics and Morphological Computation](#) might of special interest for you, see [\[link\]](#).
- A great overview of the idea of embodiment is this [tutorial](#).