Final Project Complex Adaptive Systems

In this individual final project, we start with the reinforcement learning (RL) setup where an agent learns to control an environment based on a reward signal. Your task is to extend this basic setup by focusing on one of the aspects of this RL setup. Think about which extension you choose and why this is relevant for AI.

The final project constitutes a report written in NeurIPS conference paper style, including abstract, introduction, methods, results, discussion, citations (optional). The report should be maximally five pages long (excluding citations). The report should be supplemented with a jupyter notebook which generates the results of your report. The final project will be evaluated on the following dimensions (each two points):

- motivation of the extension (introduction)
- clear description of the extension (methods)
- correct reporting and interpretation of the extension (results)
- reflection on the results (discussion)
- quality of the implementation (clarity, efficiency, documentation). It is recommended and preferred if you implement your work with Jax, since the given code is in Jax. The TA's might not be able to help if you choose a different framework than Jax.

When writing the report you may want to use the NeurIPS paper template: https://www.overleaf.com/latex/templates/neurips-2023/vstgtvjwgdng

Below you may find suggestions of possible extensions to work on:

- Implement another learning algorithm (e.g. soft actor critic, deep Q networks, evolutionary strategies, brain-inspired methods)
- Focus on other network architectures (e.g. RNNs)
- Use other solution strategies (e.g. model predictive control)
- Explore a less trivial control task (e.g. humanoid control using brax, industrial plant control or optimal foraging)
- Test the impact of changes in hyperparameters (e.g. learning rate, network size)

When working on this assignment find a good balance between complexity and the short deadline. A clear report on standard methods is to be preferred over very fancy methods with unclear results and a vague report.