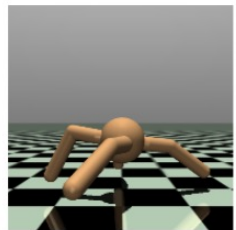
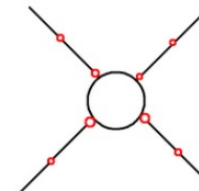
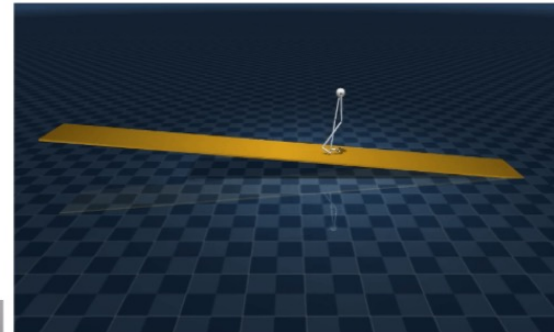
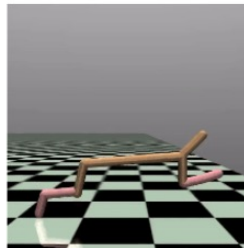
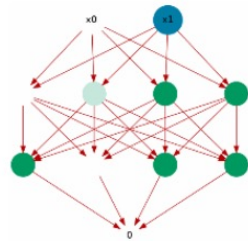
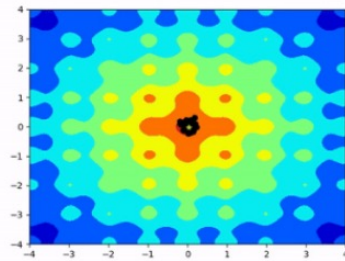
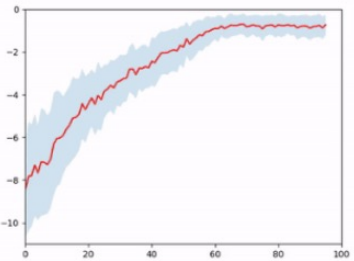


MICRO-515: Evolutionary Robotics

Introduction to the course





Dario Floreano



Fuda van Diggelen
Teaching Assistant



Alexander Dittrich
Teaching Assistant



Alexander Ertl
Teaching Assistant

Lectures

Introduction to theories, methods, and technologies for designing robots and artificial systems.

Assessment: MCQ

Algorithms

Implementation of evolutionary algorithms from the lecture.

Assessment: -

EvoRob exercises

Evolution of a neural controller and morphology of a robot in simulation.

Assessment: Report

Date	Week	Lecture		Lecturer
20.02.24	1	Lecture Introduction and Organization, Introduction to Evolutionary Computation		Floreano
27.02.24	2	Evolutionary Strategies	Evolutionary Strategies (ES), Genetic Algorithm (GA)	Floreano, Dittrich, Diggelen, Ertl
06.03.24	3	Multi-objective Optimization	Non-dominated Sorting Genetic Algorithm (NSGA-II)	Floreano, Dittrich, Diggelen, Ertl
13.03.24	4	Foundations of Neural Networks, Unsupervised Learning	Python Software Installation	Floreano, Dittrich, Diggelen, Ertl
20.03.24	5	Supervised Learning, Reinforcement Learning		Floreano
27.03.24	6	Evolution of neural controllers	Evolutionary Robotics Pipeline	Floreano, Dittrich, Diggelen, Ertl
03.04.24	7	Evolution and Learning	Evolving Control with OpenAI Gym	Floreano, Dittrich, Diggelen, Ertl
10.04.24	8	Evolving Control with OpenAI Gym		Diggelen, Dittrich, Ertl
17.04.24	9	Evolution of body morphologies	Evolving body using MuJoCo	Floreano, Diggelen, Dittrich, Ertl
24.04.24	10	Easter Break		-
01.05.24	11	Co-evolution of brains and bodies	Co-evolve parameterized body and brain	Floreano, Diggelen, Dittrich, Ertl
08.05.24	12	Cooperative co-evolution	Full body and brain evolution	Floreano, Diggelen, Dittrich, Ertl
15.05.24	13	Towards Self-Reproducing Robots	Full body and brain evolution	Diggelen, Dittrich, Ertl
22.05.24	14	Full body and brain evolution		Diggelen, Dittrich, Ertl
29.05.24	15	Ascension Day		-

	Lecture
	Algorithms
	EvoRob

Course Requirements:

Presentation with demo and submission of group project

Final written exam

	Grading	Deadline
3x Algorithm exercises (GA, ES, NSGA-II)	-	-
5x EvoRob exercises	-	-
Report submission	mandatory, graded	08.06.25 at 23:59
MCQ written exam	mandatory, graded	tba

Grading:

50% written exam (Multiple Choice Questions)

50% evolution project report

Final exam information:

Date and time to be announced

No support material (books, notes, devices) allowed

Student with special arrangements from SAC, please e-mail
dario.floreano@epfl.ch before the exam