

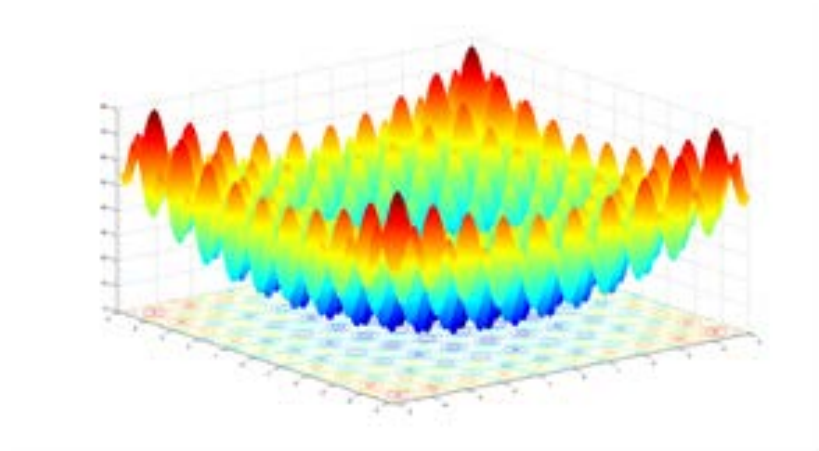
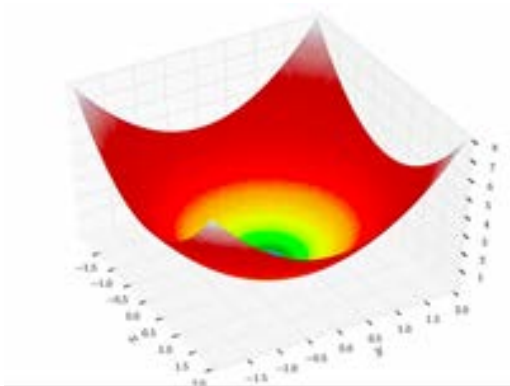
Distributed Intelligent Systems

Lab 6 Tutorial

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Part 1: Exploring PSO

- Run PSO on two benchmark functions (Sphere and Rastrigin functions) using SwarmViz

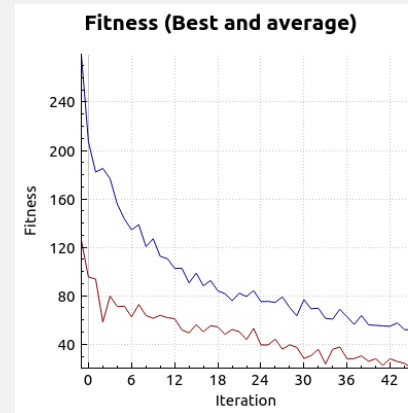
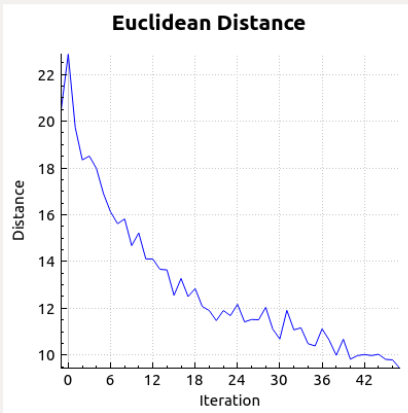
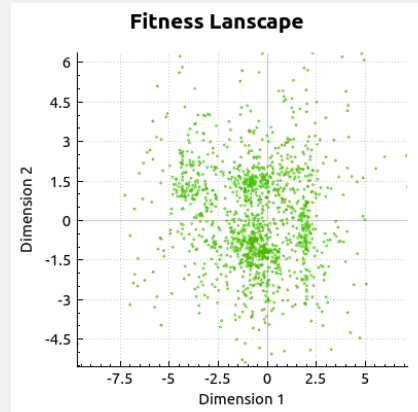


- Observe how swarm acts when varying parameters

SwarmViz

- Make sure you only have the indicated plots marked
- Fitness landscape plot
 - A history of all particles
 - Colors indicate fitness values
- Trajectory plots
 - Movement of particles
 - Previous positions can also be plotted

SwarmViz



Simulation Visualisation **Swarm** Files Plots

Benchmark function parameters

Fitness function: Sphere
Noise (sigma): 0.00
Dimension: 24

Swarm parameters

Particles: 30
Minimum: -5.12
Maximum: 5.11
Maximum velocity: 5.12
Inertia: 0.60
Max iterations: 1500
Local weight: 2.00
Neighbor weight: 2.00
Neighbor number: 2

PSO algorithm parameters

Noise resistance

Part 2 : PSO for Robotic Learning

- PSO with an Artificial Neural Network to do unsupervised robotic learning
- Design a fitness function for obstacle avoidance
 - Compare with the fitness proposed by Floreano and Mondada
- How is the performance affected by PSO parameter variations

Code Structure

Pso_sup.c

- Main()
 - Initialize world
 - Best=psos()
 - Evaluate best

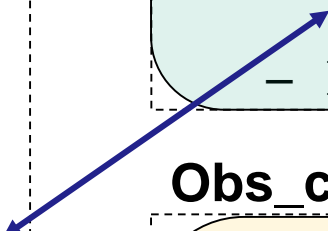
Pso.c

- Pso()
 - Initialize swarm
 - For each iteration
 - Move particles
 - Evaluate particles
 - Return best particle

Obs_con.c

- Main()
 - Initialize robot
 - Receive weights from supervisor
 - Run controller with weights
 - Send sensor data to supervisor

- Calc_fitness()
 - Reposition robots randomly
 - Send candidate solutions to robots
 - Evaluate fitness
 - Return fitness



Notes

- The performances for robotic learning are printed in the console of Webots
- Please fill in the Feedback Forms on Moodle