ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

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Distributed Intelligent Systems
Lab 8 Tutorial

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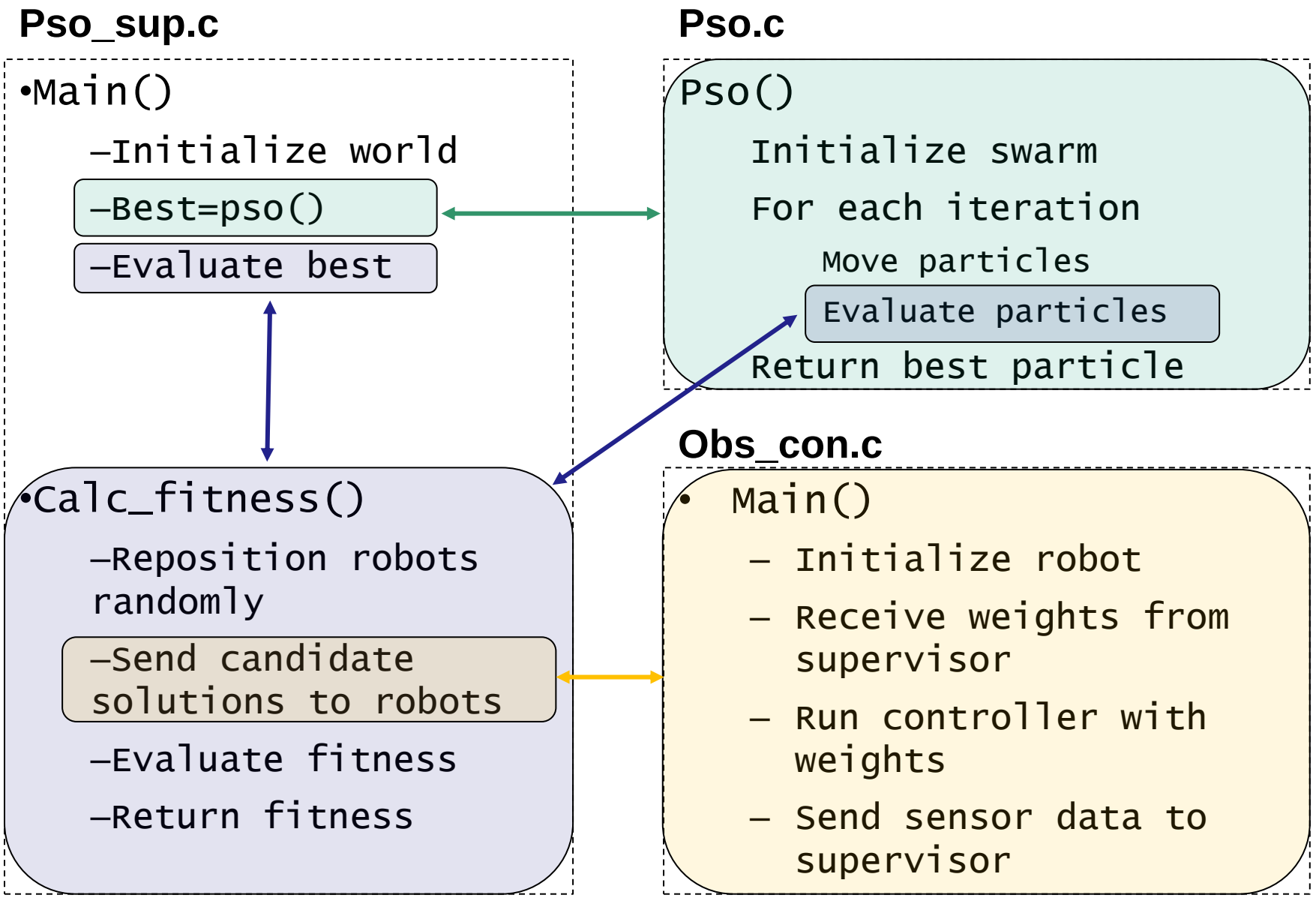
Lab Structure

1. Multi-robot PSO for obstacle avoidance:
   - Same fitness function as single-robot PSO
   - Differences in performance and evaluation time

2. Budget allocation:
   - Comparing standard PSO, PSO-pbest, PSO OCBA

3. Multi-robot PSO for collaborative tasks:
   - Coordinated motion: move as far as possible while staying together

Code Structure



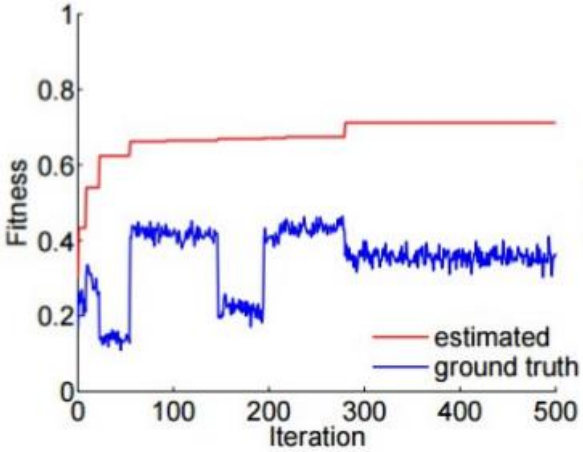
Noise-resistant PSO

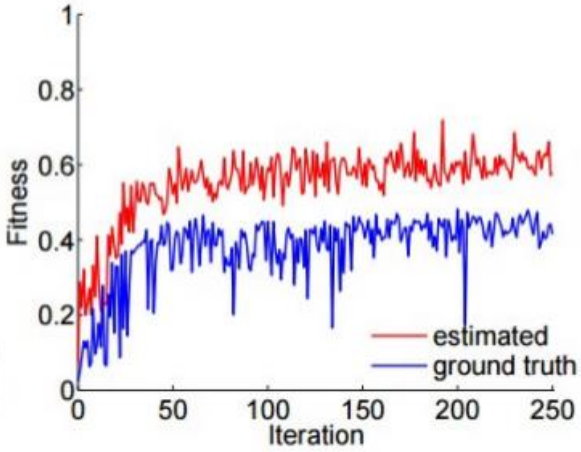
- Setting `NOISY=1` triggers two changes
  - Half the number of iterations
  - Revaluate performance for `lbest` (with flag `EVOLVE_AVG`)

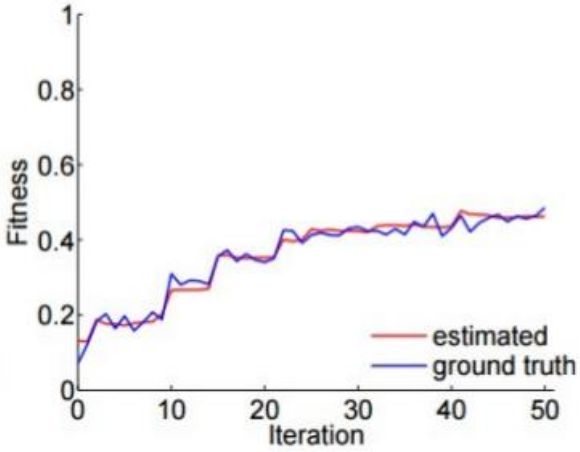
- You need to implement the behavior for `EVOLVE_AVG`
  - Modified moving average (MMA) with `age` as the number of periods.
  - Remember to increase `age`.

PSO-OCBA

- Optimal allocation of computation budget
- Very effective in the presence of noise







PSO for a collaborative task

- Fitness value to be calculated in the supervisor
- Copy-paste the noise resistant PSO
- More difficult task than obstacle avoidance
- New sources of uncertainties

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Notes and Clarifications

- Simulations take longer with complex tasks, set rending off, read ahead and answer questions while the simulation runs.

- Performance evaluations have a high variance, you may need additional runs to establish clear trends

- **Remember to fill the feedback form**