

Program

Lesson 1: Introduction to Evolutionary Algorithms

- Bibliography
- Motivation
- Evolutionary Theory
- Evolutionary Algorithms
- Schema Theorem
- Application Example
- Conclusions

Lesson 2: How to build a Genetic Algorithm

- Global Structure of the Algorithm
- Population Initialization
- Evaluation
- Selection
- Mutation
- Recombination (Crossover)
- Inversion
- Final Notes
- Other Algorithms
 - Evolution Strategies
 - Genetic Programming
 - Ant Colony Optimization

Lesson 3: Multi-Objective Optimization

- Concepts and Definitions
- Classical methods
- Difficulties with classical methods
- Early EMO methodologies
- State-of-the-art EMO
- NSGA-II
- RPSGA
- An application study
- Niching and speciation

Lesson 4: Extending MOEAs to Solve Complex Engineering Problems

- Motivation
- Multi-Objective Evolutionary Algorithm
- Decision Making
- Robustness
- Hybrid Algorithms
- Number of Objectives Reduction
- Case Study
- Global Conclusions

Lesson 5: Examples of Application of MOEAs

- Design of Shading Devices
- Polymer Extrusion (single and twin-screw extruders)
- Scale-up
- Feature Selection (bankruptcy prediction and cardiac SPEC diagnosis)