METTI5 Tutorial T2 on "Zero-order optimization algorithms"

Authors

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Duration

1h30

Туре

Methodological/numerical

Content

This workshop deals with local and global optimization algorithms and particularly with zeroorder algorithms. The field of optimization has gained increasing attention in past decades. This led to the emergence of new optimization algorithms sometimes referred as "metaheuristics". Most of them are nature-inspired: they mimic biological evolution, or the way biological entities communicate in nature. After a brief overview of the most traditional local search algorithms – simplex and gradient-based methods – the concept of heuristic and metaheuristic is presented. Some hints are pointed out in order to identify hard and simple optimization problems.

Two evolutionary algorithms are then presented: Evolution Strategies (ES) and Genetic algorithms (GA), but more details will be given on Particle Swarm Optimization (PSO), a swarm intelligence-based algorithm. An optimal experiment design problem is solved to illustrate benefits and drawbacks of metaheuristics over traditional local search algorithms. Common test functions like Rastrigin and Rosenbrock are finally used to assess the efficiency of each algorithm.