

Exercise Session – Gradient Descent

Federica Filippini – Danilo Ardagna

Politecnico di Milano

federica.filippini@polimi.it



**POLITECNICO
DI MILANO**

Goal

Provide the implementation of **gradient descent** algorithm for **polynomial functions**

$$f : \mathbb{R} \rightarrow \mathbb{R}$$

$$f(x) = a_0 + a_1x + a_2x^2 + \dots + a_nx^n = \sum_{k=0}^n a_kx^k$$

Gradient Descent algorithm

- Find the minimum of f in a given interval $[\inf, \sup]$
- Start from a given initial point x_0
- Next candidate:

$$x_i = x_{i-1} - \delta f'(x_{i-1})$$

where δ is a given constant

Required methods

- `solve`, that finds the minimum of f in $[inf, sup]$
- `solve_multistart`, that randomly picks an initial point in $[inf, sup]$ at each iteration
- `solve_domain_decomposition`, that performs multistart after having split $[inf, sup]$ in a given number of subintervals