Numerical optimization: Assignment 7

Deadline: the lab on 2024.05.20

In this assignment, we are going to do a basic implementation of gradient descent — for now, in 1D.

1. 1 point Construct, similarly to Assignment 6 Task 1, a set of interesting univariate test functions. You do not have to cover all the previously mentioned function types, but they should have multiple extrema of different magnitude. Prepare at least 5 functions.

2. 0.5 points If you have not done Assignment 6 Task 3, you can hand it in for full point value.

3. 1.5 points Implement a gradient descent method and test it by finding some minima of the functions prepared in Task 1. Experiment with different step lengths. Show some example descents and the areas of convergence to different extrema of the chosen functions.

4. 2 points Read up on using momentum in gradient descent. A reasonably easy description is at `https://towardsdatascience.com/gradient-descent-with-momentum-59420f626c8f`. Add momentum to your gradient descent and see if it changed the areas of convergence from the previous task.