Lab 1 Ordinary Least Squares (OLS) Method

Part I – presentation of the notebooks on calculus, algebra, autograd, and AutoED (data line – 22.02.2023)

Part II – Solution of OLS using Linear Algebra (deadline: 28.2.2022)

- Reading material
  - chapter 5 Houstis ebook
  - How to compute the least squares solution notes
  - An Introduction to Statistical Learning textbook chapter 3
- Solve the following problem

Problem 1: Write a python program to find the polynomials of degrees n= 3,7,15,21 that approximate $f(x) = 1/(1+x^2)$ from 60 points of this function corresponding to 60 equidistant x points in the interval [-5,5]. Apply LU, QR and SVD methods to find the polynomial approximations. Draw polynomials from each method and data in the same graph. Calculate and plan errors for each case. Explain the results obtained, Do you see a certain behavior?

Part III – Solution of OLS using calculus and gradient methods (deadline: 1.3.2023)

Problem 2: write a python program using calculus and gradient methods to solve problem 1.

Part IV: Implement OLS methods using pytorch library (7.3.2023)

Read supporting material Background Material in Lab 1 file.