

# DA2401 - Machine Learning Lab

## Assignment 1 - Linear Regression

12 Sep 2025

We have learnt implementation of Stochastic Gradient Descent (SGD) as a part of building Linear Regression models. There are other algorithms like AdaGrad, Nestorov, RMSprop etc. that improve convergence. A survey of optimization algorithms by Sun et al. <https://arxiv.org/pdf/1906.06821> is an informative read.

Complete the assignment using plain Python with simple packages like NumPy and SciPy. Please share Python notebooks, that can be executed and tested, and your results and observations in a L<sup>A</sup>T<sub>E</sub>X PDF report.

- Implement any first order algorithm listed in page 10 of the paper, except those already implemented in class (GD & SGD).
- Implement any higher order algorithm mentioned in page 16 of the paper.
- Compare performance of three algorithms - Stochastic Gradient Descent, your chosen first order method, your chosen higher order method on the diamonds dataset.
- Compare the model coefficients for best training from these three methods and tabulate the results.