POLYTECHNIQUE MONTRÉAL

Polytechnique Montréal

INF8245AE – Machine Learning

Assignment 1 – Linear Regression

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0.1 Question 1 : Linear and Weighted Ridge Regression

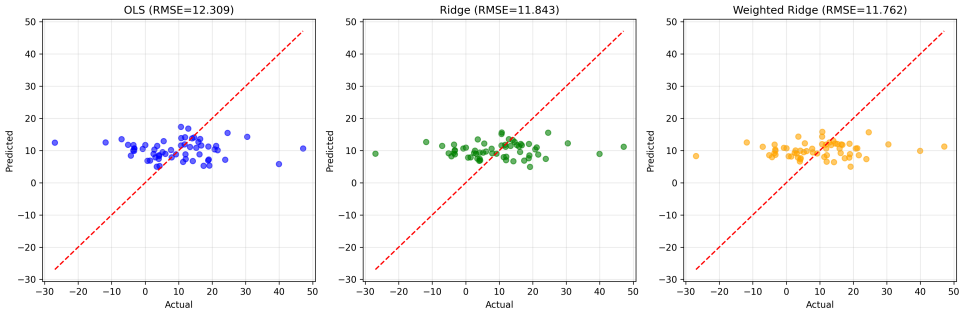

FIGURE 1 – Comparison of predictions from linear, ridge and weighted ridge regression on the test set.

0.2 Question 2 : Cross-Validation

Metric	**Best λ**	**λ=0.01**	**λ=0.1**	**λ=1**	**λ=10**	**λ=100**
MAE	10	7.381	7.316	7.140	7.110	7.817
MaxError	100	27.758	27.681	27.559	27.476	27.095
RMSE	10	9.855	9.772	9.577	9.532	10.101

TABLE 1 – Mean MAE, MaxError, and RMSE scores obtained via 5-fold cross-validation for different values of λ in ridge regression.

0.3 Question 3 : Gradient Descent for Ridge Regression

Learning Rate Schedule	**RMSE**
Constant	13.890951849807372
Exponential Decay	13.928319736225347
Cosine Annealing	14.347341446546864

TABLE 2 – RMSE results for different learning rate schedules in gradient descent for ridge regression.

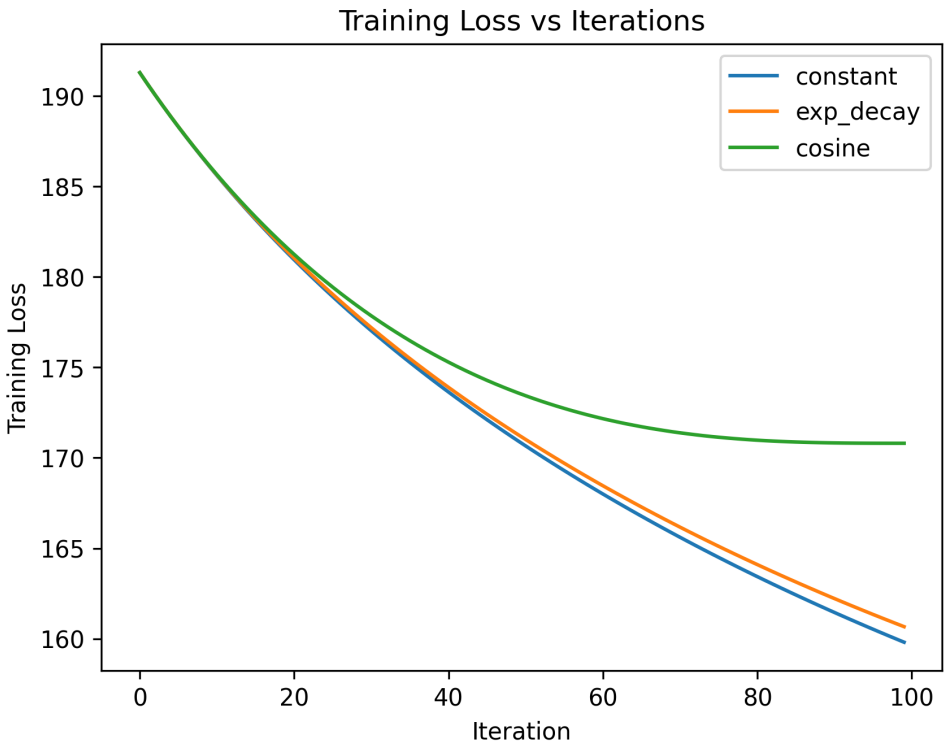

FIGURE 2 – Training loss vs iterations for different learning rate schedules in gradient descent for ridge regression.