

# ML LINEAR REGRESSION ASSIGNMENT

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GITHUB REPO LINK:

[https://github.com/priyasmitaaa/ML\\_Linear\\_Regression.git](https://github.com/priyasmitaaa/ML_Linear_Regression.git)

1. Use linear regression to fit a straight line to the given database. Set your learning rate to 0.5. What are the cost function value and learning parameters values after convergence? Also, mention the convergence criteria you used.

ANS.

Learning Rate ( $\alpha$ ) = 0.5

After convergence, the parameters are:

$\theta_0$  (intercept)  $\approx 0.1883$

$\theta_1$  (slope)  $\approx 0.9446$

Final Cost Function Value  $\approx 0.0134$

Convergence Criteria Used:

Convergence was checked by observing the change in cost function.

If the absolute difference between consecutive costs is less than  $1e-8$ , we consider the model as converged.

Otherwise, gradient descent is run up to 1000 iterations maximum.

2. The cost function that we are using in this assignment is different than the one we used in class. Can you think of the advantage of averaging the cost?

ANS.

The main advantage of **averaging the cost function** over just summing the errors is:

**Scale Independence:** The cost becomes **independent of the dataset size**.

(If you simply sum the errors, bigger datasets automatically have higher costs even if the model is good.)

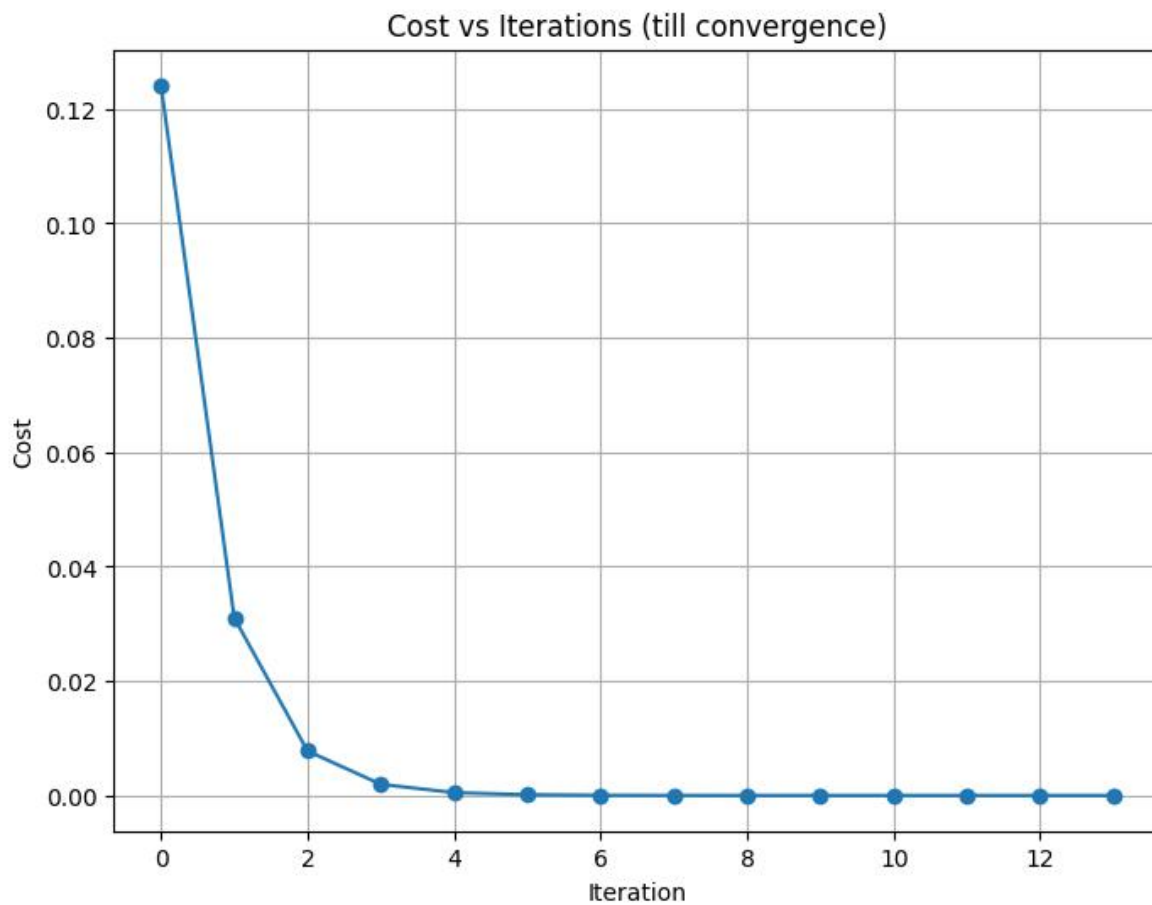
**Smoother Learning Rate Tuning:** It's easier to pick and tune a learning rate when the cost is on a consistent scale.

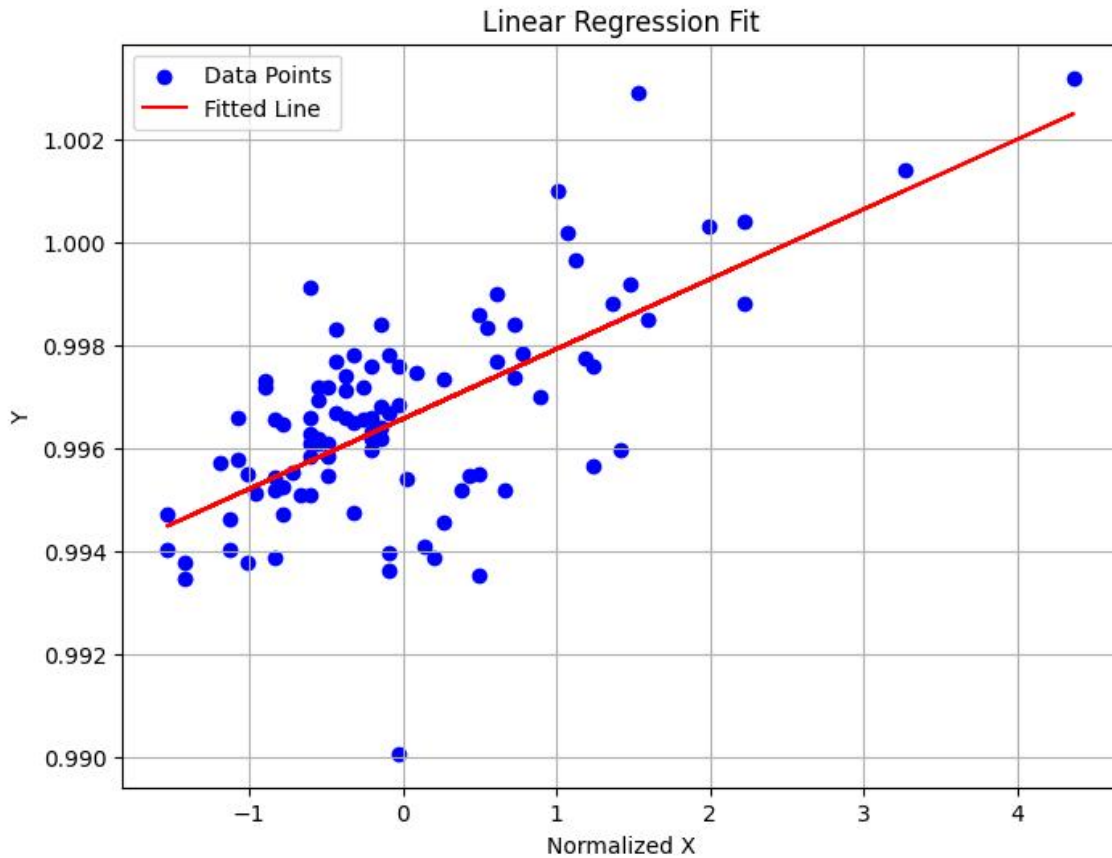
Better Interpretation: Average cost directly tells how "bad" the prediction is per example.

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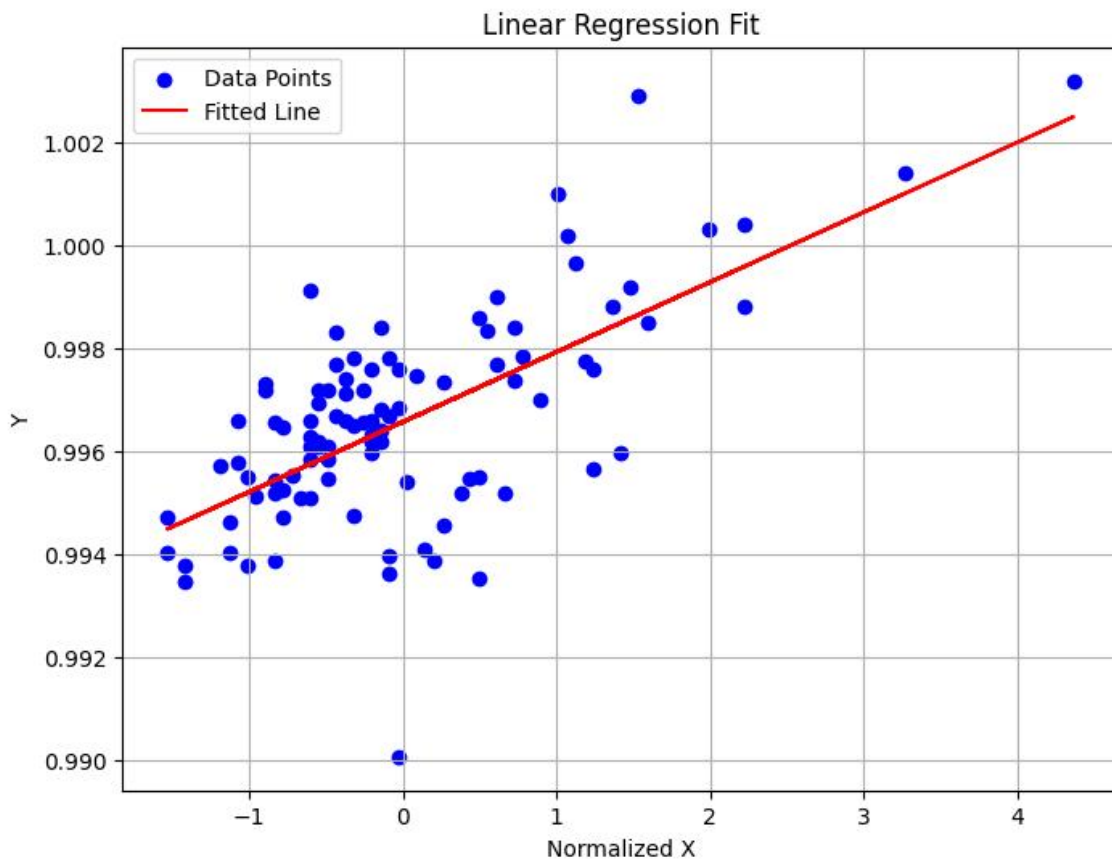
Plot the given dataset on a graph and also print the straight line you obtained in question 1 to show how it fits the data.

ANS.

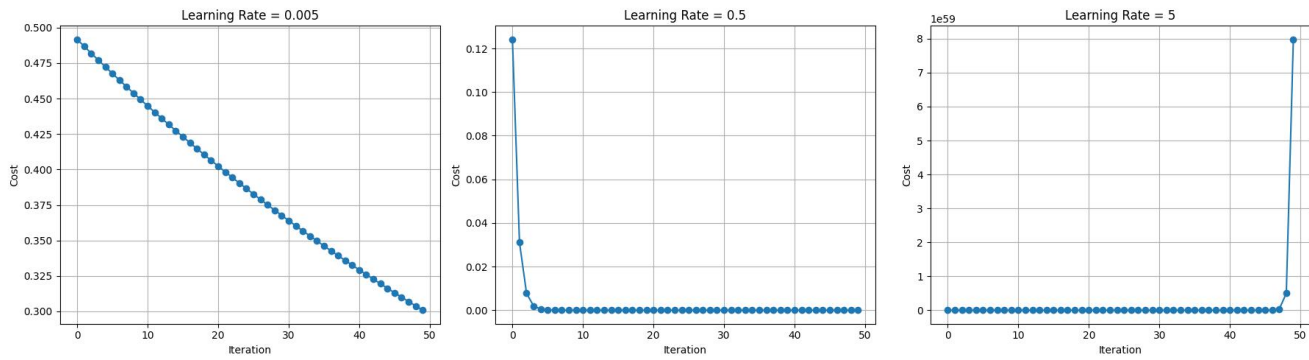




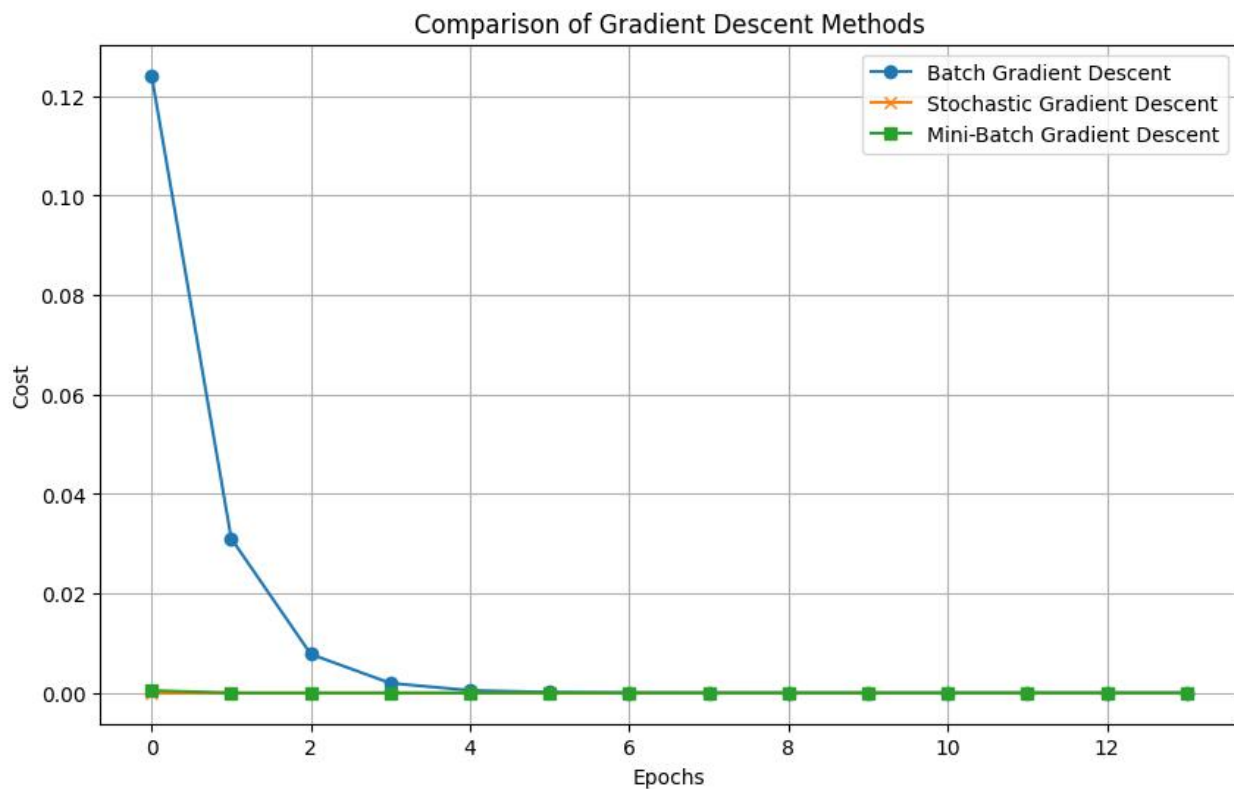
4. Plot the given dataset on a graph and also print the straight line you obtained in question 1 to show how it fits the data.  
ANS.



5. Plot the given dataset on a graph and also print the straight line you obtained in question 1 to show how it fits the data.  
ANS.



6. Plot the given dataset on a graph and also print the straight line you obtained in question 1 to show how it fits the data.



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