MACHINE LEARNING

ASSIGNMENT 2

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1 **Solution**

A column of 1’s is prepended to the feature set so as to receive the y-intercept of the regression line.

The feature matrix and target vector are both split into training and testing sets

Then *w*LIN, the coefficient of the linear regression line, is derived with the following steps:  
 step 1: pseudo inverse of the test set is calculated with built in functions.

Step 2: pseudo inverse is then multiplied with the target vector which then gives us the wLIN or, the coefficient of the linear regression line.

A picture containing diagram

Description automatically generated

The coefficient vector is used against every data point of the test set to produce the prediction set. A dot multiplication of wLin values with the test values gives us the result.

2 **Training and Validation**

The prediction set is then compared with the target set to check the accuracy of the model.

The noise level of the test set is calculated using this formula:A picture containing diagram, text

Description automatically generated

Once, the noise level has been calculated Ein and E out are calculated with these formulas:

A picture containing object, room, clock

Description automatically generated

Here, d is the number of features and N is the number of iterations.

Chart, line chart

Description automatically generated

**DISCUSSION**

The result shows that when more data points are added to the training model the error diminishes and almost converges with the expected error of the model.

1. What did you finish?

We finished the w initialization with linear aggression and were able to output the error margins.

2) What platform did you use?

We used Jupyter notebook from anaconda distribution on the Mac

3)Resources that helped me

* <http://www2.lawrence.edu/fast/GREGGJ/Python/numpy/numpyLA.html>
* <https://scikit-learn.org/stable/auto_examples/linear_model/plot_ols.html>
* <https://en.wikipedia.org/wiki/Linear_classifier#:~:text=In%20the%20field%20of%20machine,linear%20combination%20of%20the%20characteristics>
* <https://en.wikipedia.org/wiki/Linear_regression#:~:text=In%20statistics%2C%20linear%20regression%20is,is%20called%20simple%20linear%20regression>
* <https://stattrek.com/multiple-regression/regression-equation.aspx?tutorial=reg>
* [https://www.real-statistics.com/multiple-regression/weighted-linear-regression/weighted-regression-basics](•%09https:/www.real-statistics.com/multiple-regression/weighted-linear-regression/weighted-regression-basics)