CSE 574 Introduction to Machine Learning

Programming Assignment 1
Classification and Regression

Keerthana K

Hiren Aravind M G

Dept. of Electrical Engineering

PROBLEM 1:

LDA Accuracy = 97.0
QDA Accuracy = 97.0

The difference in boundaries in the case of LDA and QDA points to their theoretical difference as well, where covariance matrices are considered to be the identical in the case of LDA. Whereas, in QDA it is non-identical and the curves are determined the quadratic function.

PROBLEM 2:

MSE without intercept on testing data 106775.36155260474
MSE with intercept on testing data 3707.8401812047628

MSE without intercept on training data 8843489321.064756
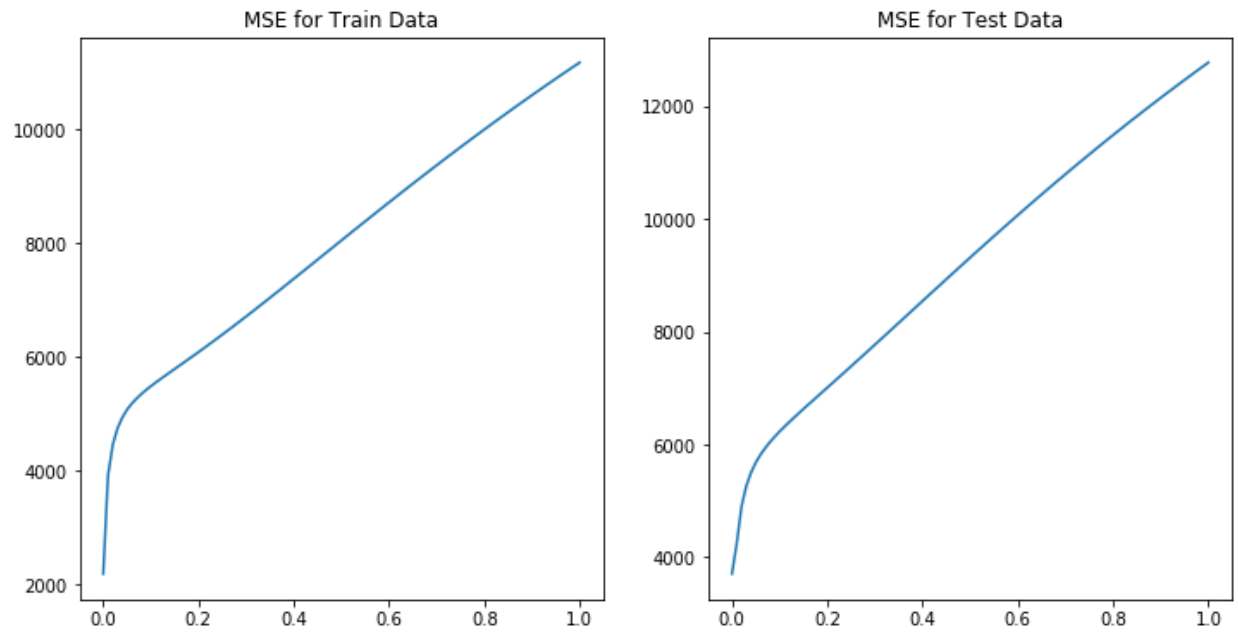MSE with intercept on training data 3632155.894314

In both the cases, when an intercept is applied the Mean Square Error becomes significantly lesser than the one without intercept and therefore can be considered to be a better option.
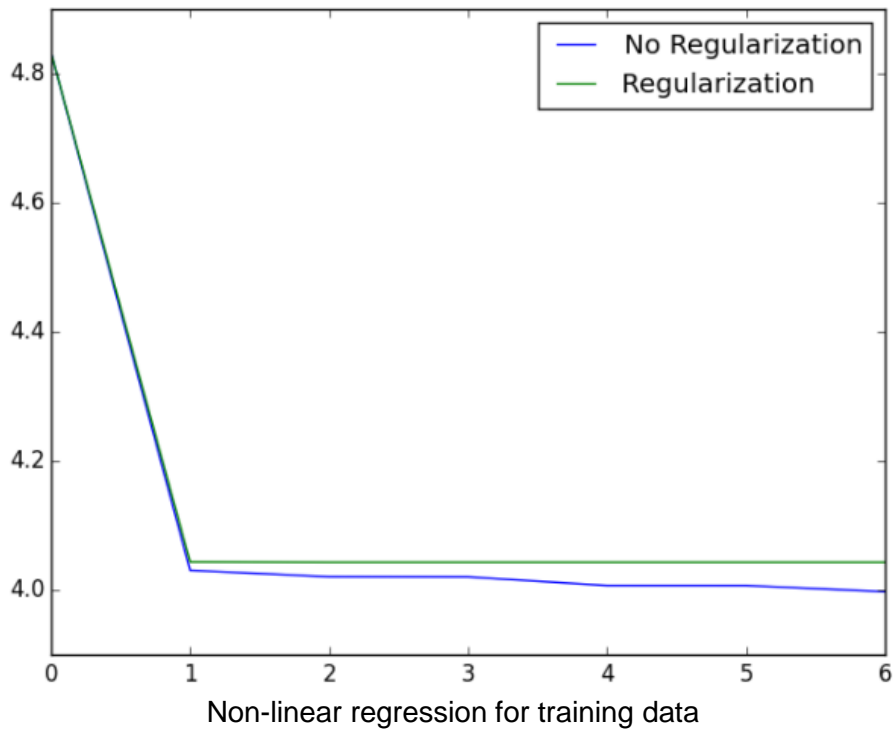
PROBLEM 3:
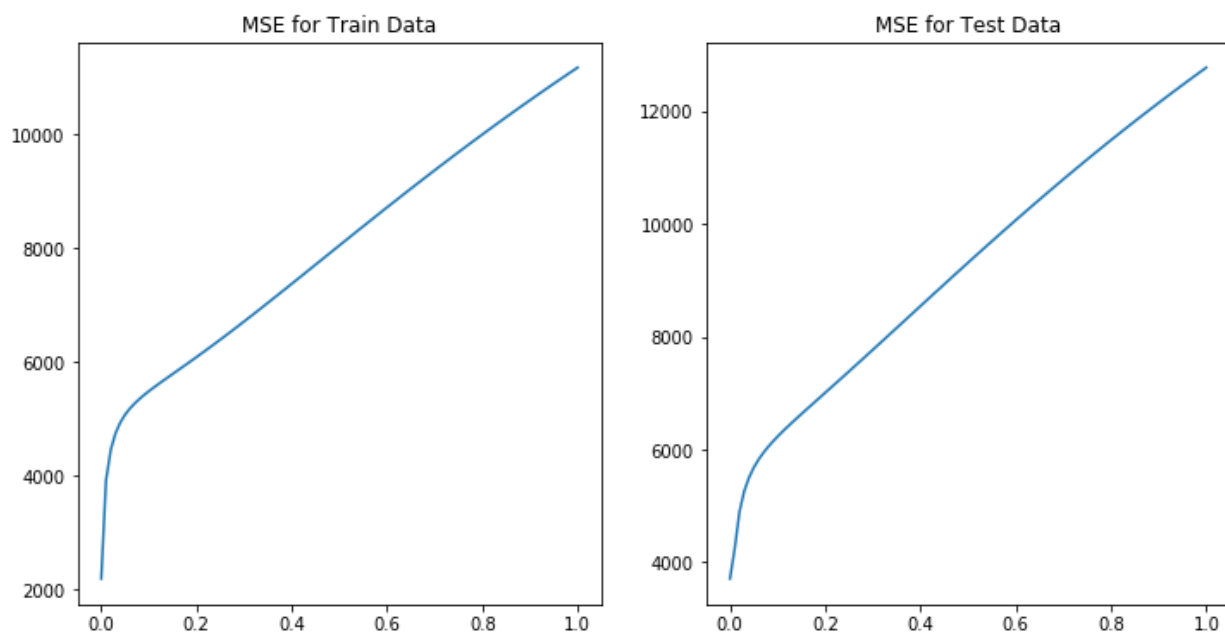


The MSE is lower for the train data

PROBLEM 4:

MSE for Train Data

MSE for Test Data

The results of Prob 3 & 4 are almost identical, yet the data set of prob 3 is much faster than the gradient descent.

PROBLEM 5:

Non-linear regression for training data

The above plot is for higher order polynomials and degrees as depicted in the figure, varies from 0 to 6.

Non-linear regression for testing data
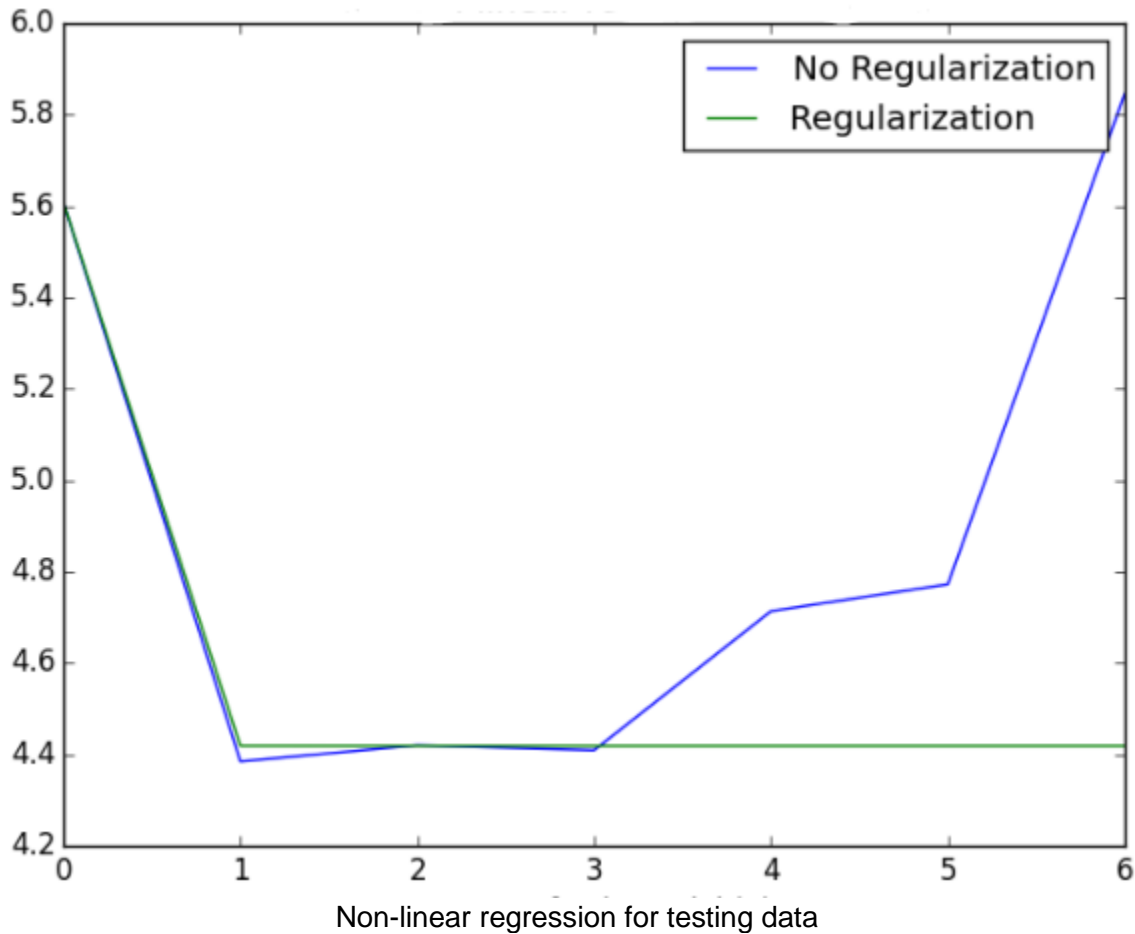
The above figure shows the plot of error for polynomials of different degrees, with and without regularization.

The optimal value of p =1 as the error is minimum, compared to other cases of p = 2, 3, 4, 5, 6

PROBLEM 6:

There are 2 metrics, namely testing error and running time. In the former, ridge regression performs well as it has minimum error and ridge regeression with gradient descent performs best with min running time and more accuracy.