

# Assignment 3 Report

Shivam Bhagat 2015B5A70460H  
Abhinav Kumar 2015B5A70674H  
Nikhil Madaan 2015A3PS0283H

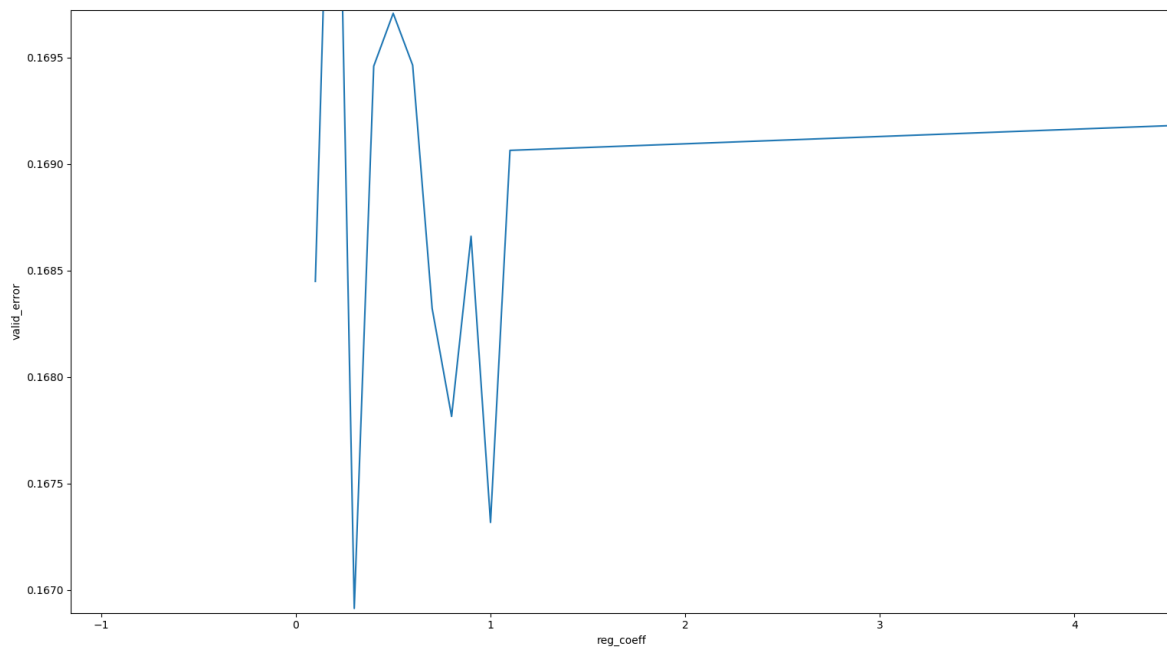
## 1. Test error table

Method	Test Error (half MSE)
Normal Equations	10.936097
Gradient Descent	10.931706
Gradient Descent with L1 Regularization	11.658700
Gradient Descent with L2 Regularization	10.908791

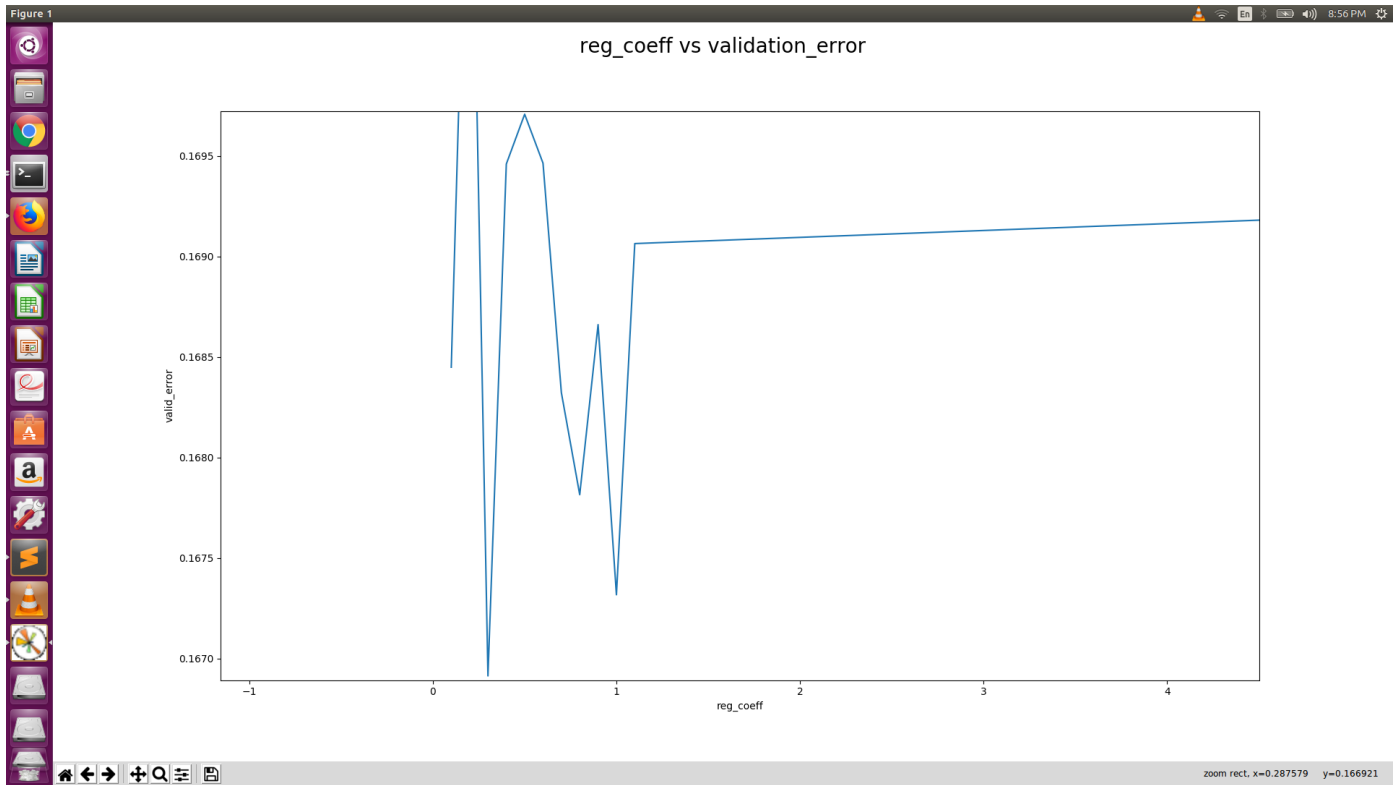
## 2. Validation Loss vs Regularization coefficient

### a. L1 (Lasso)

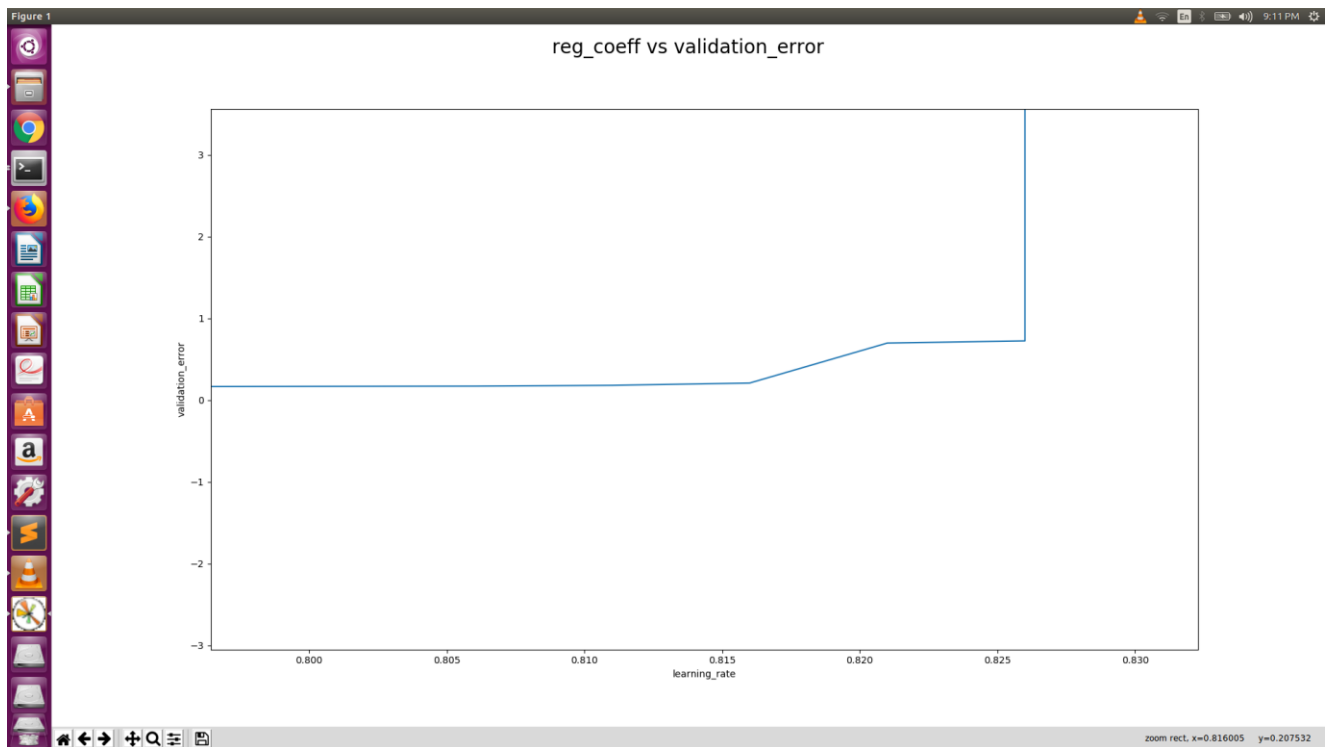
reg\_coeff vs validation\_error

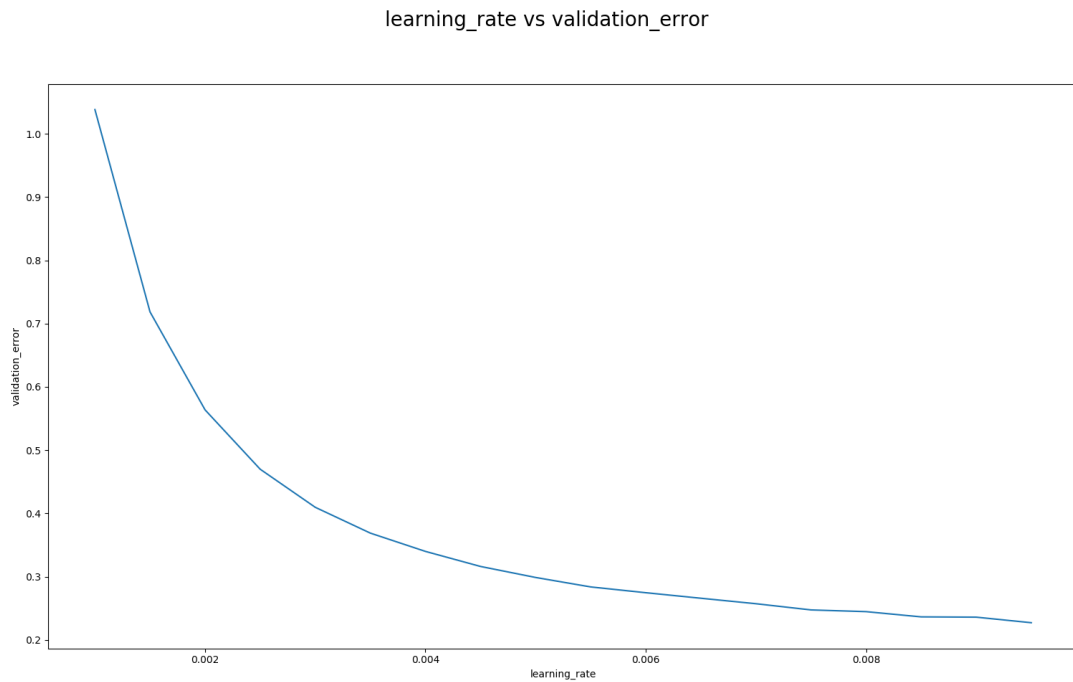


## b. L2 (Ridge)



## 3. Validation Loss vs Learning rate





## Comment on effect of Regularization on coefficients

Regularization is done to prevent the complexity of the model from increasing due to noise in the dataset. This is done to avoid overfitting and obtain a more general model for handling future unseen test cases. Without regularization, the coefficients are chosen, such that they minimize the loss function. If there is noise in the training data, then the estimated coefficients won't generalize well to the future data. This is where regularization comes in and penalizes or regularizes these learned estimates towards zero.