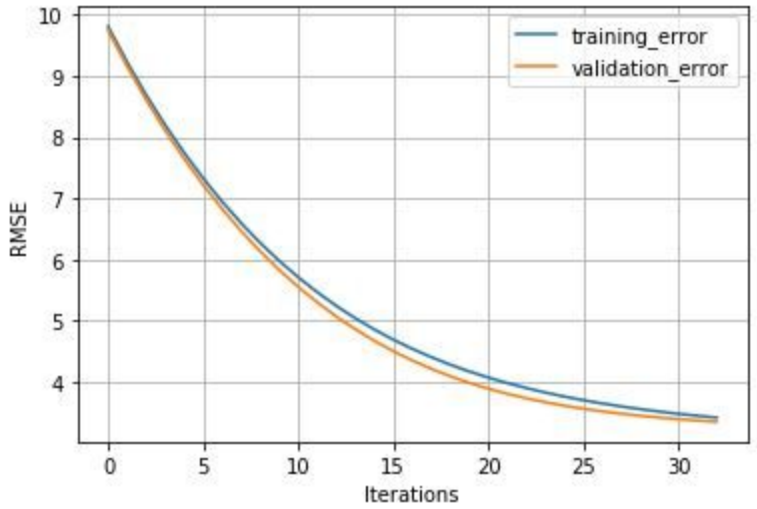
MACHINE LEARNING
PROGRAMMING ASSIGNMENT-01

1)

For Abalone Dataset.,
Plot for RMSE vs. Gradient Descent Iterations



Normal Equation:-
For 5 folds,

Validation Set as,	Training Error	Validation Error
Set_1	1.9426886875517582	3.1432646752702667
Set_2	2.309533279020077	1.7390761273526838
Set_3	2.153749554804753	2.41613134782802
Set_4	2.2615904696714675	1.9376728831949075
Set_5	2.245421961909177	2.008866622887424

As fold_2 considering as validation set,we are getting minimal RMSE.

RMSE(on validation set) for fold_2,

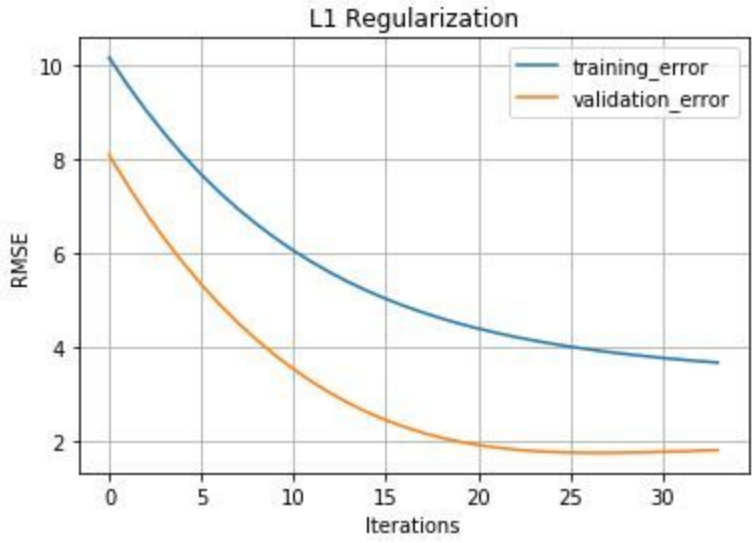
Using Normal Equation :- 1.7390761273526838

Using Gradient Descent:- 1.986580991903103

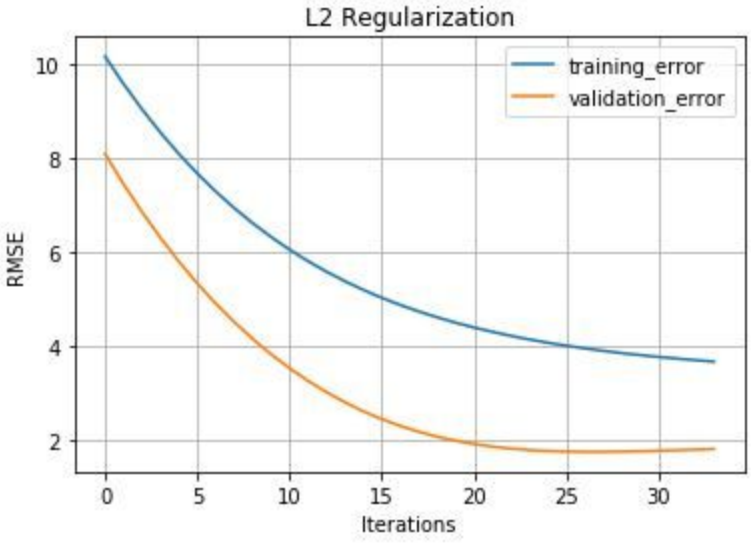
Normal Equation is always treated as a benchmark and very fast to compute,Gradient Descent takes time because it has to iterate until it converges.

b)

L1-regularization with lambda=1000

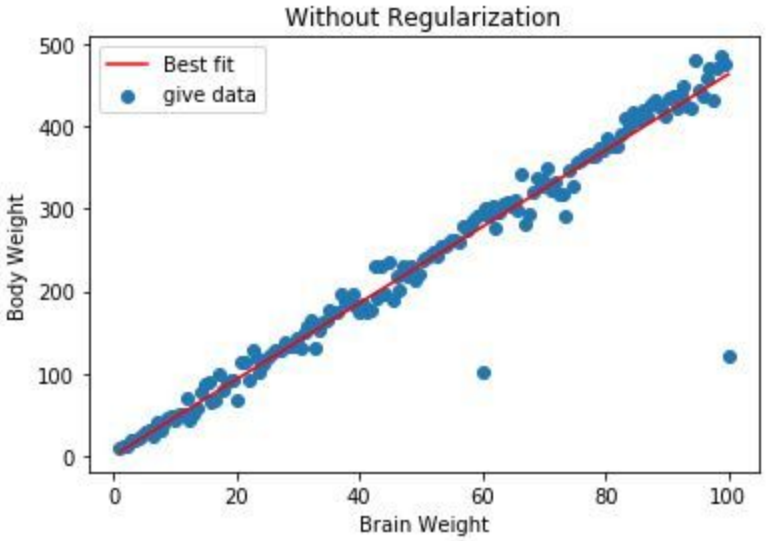


L2-regularization with lambda=1

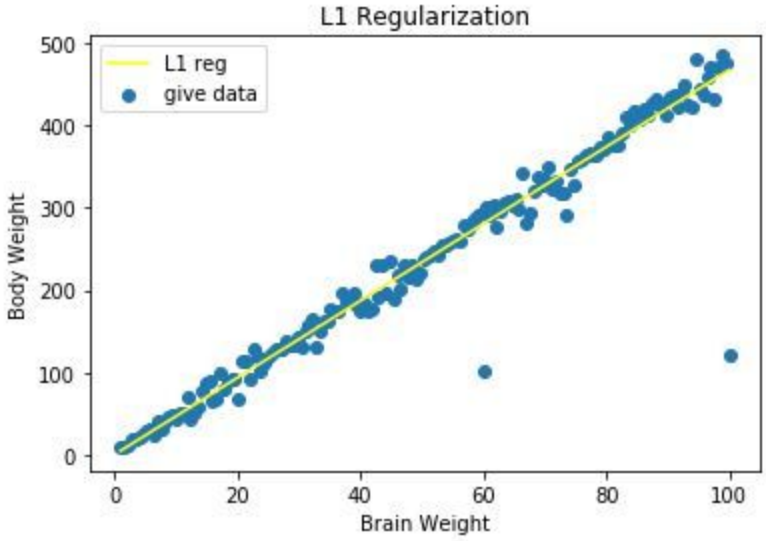


RMSE on test set using L1 regularization :- 1.8067985589580664
RMSE on test set using L2 regularization :- 1.9844921665450708

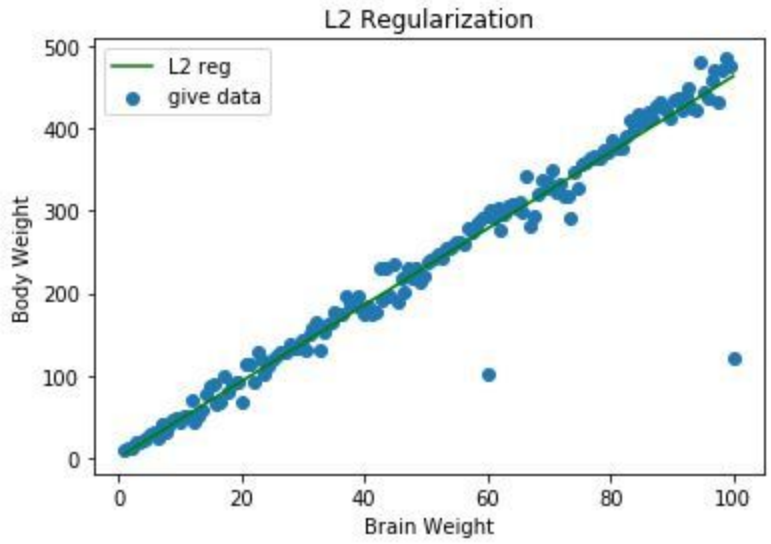
c) Best-Fit line without regularization



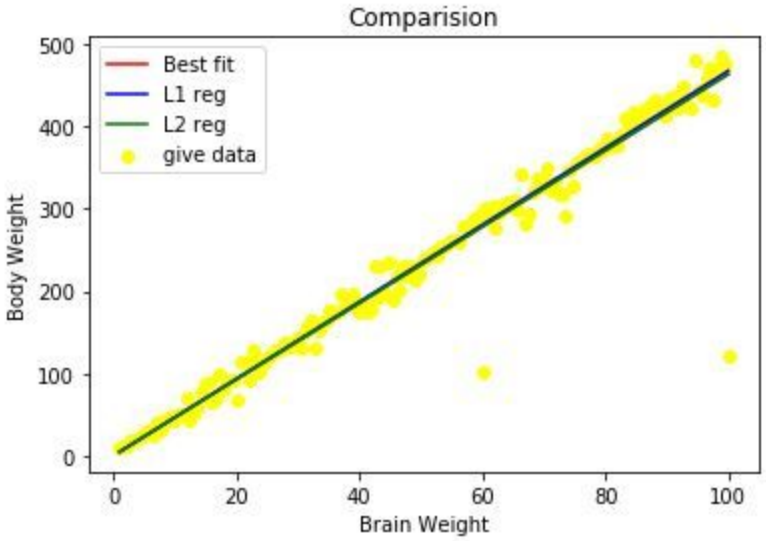
Best-Fit Line with L1-regularization with lambda= 10,000



Best-Fit Line with L2-regularization with lambda=10



Comparison between the above 3:-



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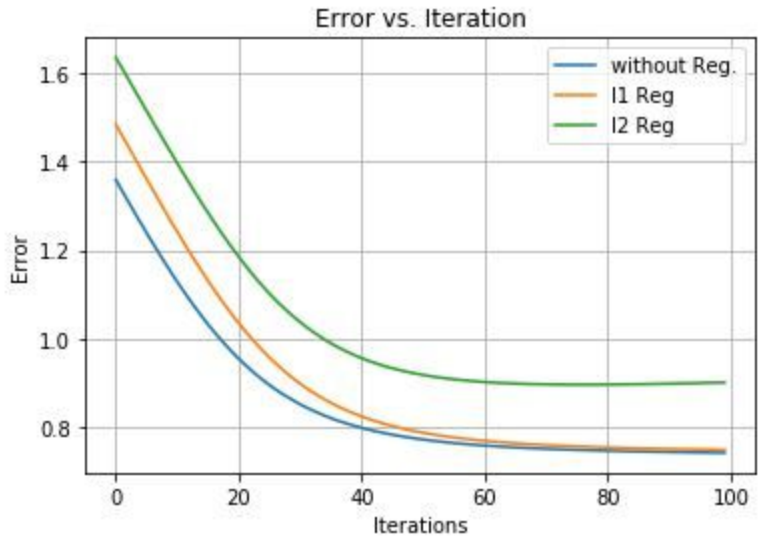
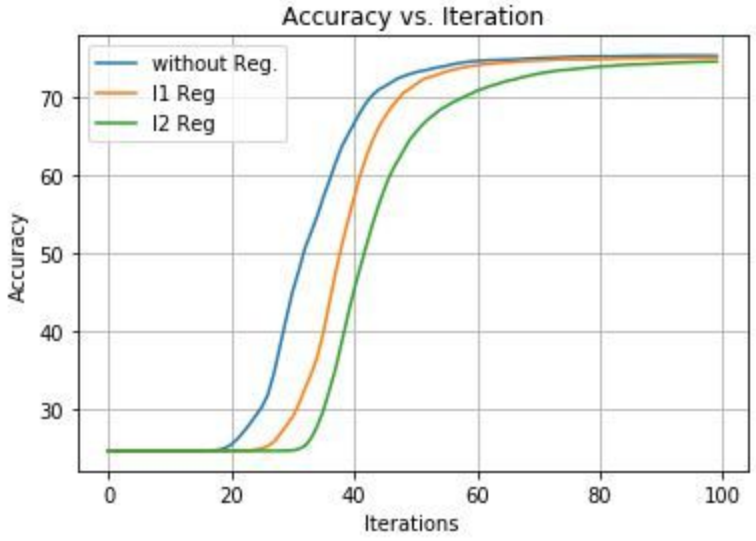
2) a)

Error Vs. Iterations curve:-



Accuracy vs Iteration curve:-



In this case,L1 Regularization is better than L2 Regularization,because gradually the error in the case of L1 is decreasing more compared to the L2.

2)b)

Training accuracy using L1: 90.84333333333333
Training accuracy using L2: 90.73333333333333
Testing accuracy using L1: 91.25999999999999
Testing accuracy using L2: 91.09