ASSIGNMENT 1
CLL788

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Solution to Question 1

1.a) Different Approaches for linear regression

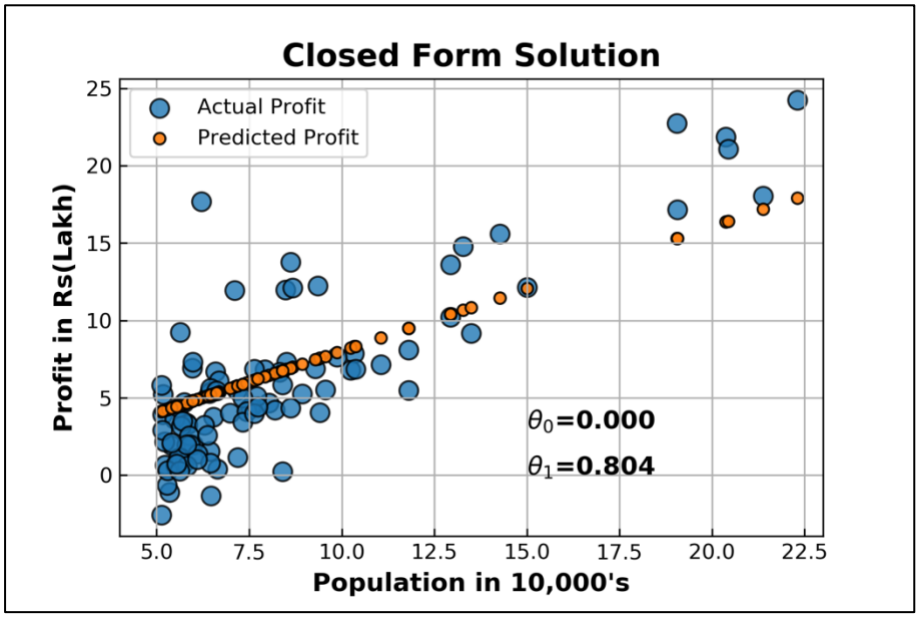

Figure 1 - Closed Form Solution

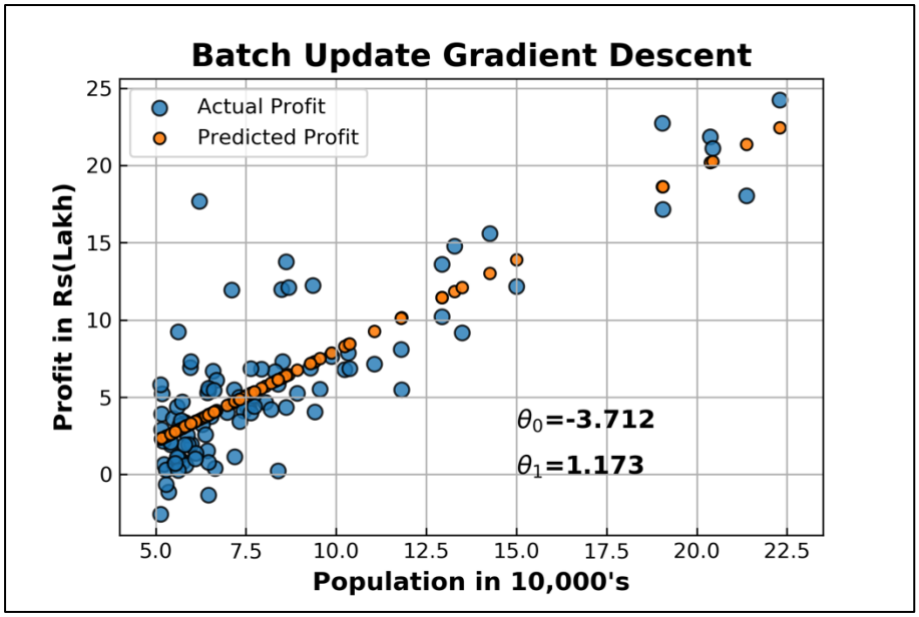

Figure 2 - Batch Update LMS

For obtaining result of stochastic update, shuffling of data was done 200 times to capture the best parameters

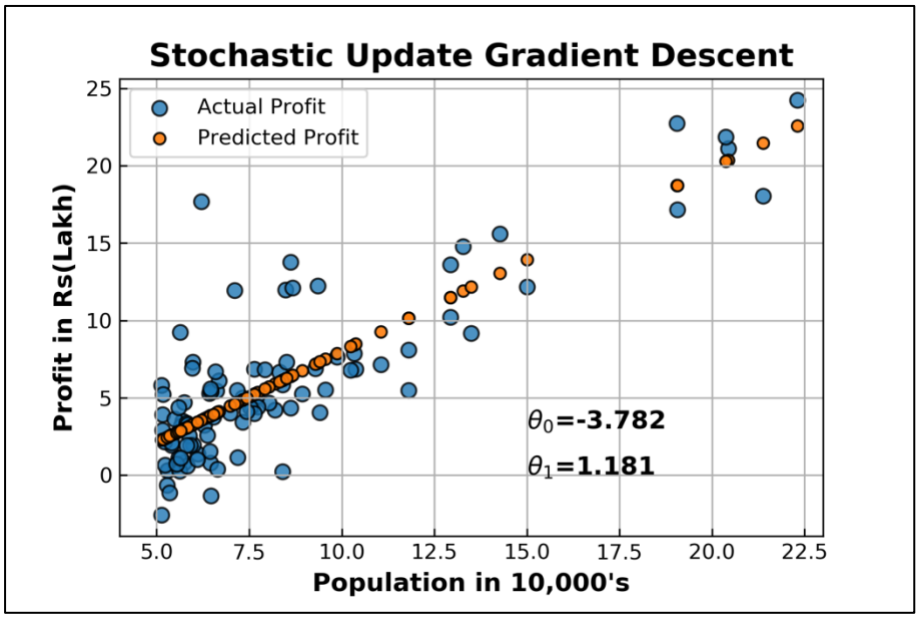

Figure 3 - Stochastic Update Gradient Descent

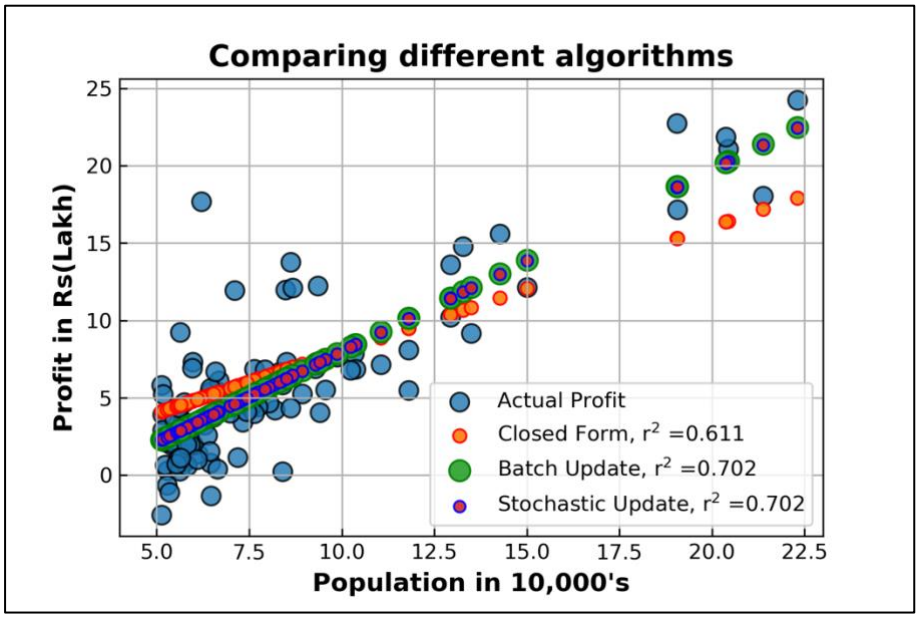

Figure 4 - Comparing different gradient descent algorithms

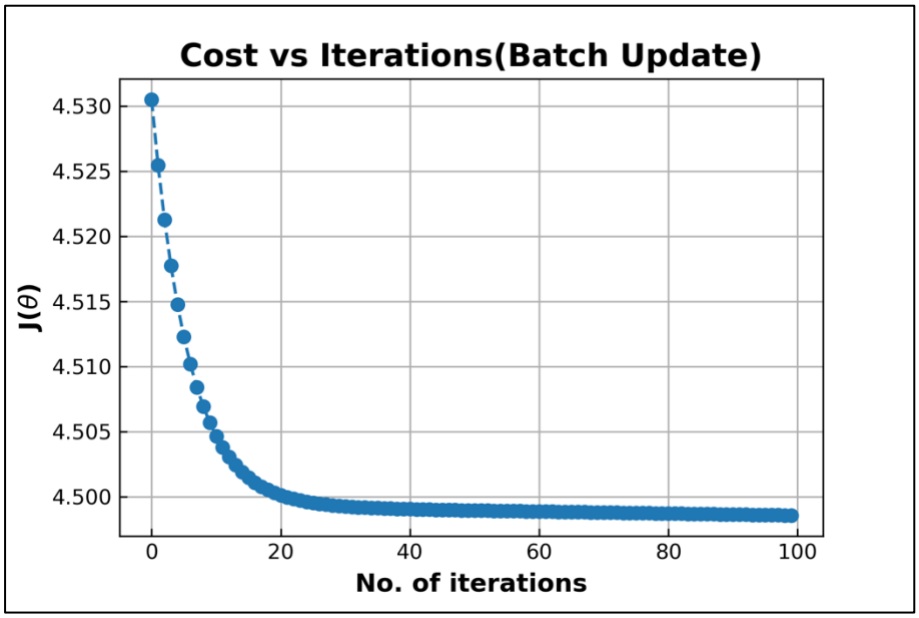

Figure 5 - Cost convergence (Batch Update)

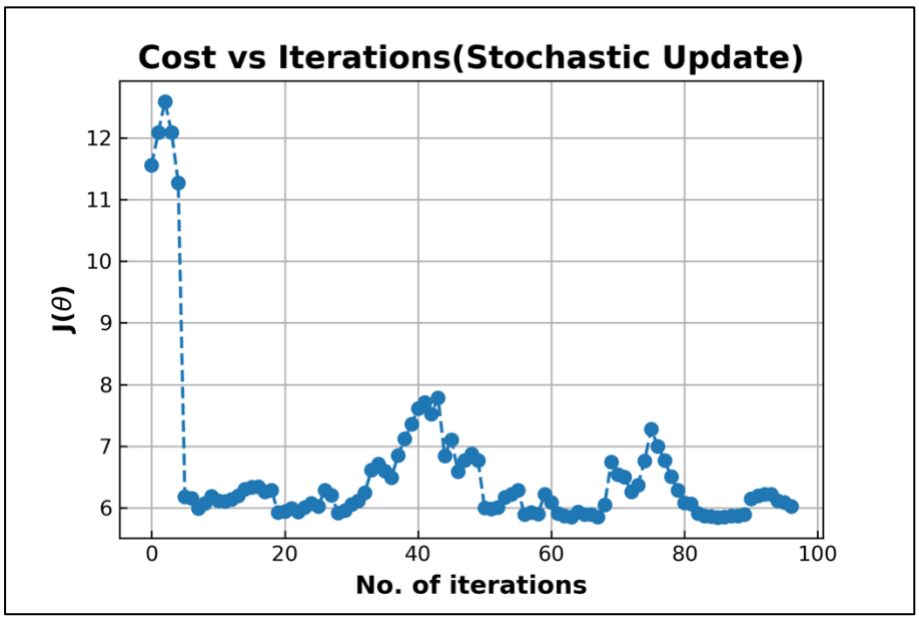

Figure 6 - Cost convergence (Stochastic Update)

Table 1 - Runtime of different algorithms

Algorithm	Runtime(ms)
Batch Update	0.15
Stochastic Update	0.02

1.b) Locally weighted regression

Query point = 7.576
Bandwidth = 0.5

Weights :
0.023960
0.000505
0.113718
0.639493

theta_0 in start = 0.380
theta_1 in start = 0.948

Result of 4 iterations :

theta_0	theta_1
[0.6926433]	[1.26105347]
[0.69274804]	[1.26115821]
[0.74777946]	[1.31618963]
[0.96832016]	[1.53673032]

final theta_0 = 0.968
final theta_1 = 1.537

result for query point = [12.6105891]

1.c) Comparing the results of Elastic Net, Lasso and Ridge Regression

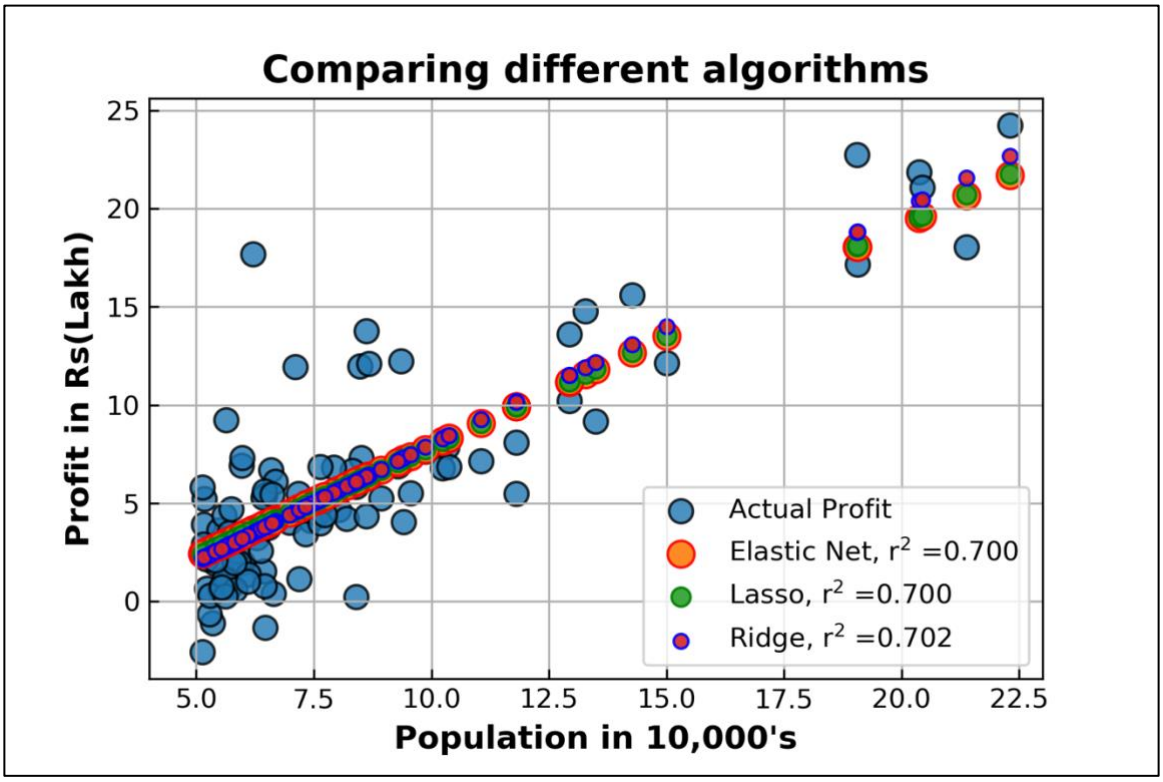

Figure 7 - Comparing regression models (using in-built functions)

Solution to Question 2

2.a) Logistic Regression

Actual Dataset

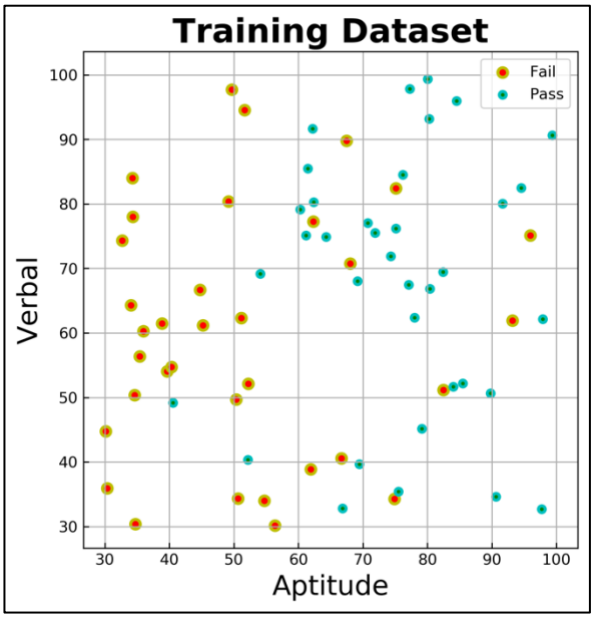

Figure 8 - Visualising training dataset

Prediction on actual dataset

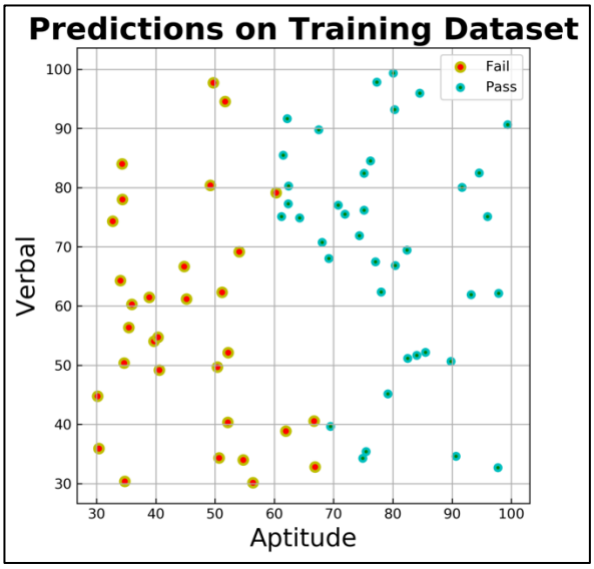

Figure 9 - Visualising prediction on training dataset

Predictions on test dataset

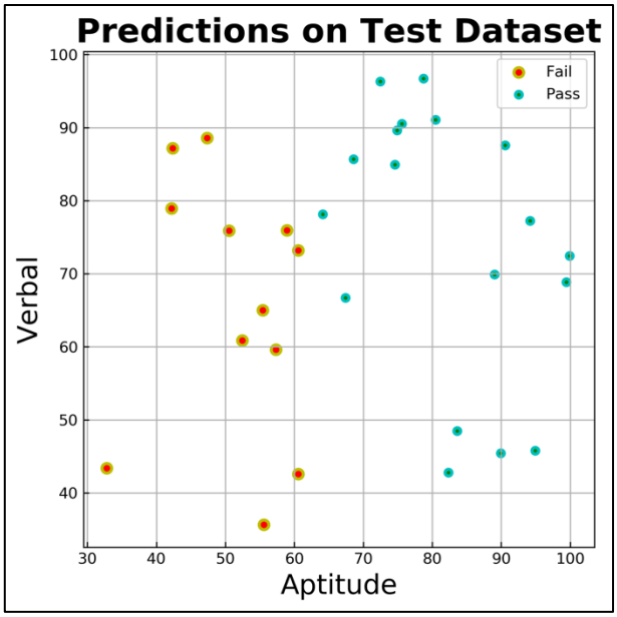

Figure 10 - Visualising predictions on test dataset