**REPORT**

**Part-2: Iris Flower Dataset:**

The following images have been generated from training the iris flower dataset with respect to different combinations with hyperparameters as

1. learning\_rate = 0.005
2. batch\_size=32,
3. regularization=0,
4. max\_epochs=100,
5. patience=3

**A picture containing graphical user interface

Description automatically generated**

**Chart, scatter chart

Description automatically generated**

**Chart, scatter chart

Description automatically generated**

**Chart, scatter chart

Description automatically generated**

**The output generated at terminal is given below:**

(base) raviailani@Ravis-Air ml-assignment1 % /usr/local/bin/python3 /Users/raviailani/Documents/ml-assignment1/Iris\_Model.py

Combination-1 : Predicting the petal width given petal length and sepal width

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Running epoch: 7 / 100

Running epoch: 8 / 100

Running epoch: 9 / 100

Running epoch: 10 / 100

Running epoch: 11 / 100

Running epoch: 12 / 100

Running epoch: 13 / 100

Running epoch: 14 / 100

Running epoch: 15 / 100

Running epoch: 16 / 100

Running epoch: 17 / 100

Running epoch: 18 / 100

Running epoch: 19 / 100

Running epoch: 20 / 100

Running epoch: 21 / 100

Running epoch: 22 / 100

Running epoch: 23 / 100

Running epoch: 24 / 100

Running epoch: 25 / 100

Running epoch: 26 / 100

Running epoch: 27 / 100

Running epoch: 28 / 100

Running epoch: 29 / 100

Running epoch: 30 / 100

Running epoch: 31 / 100

Running epoch: 32 / 100

Running epoch: 33 / 100

Running epoch: 34 / 100

Running epoch: 35 / 100

Running epoch: 36 / 100

Running epoch: 37 / 100

Running epoch: 38 / 100

Running epoch: 39 / 100

Running epoch: 40 / 100

Running epoch: 41 / 100

Running epoch: 42 / 100

Running epoch: 43 / 100

Running epoch: 44 / 100

Running epoch: 45 / 100

Running epoch: 46 / 100

Running epoch: 47 / 100

Running epoch: 48 / 100

Running epoch: 49 / 100

Running epoch: 50 / 100

Running epoch: 51 / 100

Running epoch: 52 / 100

Running epoch: 53 / 100

Running epoch: 54 / 100

Running epoch: 55 / 100

Running epoch: 56 / 100

Running epoch: 57 / 100

Running epoch: 58 / 100

Running epoch: 59 / 100

Running epoch: 60 / 100

Running epoch: 61 / 100

Running epoch: 62 / 100

Running epoch: 63 / 100

Running epoch: 64 / 100

Running epoch: 65 / 100

Running epoch: 66 / 100

Running epoch: 67 / 100

Running epoch: 68 / 100

Running epoch: 69 / 100

Running epoch: 70 / 100

Running epoch: 71 / 100

Running epoch: 72 / 100

Running epoch: 73 / 100

Running epoch: 74 / 100

Running epoch: 75 / 100

Running epoch: 76 / 100

Running epoch: 77 / 100

Running epoch: 78 / 100

Running epoch: 79 / 100

Running epoch: 80 / 100

Running epoch: 81 / 100

Running epoch: 82 / 100

Running epoch: 83 / 100

Running epoch: 84 / 100

Running epoch: 85 / 100

Running epoch: 86 / 100

Running epoch: 87 / 100

Running epoch: 88 / 100

Running epoch: 89 / 100

Running epoch: 90 / 100

Running epoch: 91 / 100

Running epoch: 92 / 100

Running epoch: 93 / 100

Running epoch: 94 / 100

Running epoch: 95 / 100

Running epoch: 96 / 100

Running epoch: 97 / 100

Running epoch: 98 / 100

Running epoch: 99 / 100

Running epoch: 100 / 100

Weights and Bias: [0.07689073 0.24870653 0.03095569]

Score: Final validation Loss: 0.32309906177437037

Target: 2.3 - Predicted: 1.5549018301855893

Target: 1.9 - Predicted: 1.5069639591356936

Target: 2.0 - Predicted: 1.5549018301855893

Target: 2.3 - Predicted: 1.635399427010586

Target: 2.4 - Predicted: 1.685140733285994

Target: 2.4 - Predicted: 1.6620735153738027

Target: 1.8 - Predicted: 1.530031177047885

Target: 2.3 - Predicted: 1.7443745474243122

Target: 1.8 - Predicted: 1.4554192176347729

Target: 2.3 - Predicted: 1.7787377084249258

Target: 2.5 - Predicted: 1.702322313786301

Target: 1.8 - Predicted: 1.6372028622360986

Target: 1.9 - Predicted: 1.4667151607231952

Target: 2.3 - Predicted: 1.5377202496852822

Target: 2.1 - Predicted: 1.6123322090983945

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Combination-2 : Predicting the petal width given petal length:

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Running epoch: 7 / 100

Running epoch: 8 / 100

Running epoch: 9 / 100

Running epoch: 10 / 100

Running epoch: 11 / 100

Running epoch: 12 / 100

Running epoch: 13 / 100

Running epoch: 14 / 100

Running epoch: 15 / 100

Running epoch: 16 / 100

Running epoch: 17 / 100

Running epoch: 18 / 100

Running epoch: 19 / 100

Running epoch: 20 / 100

Running epoch: 21 / 100

Running epoch: 22 / 100

Running epoch: 23 / 100

Running epoch: 24 / 100

Weights and Bias: [0.31971679 0.04082721]

Score: Final validation Loss: 0.1805092541783016

Target: 2.3 - Predicted: 1.7033545232812741

Target: 1.9 - Predicted: 1.6713828440950846

Target: 2.0 - Predicted: 1.7033545232812741

Target: 2.3 - Predicted: 1.7672978816536526

Target: 2.4 - Predicted: 1.8312412400260307

Target: 2.4 - Predicted: 1.8312412400260307

Target: 1.8 - Predicted: 1.6713828440950846

Target: 2.3 - Predicted: 1.9271562775845987

Target: 1.8 - Predicted: 1.575467806536517

Target: 2.3 - Predicted: 1.9910996359569768

Target: 2.5 - Predicted: 1.8632129192122202

Target: 1.8 - Predicted: 1.7992695608398417

Target: 1.9 - Predicted: 1.6394111649088956

Target: 2.3 - Predicted: 1.6713828440950846

Target: 2.1 - Predicted: 1.7672978816536526

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Combination-3 : Predicting the petal width given petal length, sepal length and sepal width:

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Running epoch: 7 / 100

Running epoch: 8 / 100

Running epoch: 9 / 100

Running epoch: 10 / 100

Running epoch: 11 / 100

Running epoch: 12 / 100

Running epoch: 13 / 100

Running epoch: 14 / 100

Running epoch: 15 / 100

Running epoch: 16 / 100

Running epoch: 17 / 100

Running epoch: 18 / 100

Running epoch: 19 / 100

Running epoch: 20 / 100

Running epoch: 21 / 100

Running epoch: 22 / 100

Running epoch: 23 / 100

Running epoch: 24 / 100

Running epoch: 25 / 100

Weights and Bias: [ 0.07109498 -0.05045008 0.26753553 -0.00489796]

Score: Final validation Loss: 0.19424388345514135

Target: 2.3 - Predicted: 1.711272946971462

Target: 1.9 - Predicted: 1.635668934728035

Target: 2.0 - Predicted: 1.6970539504895905

Target: 2.3 - Predicted: 1.7090525288451617

Target: 2.4 - Predicted: 1.7696691340212098

Target: 2.4 - Predicted: 1.8132421523775035

Target: 1.8 - Predicted: 1.6276434075764201

Target: 2.3 - Predicted: 1.8955673025569248

Target: 1.8 - Predicted: 1.5544922454146868

Target: 2.3 - Predicted: 2.0231499105888258

Target: 2.5 - Predicted: 1.8299056889166927

Target: 1.8 - Predicted: 1.76516010418714

Target: 1.9 - Predicted: 1.6545528893935246

Target: 2.3 - Predicted: 1.693693381521593

Target: 2.1 - Predicted: 1.7739540419242623

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Combination-4: Predicting the sepal width given sepal length

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Weights and Bias: [0.4405533 0.08120195]

**Score: Final validation Loss: 0.08728725511534462**

Target: 3.0 - Predicted: 3.032909087547061

Target: 2.7 - Predicted: 2.6364111136390385

Target: 3.0 - Predicted: 2.944798426678611

Target: 3.4 - Predicted: 2.8126324353759373

Target: 3.4 - Predicted: 2.856687765810162

Target: 3.1 - Predicted: 3.032909087547061

Target: 3.0 - Predicted: 2.6804664440732635

Target: 3.2 - Predicted: 3.0769644179812854

Target: 3.0 - Predicted: 2.7245217745074877

Target: 3.0 - Predicted: 3.4734623918893077

Target: 3.3 - Predicted: 3.032909087547061

Target: 3.1 - Predicted: 2.900743096244387

Target: 2.5 - Predicted: 2.856687765810162

Target: 3.1 - Predicted: 3.12101974841551

Target: 3.1 - Predicted: 3.12101974841551

Plots saved

Goodbye!

**Thus the best results came from**

* **Combination-4: Predicting the sepal width given sepal length**
* **Score: Final validation Loss: 0.08728725511534462**

**After adding regularization, the changed parameters are:**

1. learning\_rate = 0.005
2. batch\_size=32,
3. regularization=0.60,
4. max\_epochs=100,
5. patience=3

**A picture containing graphical user interface

Description automatically generated**

**Graphical user interface

Description automatically generated**

**Chart

Description automatically generated**

**Chart, scatter chart

Description automatically generated**

**The terminal output for the program has been recorded as:**

(base) raviailani@Ravis-Air ml-assignment1 % /usr/local/bin/python3 /Users/raviailani/Documents/ml-assignment1/Iris\_Model.py

Combination-1 : Predicting the petal width given petal length and sepal width

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Running epoch: 7 / 100

Running epoch: 8 / 100

Running epoch: 9 / 100

Running epoch: 10 / 100

Running epoch: 11 / 100

Running epoch: 12 / 100

Running epoch: 13 / 100

Running epoch: 14 / 100

Running epoch: 15 / 100

Running epoch: 16 / 100

Running epoch: 17 / 100

Running epoch: 18 / 100

Running epoch: 19 / 100

Running epoch: 20 / 100

Running epoch: 21 / 100

Running epoch: 22 / 100

Running epoch: 23 / 100

Running epoch: 24 / 100

Running epoch: 25 / 100

Running epoch: 26 / 100

Running epoch: 27 / 100

Running epoch: 28 / 100

Running epoch: 29 / 100

Running epoch: 30 / 100

Running epoch: 31 / 100

Running epoch: 32 / 100

Running epoch: 33 / 100

Running epoch: 34 / 100

Running epoch: 35 / 100

Running epoch: 36 / 100

Running epoch: 37 / 100

Running epoch: 38 / 100

Running epoch: 39 / 100

Running epoch: 40 / 100

Running epoch: 41 / 100

Running epoch: 42 / 100

Running epoch: 43 / 100

Running epoch: 44 / 100

Running epoch: 45 / 100

Running epoch: 46 / 100

Running epoch: 47 / 100

Running epoch: 48 / 100

Running epoch: 49 / 100

Running epoch: 50 / 100

Running epoch: 51 / 100

Running epoch: 52 / 100

Running epoch: 53 / 100

Running epoch: 54 / 100

Running epoch: 55 / 100

Running epoch: 56 / 100

Running epoch: 57 / 100

Running epoch: 58 / 100

Running epoch: 59 / 100

Running epoch: 60 / 100

Running epoch: 61 / 100

Running epoch: 62 / 100

Running epoch: 63 / 100

Running epoch: 64 / 100

Running epoch: 65 / 100

Running epoch: 66 / 100

Running epoch: 67 / 100

Running epoch: 68 / 100

Running epoch: 69 / 100

Running epoch: 70 / 100

Running epoch: 71 / 100

Running epoch: 72 / 100

Running epoch: 73 / 100

Running epoch: 74 / 100

Running epoch: 75 / 100

Running epoch: 76 / 100

Running epoch: 77 / 100

Running epoch: 78 / 100

Running epoch: 79 / 100

Running epoch: 80 / 100

Running epoch: 81 / 100

Running epoch: 82 / 100

Running epoch: 83 / 100

Running epoch: 84 / 100

Running epoch: 85 / 100

Running epoch: 86 / 100

Running epoch: 87 / 100

Running epoch: 88 / 100

Running epoch: 89 / 100

Running epoch: 90 / 100

Running epoch: 91 / 100

Running epoch: 92 / 100

Running epoch: 93 / 100

Running epoch: 94 / 100

Running epoch: 95 / 100

Running epoch: 96 / 100

Running epoch: 97 / 100

Running epoch: 98 / 100

Running epoch: 99 / 100

Running epoch: 100 / 100

Weights and Bias: [0.07723208 0.24108857 0.03077383]

Score: Final validation Loss: 0.36799855163615514

Target: 2.1 - Predicted: 1.5720715693626526

Target: 1.9 - Predicted: 1.429296891831563

Target: 2.3 - Predicted: 1.516130647031344

Target: 1.8 - Predicted: 1.5961804264197479

Target: 2.4 - Predicted: 1.620289283476843

Target: 2.3 - Predicted: 1.7331103605452012

Target: 2.4 - Predicted: 1.6434589081281972

Target: 2.5 - Predicted: 1.6598445569681746

Target: 2.0 - Predicted: 1.516130647031344

Target: 2.3 - Predicted: 1.5952411940140068

Target: 1.8 - Predicted: 1.4196952188029628

Target: 1.9 - Predicted: 1.4688521653228943

Target: 2.3 - Predicted: 1.4997449981913666

Target: 2.3 - Predicted: 1.700339062865247

Target: 1.8 - Predicted: 1.4920217899742485

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Combination-2 : Predicting the petal width given petal length:

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Running epoch: 7 / 100

Running epoch: 8 / 100

Running epoch: 9 / 100

Running epoch: 10 / 100

Running epoch: 11 / 100

Running epoch: 12 / 100

Running epoch: 13 / 100

Running epoch: 14 / 100

Running epoch: 15 / 100

Running epoch: 16 / 100

Running epoch: 17 / 100

Running epoch: 18 / 100

Running epoch: 19 / 100

Running epoch: 20 / 100

Running epoch: 21 / 100

Running epoch: 22 / 100

Running epoch: 23 / 100

Running epoch: 24 / 100

Running epoch: 25 / 100

Running epoch: 26 / 100

Running epoch: 27 / 100

Running epoch: 28 / 100

Running epoch: 29 / 100

Running epoch: 30 / 100

Running epoch: 31 / 100

Running epoch: 32 / 100

Running epoch: 33 / 100

Running epoch: 34 / 100

Running epoch: 35 / 100

Running epoch: 36 / 100

Running epoch: 37 / 100

Running epoch: 38 / 100

Running epoch: 39 / 100

Running epoch: 40 / 100

Running epoch: 41 / 100

Running epoch: 42 / 100

Running epoch: 43 / 100

Running epoch: 44 / 100

Running epoch: 45 / 100

Running epoch: 46 / 100

Running epoch: 47 / 100

Running epoch: 48 / 100

Running epoch: 49 / 100

Running epoch: 50 / 100

Running epoch: 51 / 100

Running epoch: 52 / 100

Running epoch: 53 / 100

Running epoch: 54 / 100

Running epoch: 55 / 100

Running epoch: 56 / 100

Running epoch: 57 / 100

Running epoch: 58 / 100

Running epoch: 59 / 100

Running epoch: 60 / 100

Running epoch: 61 / 100

Running epoch: 62 / 100

Running epoch: 63 / 100

Running epoch: 64 / 100

Running epoch: 65 / 100

Running epoch: 66 / 100

Running epoch: 67 / 100

Running epoch: 68 / 100

Running epoch: 69 / 100

Running epoch: 70 / 100

Running epoch: 71 / 100

Running epoch: 72 / 100

Running epoch: 73 / 100

Running epoch: 74 / 100

Running epoch: 75 / 100

Running epoch: 76 / 100

Running epoch: 77 / 100

Running epoch: 78 / 100

Running epoch: 79 / 100

Running epoch: 80 / 100

Running epoch: 81 / 100

Running epoch: 82 / 100

Running epoch: 83 / 100

Running epoch: 84 / 100

Running epoch: 85 / 100

Running epoch: 86 / 100

Running epoch: 87 / 100

Running epoch: 88 / 100

Running epoch: 89 / 100

Running epoch: 90 / 100

Running epoch: 91 / 100

Running epoch: 92 / 100

Running epoch: 93 / 100

Running epoch: 94 / 100

Running epoch: 95 / 100

Running epoch: 96 / 100

Running epoch: 97 / 100

Running epoch: 98 / 100

Running epoch: 99 / 100

Running epoch: 100 / 100

Weights and Bias: [ 0.32103622 -0.01247897]

Score: Final validation Loss: 0.21763994816741186

Target: 2.1 - Predicted: 1.721116600707334

Target: 1.9 - Predicted: 1.592702113625329

Target: 2.3 - Predicted: 1.6569093571663314

Target: 1.8 - Predicted: 1.753220222477835

Target: 2.4 - Predicted: 1.7853238442483361

Target: 2.3 - Predicted: 1.9458419531008422

Target: 2.4 - Predicted: 1.7853238442483361

Target: 2.5 - Predicted: 1.8174274660188374

Target: 2.0 - Predicted: 1.6569093571663314

Target: 2.3 - Predicted: 1.721116600707334

Target: 1.8 - Predicted: 1.5284948700843264

Target: 1.9 - Predicted: 1.62480573539583

Target: 2.3 - Predicted: 1.62480573539583

Target: 2.3 - Predicted: 1.8816347095598398

Target: 1.8 - Predicted: 1.62480573539583

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Combination-3 : Predicting the petal width given petal length, sepal length and sepal width:

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Running epoch: 7 / 100

Running epoch: 8 / 100

Running epoch: 9 / 100

Running epoch: 10 / 100

Running epoch: 11 / 100

Running epoch: 12 / 100

Running epoch: 13 / 100

Running epoch: 14 / 100

Running epoch: 15 / 100

Running epoch: 16 / 100

Running epoch: 17 / 100

Running epoch: 18 / 100

Running epoch: 19 / 100

Running epoch: 20 / 100

Running epoch: 21 / 100

Running epoch: 22 / 100

Running epoch: 23 / 100

Running epoch: 24 / 100

Running epoch: 25 / 100

Running epoch: 26 / 100

Running epoch: 27 / 100

Running epoch: 28 / 100

Running epoch: 29 / 100

Running epoch: 30 / 100

Running epoch: 31 / 100

Running epoch: 32 / 100

Running epoch: 33 / 100

Running epoch: 34 / 100

Running epoch: 35 / 100

Running epoch: 36 / 100

Running epoch: 37 / 100

Weights and Bias: [ 0.06287951 -0.06002773 0.28344304 -0.00786873]

Score: Final validation Loss: 0.19479093275603987

Target: 2.1 - Predicted: 1.7705063500798333

Target: 1.9 - Predicted: 1.6554180643392107

Target: 2.3 - Predicted: 1.7072446129891323

Target: 1.8 - Predicted: 1.7674108972101357

Target: 2.4 - Predicted: 1.8146190547336833

Target: 2.3 - Predicted: 2.0252228586154173

Target: 2.4 - Predicted: 1.7714589312577431

Target: 2.5 - Predicted: 1.8309578128402193

Target: 2.0 - Predicted: 1.6946687103908211

Target: 2.3 - Predicted: 1.708482372706426

Target: 1.8 - Predicted: 1.5498517393907192

Target: 1.9 - Predicted: 1.640317065949968

Target: 2.3 - Predicted: 1.6854734392015902

Target: 2.3 - Predicted: 1.8999371441513093

Target: 1.8 - Predicted: 1.6285966989698062

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Combination-4: Predicting the sepal width given sepal length

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Weights and Bias: [0.43517051 0.08013529]

**Score: Final validation Loss: 0.09548696311710575**

Target: 3.1 - Predicted: 3.08281183353018

Target: 2.5 - Predicted: 2.821709524987294

Target: 3.0 - Predicted: 2.9957777306825513

Target: 3.1 - Predicted: 2.8652265764111085

Target: 3.1 - Predicted: 2.9957777306825513

Target: 3.0 - Predicted: 3.4309482449206947

Target: 3.4 - Predicted: 2.821709524987294

Target: 3.3 - Predicted: 2.9957777306825513

Target: 3.0 - Predicted: 2.9087436278349226

Target: 3.4 - Predicted: 2.7781924735634798

Target: 3.0 - Predicted: 2.691158370715851

Target: 2.7 - Predicted: 2.6041242678682224

Target: 3.1 - Predicted: 3.08281183353018

Target: 3.2 - Predicted: 3.0392947821063654

Target: 3.0 - Predicted: 2.647641319292037

Plots saved

Goodbye!

**Part-3: Traffic Data Dataset**

**Explanation of code:**

This code is implementing a linear regression model to predict the traffic flow at 36 spatial locations 15 minutes into the future. The code first loads the data in a .mat file using the scipy.io.loadmat function. The training and testing input data are loaded as sparse matrices, which are then converted to dense matrices and stored as numpy arrays.

For the training data, a dataframe training\_set\_x is created. The total number of entries in the data is 45396 (36 locations and 1261 entries for each location), and each entry is a 36x48 table. The entries of the dense matrix are then appended to the training\_set\_x dataframe. A column named Target is then added to the dataframe and populated with the output training data. A new dataframe tr\_x is created, and the rows from the training\_set\_x dataframe are extracted and appended to tr\_x. The target values are extracted from training\_set\_x into the dataframe tr\_y. The first column of tr\_x is then dropped, as it contains the target values which have been extracted into tr\_y.

The process for the testing data is similar to the process for the training data. A dataframe testing\_set\_x is created, and the entries of the dense matrix representation of the testing data are appended to the dataframe. A column named Target is then added to the dataframe and populated with the output testing data. A new dataframe te\_x is created, and the rows from the testing\_set\_x dataframe are extracted and appended to te\_x. The target values are extracted from testing\_set\_x into the dataframe te\_y. The first column of te\_x is then dropped, as it contains the target values which have been extracted into te\_y.

Finally, a linear regression model is fit using the training inputs and targets, and the model's predictions are made on the testing inputs. The performance of the model is evaluated using the root mean squared error (RMSE) of the model's predictions on the testing targets. The code also plots the batch validation loss, which is a measure of the model's performance on the validation set after each iteration of training, as a scatter plot.

**A picture containing graphical user interface

Description automatically generated**

**Setting-1: The best setting came out**

* **with learning rate as 0.005**
* **Score method RMSE= 0.047563018151353734**

**The terminal output for the following program is being presented below:**

(base) raviailani@Ravis-Air ml-assignment1 % /usr/local/bin/python3 /Users/raviailani/Documents/ml-assignment1/TrafficData.py

---------------- Prepairing training set -----------------

---------------- Prepairing testing set -----------------

---------------- Initiating model -----------------

Running epoch: 1 / 100

Running epoch: 2 / 100

Running epoch: 3 / 100

Running epoch: 4 / 100

Running epoch: 5 / 100

Running epoch: 6 / 100

Running epoch: 7 / 100

Running epoch: 8 / 100

Running epoch: 9 / 100

Running epoch: 10 / 100

Running epoch: 11 / 100

Running epoch: 12 / 100

Running epoch: 13 / 100

Running epoch: 14 / 100

Running epoch: 15 / 100

Running epoch: 16 / 100

Running epoch: 17 / 100

Running epoch: 18 / 100

Running epoch: 19 / 100

Running epoch: 20 / 100

Running epoch: 21 / 100

Running epoch: 22 / 100

Running epoch: 23 / 100

Running epoch: 24 / 100

Running epoch: 25 / 100

Running epoch: 26 / 100

Running epoch: 27 / 100

Running epoch: 28 / 100

Running epoch: 29 / 100

Running epoch: 30 / 100

Running epoch: 31 / 100

Running epoch: 32 / 100

Running epoch: 33 / 100

Running epoch: 34 / 100

Running epoch: 35 / 100

Running epoch: 36 / 100

Running epoch: 37 / 100

Running epoch: 38 / 100

Running epoch: 39 / 100

Running epoch: 40 / 100

Running epoch: 41 / 100

Running epoch: 42 / 100

Running epoch: 43 / 100

Running epoch: 44 / 100

Running epoch: 45 / 100

Running epoch: 46 / 100

Running epoch: 47 / 100

Running epoch: 48 / 100

Running epoch: 49 / 100

Running epoch: 50 / 100

Running epoch: 51 / 100

Running epoch: 52 / 100

Running epoch: 53 / 100

Running epoch: 54 / 100

Running epoch: 55 / 100

Running epoch: 56 / 100

Running epoch: 57 / 100

Running epoch: 58 / 100

Running epoch: 59 / 100

Running epoch: 60 / 100

Running epoch: 61 / 100

Running epoch: 62 / 100

Running epoch: 63 / 100

Running epoch: 64 / 100

Running epoch: 65 / 100

Running epoch: 66 / 100

Running epoch: 67 / 100

Running epoch: 68 / 100

Running epoch: 69 / 100

Running epoch: 70 / 100

Running epoch: 71 / 100

Running epoch: 72 / 100

Running epoch: 73 / 100

Running epoch: 74 / 100

Running epoch: 75 / 100

Running epoch: 76 / 100

Running epoch: 77 / 100

Running epoch: 78 / 100

Running epoch: 79 / 100

Running epoch: 80 / 100

Running epoch: 81 / 100

Running epoch: 82 / 100

Running epoch: 83 / 100

Running epoch: 84 / 100

Running epoch: 85 / 100

Running epoch: 86 / 100

Running epoch: 87 / 100

Running epoch: 88 / 100

Running epoch: 89 / 100

Running epoch: 90 / 100

Running epoch: 91 / 100

Running epoch: 92 / 100

Running epoch: 93 / 100

Running epoch: 94 / 100

Running epoch: 95 / 100

Running epoch: 96 / 100

Running epoch: 97 / 100

Running epoch: 98 / 100

Running epoch: 99 / 100

Running epoch: 100 / 100

Weights and Bias: [-3.67559014e-02 -5.44292918e-02 -3.36541174e-02 -1.00266360e-02

-1.12546933e-02 2.74534942e-02 1.13850344e-01 2.05665806e-01

3.06822247e-01 4.30009212e-01 9.62336997e-05 0.00000000e+00

0.00000000e+00 0.00000000e+00 0.00000000e+00 -1.80923409e-02

-5.00621114e-03 9.86932311e-03 1.88991443e-03 -3.96145263e-03

3.98686483e-03 2.77152795e-02 2.84583473e-02 -4.30600249e-03

3.73860406e-03 -6.65574974e-04 3.62397480e-03 -4.45808493e-03

-9.39750770e-03 -4.85866568e-03 -1.10841050e-02 -1.73561289e-02

0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00

0.00000000e+00 0.00000000e+00 0.00000000e+00 6.67793886e-03

5.11375022e-04 1.67083405e-03 -7.44001344e-04 -1.34197403e-03

2.14224212e-03 -7.04034389e-04 -2.20393439e-03 8.61960356e-04

9.62336997e-05]

Score: Final validation Loss: 0.002262240695666005

Score method RMSE= 0.047563018151353734

Plots saved

Goodbye!