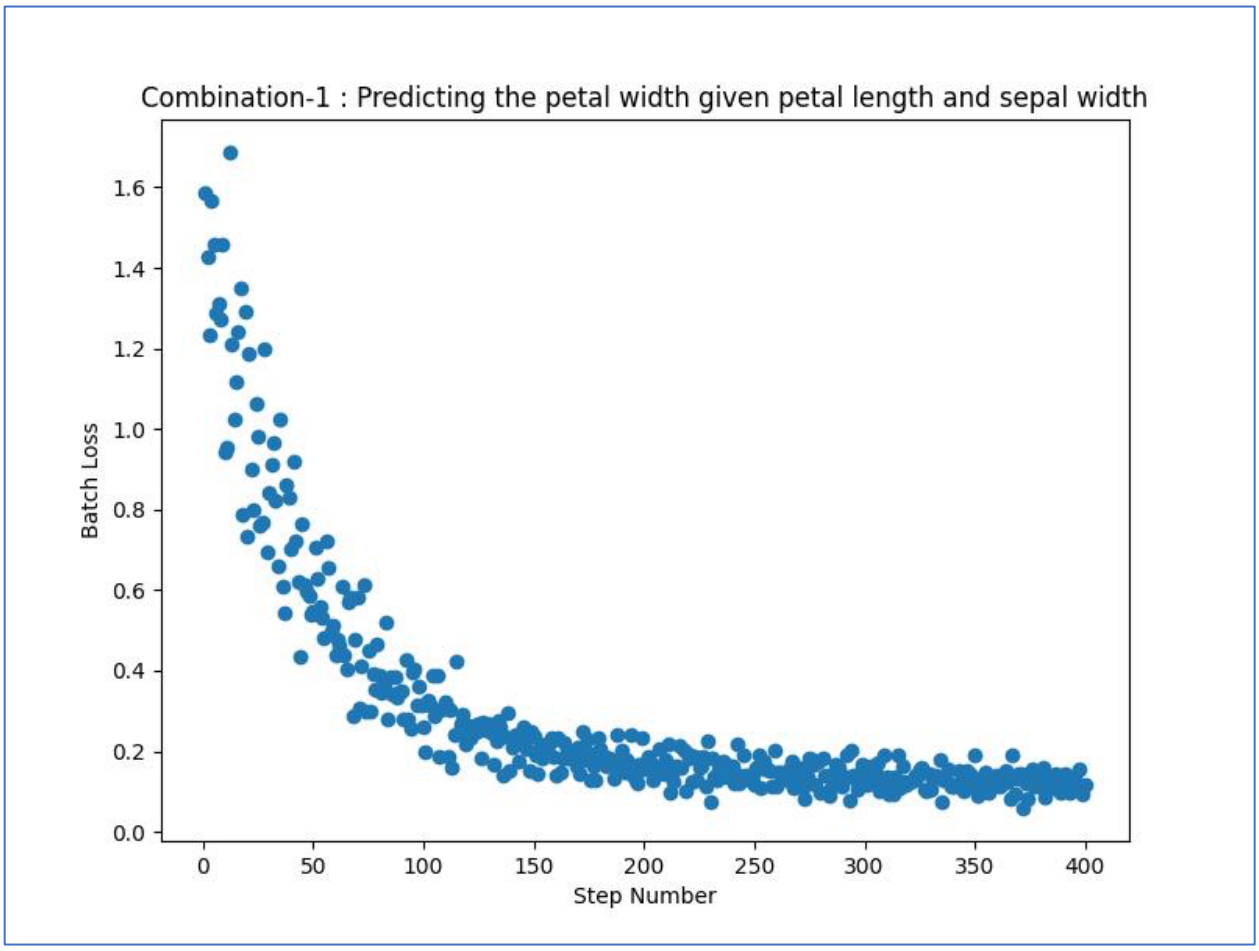
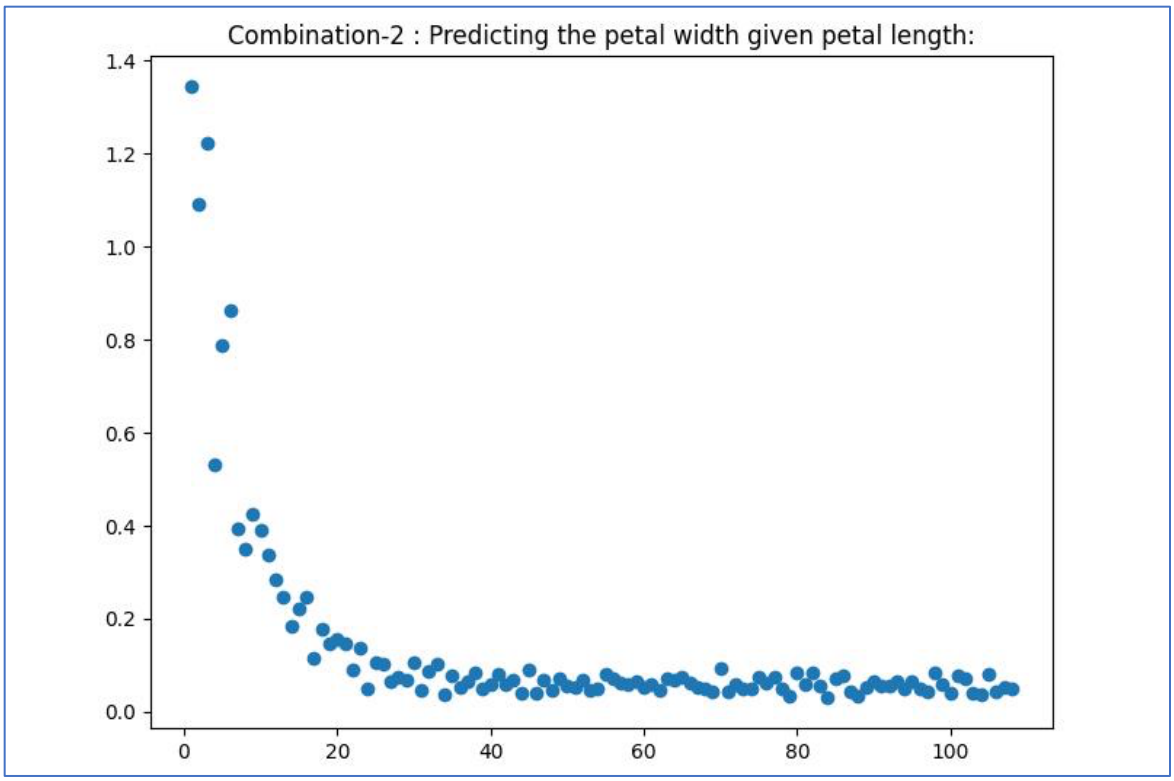
REPORT

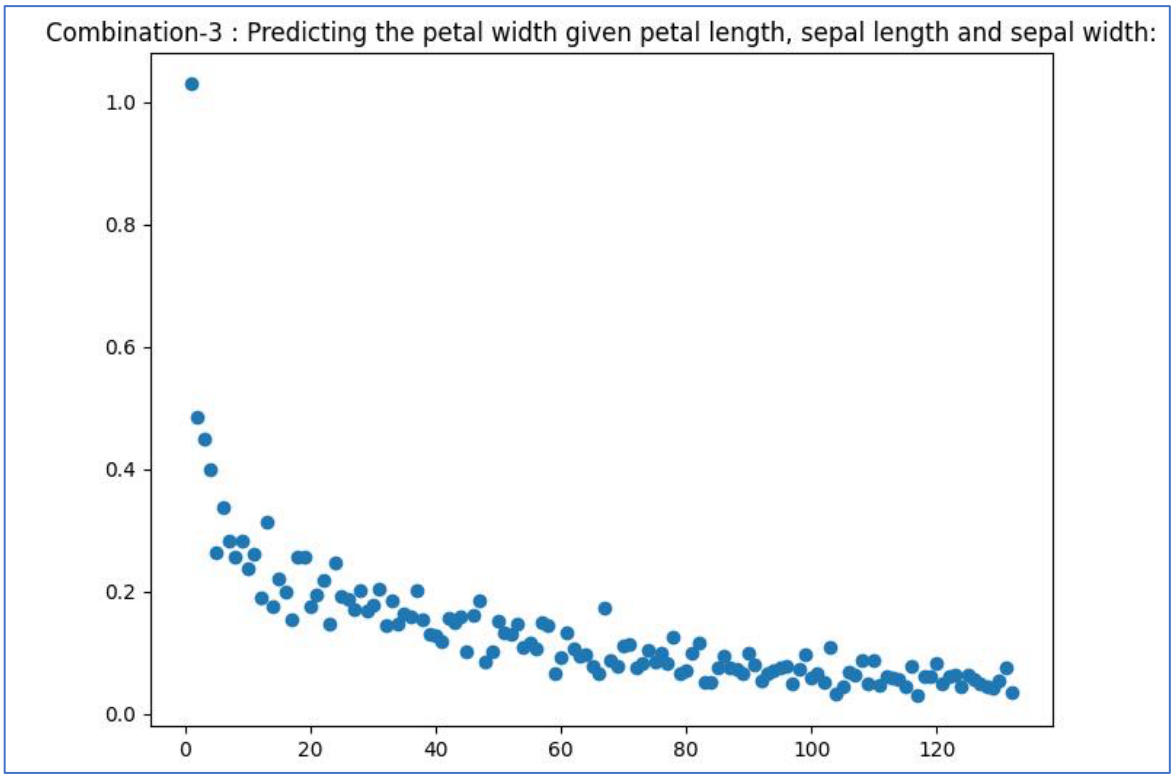
Part-2: Iris Flower Dataset:

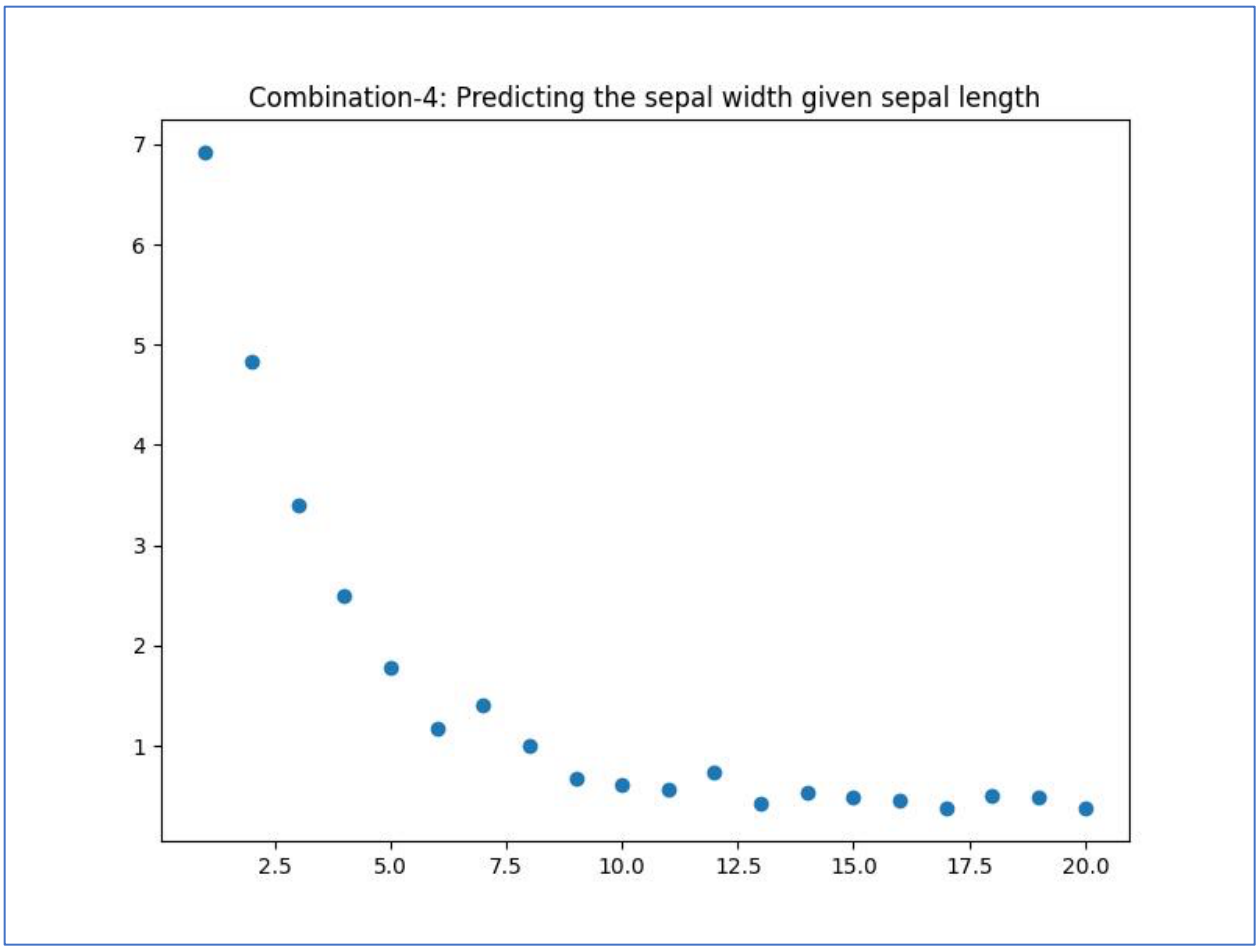
The following images have been generated from training the iris flower dataset with respect to different combinations with hyperparameters as

1. learning_rate = 0.005
2. batch_size=32,
3. regularization=0,
4. max_epochs=100,
5. patience=3




Combination-2 : Predicting the petal width given petal length:
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
100


Combination-3 : Predicting the petal width given petal length, sepal length and sepal width:
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
100
120



The output generated at terminal is given below:

(base) raviailani@Ravis-MacBook-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
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Running epoch: 53 / 100

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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: [0.07478836 0.24165554 0.03045577]

Score: Final validation Loss: 0.3735619742446773

Target: 2.5 - Predicted: 1.6546939360028603
Target: 2.0 - Predicted: 1.511429658416494
Target: 2.4 - Predicted: 1.6155707101160628
Target: 1.8 - Predicted: 1.4872641044861592
Target: 1.8 - Predicted: 1.414767442695156
Target: 2.3 - Predicted: 1.6955462078852979
Target: 1.9 - Predicted: 1.4648275965514648
Target: 1.9 - Predicted: 1.4257043706646675
Target: 2.3 - Predicted: 1.511429658416494
Target: 2.3 - Predicted: 1.5896761101900887
Target: 2.3 - Predicted: 1.7289196437895034
Target: 2.3 - Predicted: 1.4947429404643908
Target: 2.4 - Predicted: 1.6380072180507572
Target: 1.8 - Predicted: 1.5914051561857285
Target: 2.1 - Predicted: 1.5672396022553943

##

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

Weights and Bias: [0.31252668 0.035202]

Score: Final validation Loss: 0.2162850733576405

Target: 2.5 - Predicted: 1.8166040933401921
Target: 2.0 - Predicted: 1.6603407518481137
Target: 2.4 - Predicted: 1.7853514250417764
Target: 1.8 - Predicted: 1.6290880835496977
Target: 1.8 - Predicted: 1.5353300786544506
Target: 2.3 - Predicted: 1.8791094299370237
Target: 1.9 - Predicted: 1.6290880835496977
Target: 1.9 - Predicted: 1.5978354152512821
Target: 2.3 - Predicted: 1.6603407518481137
Target: 2.3 - Predicted: 1.722846088444945
Target: 2.3 - Predicted: 1.941614766533855
Target: 2.3 - Predicted: 1.6290880835496977
Target: 2.4 - Predicted: 1.7853514250417764
Target: 1.8 - Predicted: 1.7540987567433608
Target: 2.1 - Predicted: 1.722846088444945

##

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

Weights and Bias: [0.05663171 -0.0660929   0.28284874 -0.00946392]

Score: Final validation Loss: 0.2503277000848165

Target: 2.5 - Predicted: 1.7640998097870741
Target: 2.0 - Predicted: 1.6311769667751421
Target: 2.4 - Predicted: 1.7490335153559453
Target: 1.8 - Predicted: 1.5689130651607812
Target: 1.8 - Predicted: 1.4897216146027226
Target: 2.3 - Predicted: 1.8329420187131835
Target: 1.9 - Predicted: 1.5830777631540378
Target: 1.9 - Predicted: 1.596327325113705
Target: 2.3 - Predicted: 1.6425033093314603

Target: 2.3 - Predicted: 1.644320041802922
Target: 2.3 - Predicted: 1.9536988876217047
Target: 2.3 - Predicted: 1.618935488185234
Target: 2.4 - Predicted: 1.706552960971893
Target: 1.8 - Predicted: 1.703759127576062
Target: 2.1 - Predicted: 1.7037901100214519

##

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

Weights and Bias: [0.39893595 0.07165142]

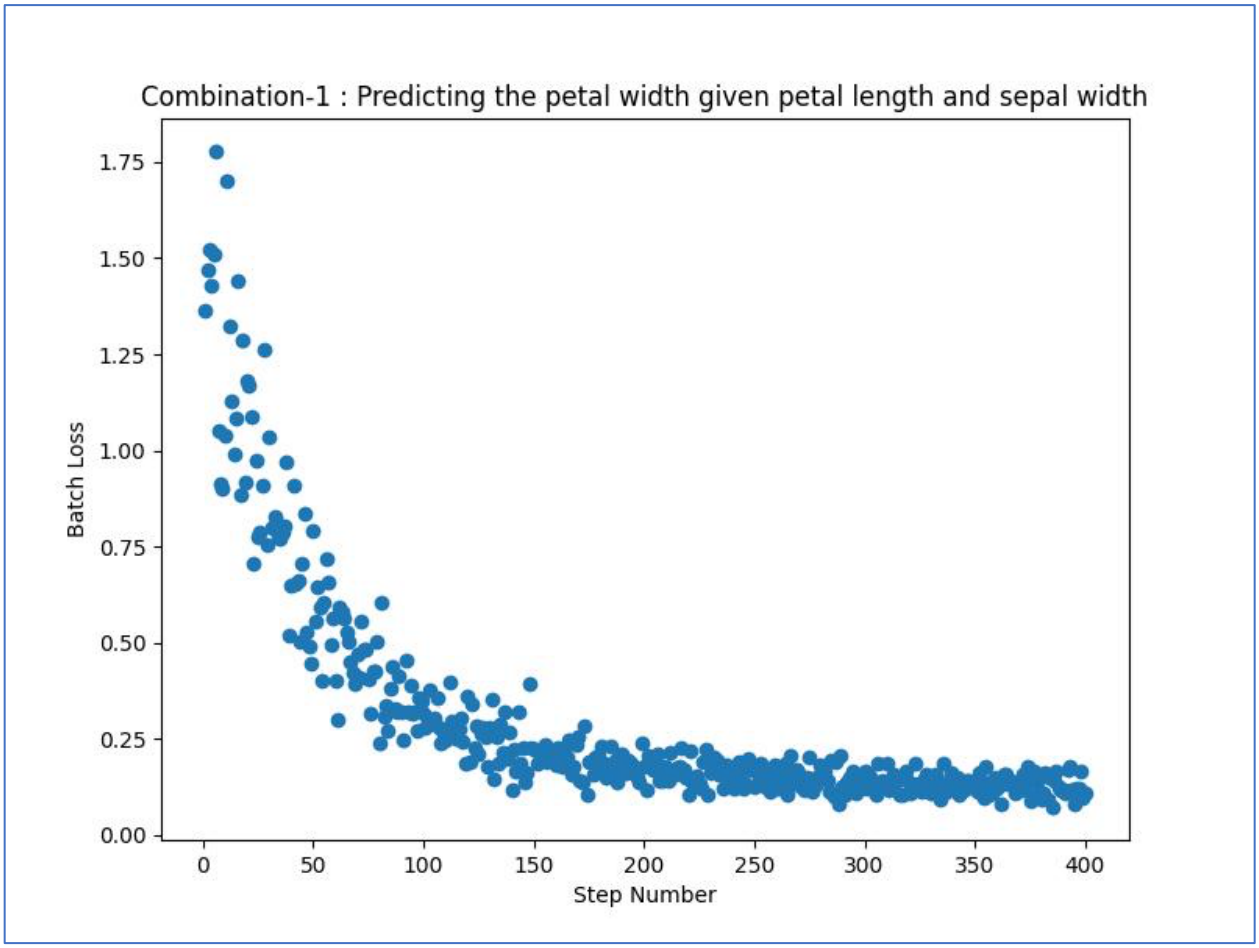
Score: Final validation Loss: 0.22007893437274745

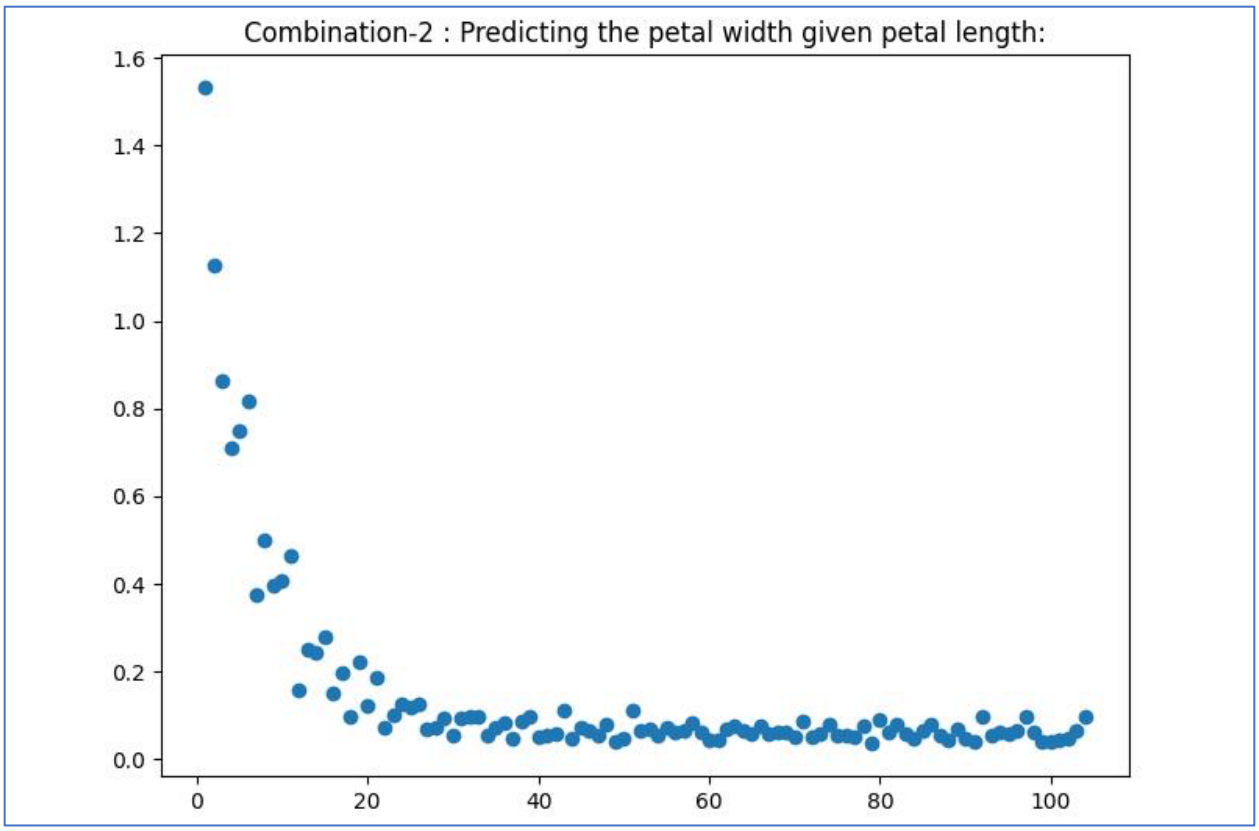
Target: 3.3 - Predicted: 2.7445222641734492
Target: 3.0 - Predicted: 2.664735074707591
Target: 3.1 - Predicted: 2.7445222641734492
Target: 3.0 - Predicted: 2.4253735063100157
Target: 3.0 - Predicted: 2.465267101042945
Target: 3.2 - Predicted: 2.7844158589063785
Target: 2.7 - Predicted: 2.3854799115770864
Target: 2.5 - Predicted: 2.5849478852417325
Target: 3.0 - Predicted: 2.7445222641734492
Target: 3.4 - Predicted: 2.545054290508803
Target: 3.0 - Predicted: 3.143458211502742
Target: 3.1 - Predicted: 2.824309453639308
Target: 3.4 - Predicted: 2.5849478852417325
Target: 3.1 - Predicted: 2.6248414799746618
Target: 3.1 - Predicted: 2.824309453639308

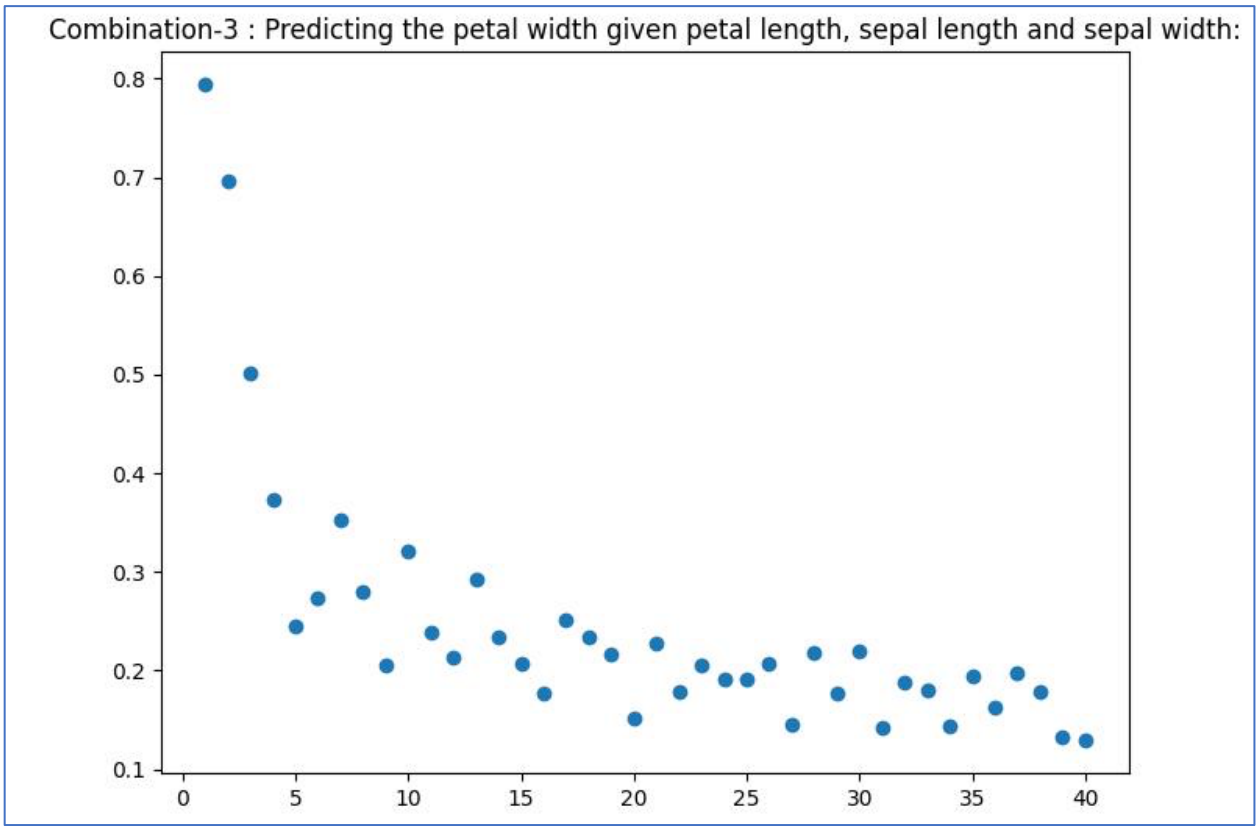
Plots saved
Goodbye!

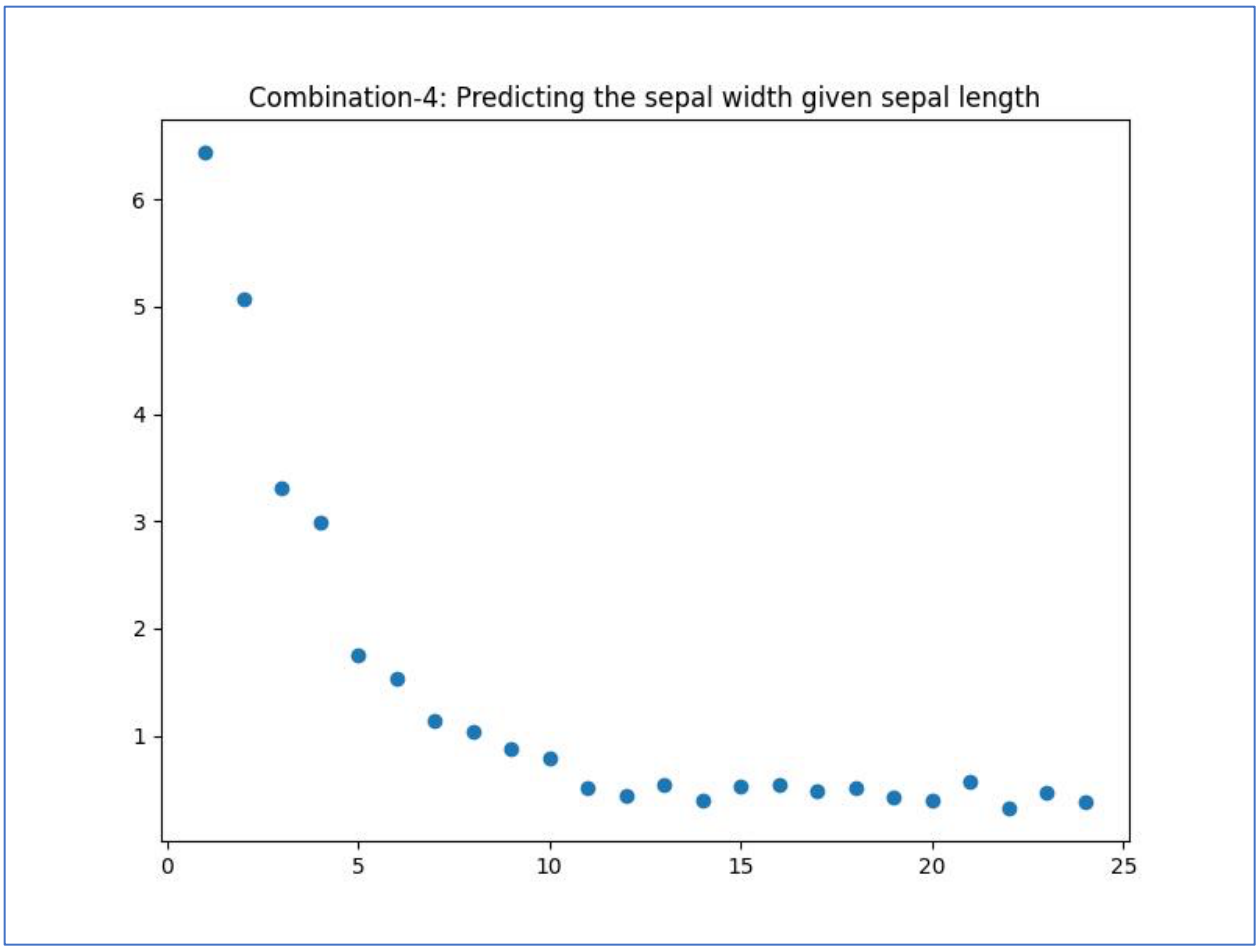
After adding regularization, the changed parameters are:

1. learning_rate = 0.005
2. batch_size=32,
3. regularization=0.60,
4. max_epochs=100,
5. patience=3




Combination-2 : Predicting the petal width given petal length:
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
100


Combination-3 : Predicting the petal width given petal length, sepal length and sepal width:
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
5
10
15
20
25
30
35
40



The terminal output for the program has been recorded as:
(base) raviailani@Ravis-MacBook-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
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Running epoch: 89 / 100
Running epoch: 90 / 100
Running epoch: 91 / 100
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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: [0.07506664 0.23410912 0.03024506]

Score: Final validation Loss: 0.42187262349218574

Target: 1.8 - Predicted: 1.4494015191953518
Target: 2.3 - Predicted: 1.549660913435591
Target: 2.4 - Predicted: 1.5739627455226435
Target: 2.5 - Predicted: 1.6123869864348535
Target: 2.1 - Predicted: 1.5271409206910052
Target: 1.8 - Predicted: 1.3791687819478942
Target: 2.3 - Predicted: 1.4728124316111713
Target: 1.9 - Predicted: 1.426881526450766
Target: 1.9 - Predicted: 1.3884572855385562
Target: 2.3 - Predicted: 1.4569081834435471
Target: 2.0 - Predicted: 1.4728124316111713
Target: 2.3 - Predicted: 1.6835106433535445
Target: 1.8 - Predicted: 1.5505518331068242
Target: 2.3 - Predicted: 1.6517021470182967
Target: 2.4 - Predicted: 1.5964827382672293

##

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

Weights and Bias: [0.2993247 0.03830393]

Score: Final validation Loss: 0.27885153137498564

Target: 1.8 - Predicted: 1.5648599117013149
Target: 2.3 - Predicted: 1.6546573223660688
Target: 2.4 - Predicted: 1.7145222628092378
Target: 2.5 - Predicted: 1.7444547330308227
Target: 2.1 - Predicted: 1.6546573223660688
Target: 1.8 - Predicted: 1.4750625010365612
Target: 2.3 - Predicted: 1.5947923819228995
Target: 1.9 - Predicted: 1.5648599117013149
Target: 1.9 - Predicted: 1.5349274414797303
Target: 2.3 - Predicted: 1.5648599117013149
Target: 2.0 - Predicted: 1.5947923819228995
Target: 2.3 - Predicted: 1.8641846139171607
Target: 1.8 - Predicted: 1.6845897925876534
Target: 2.3 - Predicted: 1.804319673473992
Target: 2.4 - Predicted: 1.7145222628092378

##

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

Weights and Bias: [0.06003676 -0.05492336 0.26151574 -0.00693185]

Score: Final validation Loss: 0.3049011326540209

Target: 1.8 - Predicted: 1.5162452258722405
Target: 2.3 - Predicted: 1.5907416328283557
Target: 2.4 - Predicted: 1.6895401675178403
Target: 2.5 - Predicted: 1.704707070018578
Target: 2.1 - Predicted: 1.6492443721913213
Target: 1.8 - Predicted: 1.4437941807367718
Target: 2.3 - Predicted: 1.5904262081911054
Target: 1.9 - Predicted: 1.526718556652446
Target: 1.9 - Predicted: 1.5415700345159338
Target: 2.3 - Predicted: 1.5707896509830073

Target: 2.0 - Predicted: 1.5784188560454153
Target: 2.3 - Predicted: 1.885827132544497
Target: 1.8 - Predicted: 1.6453775655632008
Target: 2.3 - Predicted: 1.7685062291813158
Target: 2.4 - Predicted: 1.6490484563734098

##

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: [0.45330917 0.08237896]

Score: Final validation Loss: 0.07840654194650526

Target: 3.0 - Predicted: 2.7569030772469114
Target: 3.4 - Predicted: 2.89289582887432
Target: 3.1 - Predicted: 3.1195504149200017
Target: 3.3 - Predicted: 3.1195504149200017
Target: 3.1 - Predicted: 3.2102122493382743
Target: 3.0 - Predicted: 2.8022339944560475
Target: 3.0 - Predicted: 3.1195504149200017
Target: 2.7 - Predicted: 2.711572160037775
Target: 2.5 - Predicted: 2.938226746083456
Target: 3.1 - Predicted: 3.2102122493382743
Target: 3.0 - Predicted: 3.028888580501729
Target: 3.0 - Predicted: 3.572859587011365
Target: 3.1 - Predicted: 2.983557663292593
Target: 3.2 - Predicted: 3.164881332129138
Target: 3.4 - Predicted: 2.938226746083456

Plots saved
Goodbye!

(base) raviailani@Ravis-MacBook-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
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Running epoch: 52 / 100
Running epoch: 53 / 100
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Running epoch: 55 / 100
Running epoch: 56 / 100
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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
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Running epoch: 77 / 100
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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
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Running epoch: 87 / 100
Running epoch: 88 / 100
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Running epoch: 90 / 100
Running epoch: 91 / 100
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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: [0.0751033 0.23411572 0.03024369]

Score: Final validation Loss: 0.4216892627624432

Target: 1.9 - Predicted: 1.3885805530061037
Target: 1.9 - Predicted: 1.4270127849135492
Target: 2.1 - Predicted: 1.5272888210367874
Target: 2.5 - Predicted: 1.6125441975609276
Target: 2.3 - Predicted: 1.6836594973956702
Target: 2.3 - Predicted: 1.5498198104354344
Target: 1.8 - Predicted: 1.3793090573871538
Target: 2.0 - Predicted: 1.4729553466205436
Target: 1.8 - Predicted: 1.5507003933451349
Target: 2.4 - Predicted: 1.574111965653482
Target: 2.3 - Predicted: 1.457054104111745
Target: 2.3 - Predicted: 1.4729553466205436
Target: 2.3 - Predicted: 1.6518570123780736
Target: 2.4 - Predicted: 1.596642955052129
Target: 1.8 - Predicted: 1.4495437743121962

##

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

Weights and Bias: [0.2997148 0.03843666]

Score: Final validation Loss: 0.27665035107856106

Target: 1.9 - Predicted: 1.5370106595317474
Target: 1.9 - Predicted: 1.5669821395558399
Target: 2.1 - Predicted: 1.6568965796281179
Target: 2.5 - Predicted: 1.7468110197003954
Target: 2.3 - Predicted: 1.8666969397967654
Target: 2.3 - Predicted: 1.6568965796281179
Target: 1.8 - Predicted: 1.4770676994835623
Target: 2.0 - Predicted: 1.5969536195799328
Target: 1.8 - Predicted: 1.6868680596522103
Target: 2.4 - Predicted: 1.7168395396763028
Target: 2.3 - Predicted: 1.5669821395558399

Target: 2.3 - Predicted: 1.5969536195799328
Target: 2.3 - Predicted: 1.8067539797485805
Target: 2.4 - Predicted: 1.7168395396763028
Target: 1.8 - Predicted: 1.5669821395558399

##

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

Weights and Bias: [0.0966611 0.01698135 0.14235166 0.01032339]

Score: Final validation Loss: 0.5021083416816673

Target: 1.9 - Predicted: 1.3734999908519794
Target: 1.9 - Predicted: 1.342800877880076
Target: 2.1 - Predicted: 1.4986261240014074
Target: 2.5 - Predicted: 1.5253956729083689
Target: 2.3 - Predicted: 1.6739030311755225
Target: 2.3 - Predicted: 1.4360577600880284
Target: 1.8 - Predicted: 1.324522003466196
Target: 2.0 - Predicted: 1.4297932174226078
Target: 1.8 - Predicted: 1.4645307412322712
Target: 2.4 - Predicted: 1.507764236873681
Target: 2.3 - Predicted: 1.455920625289042
Target: 2.3 - Predicted: 1.4491254370252442
Target: 2.3 - Predicted: 1.5618339802859809
Target: 2.4 - Predicted: 1.4741942023642567
Target: 1.8 - Predicted: 1.3575613923772432

##

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: [0.45330883 0.08243663]

Score: Final validation Loss: 0.07840404685033864

Target: 2.5 - Predicted: 2.9382822833735784
Target: 2.7 - Predicted: 2.7116278667507383
Target: 3.1 - Predicted: 3.2102675833209866
Target: 3.3 - Predicted: 3.1196058166718506
Target: 3.0 - Predicted: 3.5729146499175304
Target: 3.4 - Predicted: 2.8929514000490104
Target: 3.0 - Predicted: 2.8022896333998744
Target: 3.0 - Predicted: 3.0289440500227145
Target: 3.1 - Predicted: 2.9836131666981465
Target: 3.1 - Predicted: 3.1196058166718506
Target: 3.1 - Predicted: 3.2102675833209866
Target: 3.0 - Predicted: 3.1196058166718506
Target: 3.2 - Predicted: 3.164936699996418
Target: 3.4 - Predicted: 2.9382822833735784
Target: 3.0 - Predicted: 2.7569587500753063

Plots saved
Goodbye!

Thus, with regularization added, the most predictive model came out to be

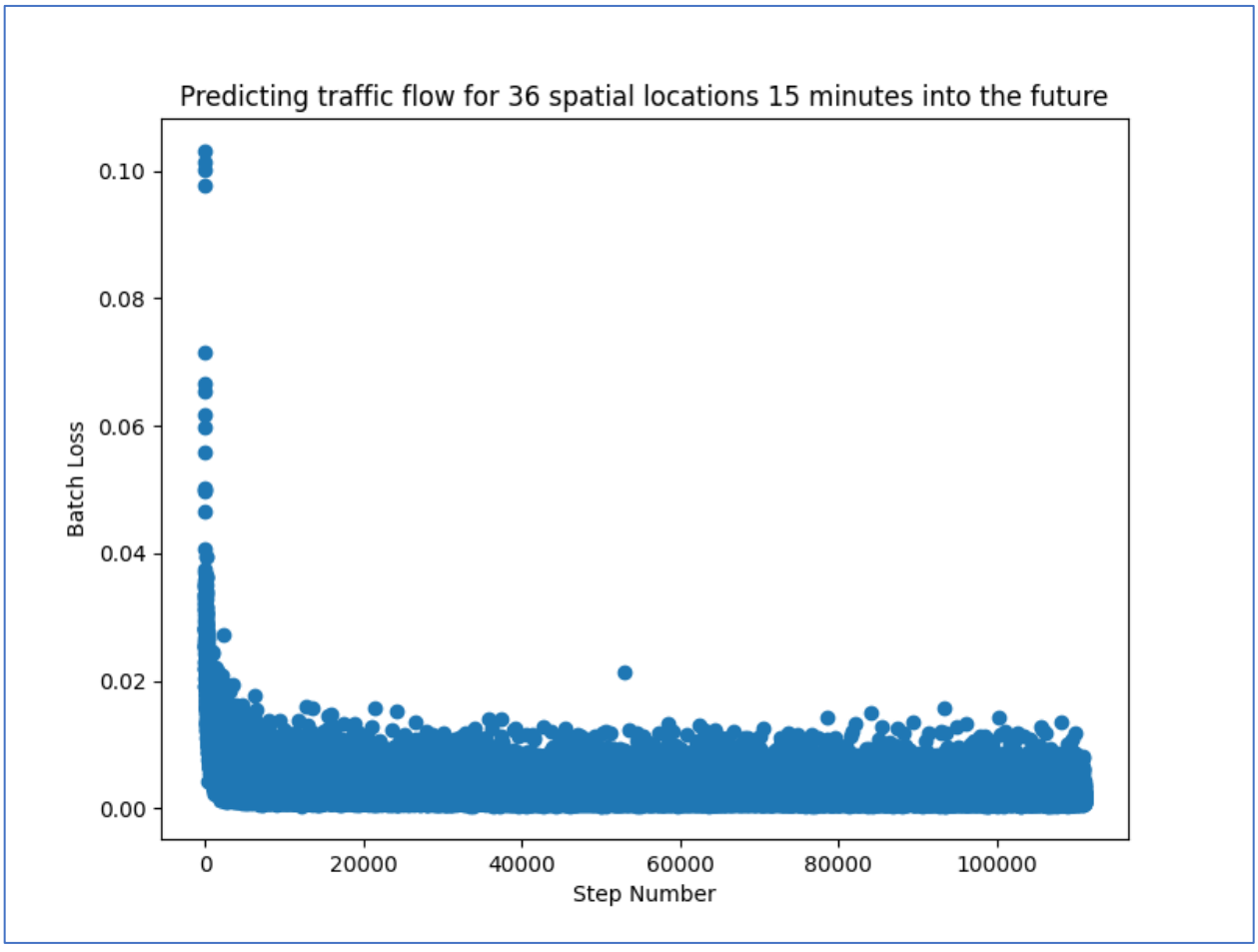
- Combination-4: **Predicting the sepal width given sepal length**
- With **Final validation Loss: 0.07840404685033864**

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.

Next, the code prepares the training and testing data for modeling by creating pandas dataframes with the training and testing inputs and targets. The location names are added as a column in both the training and testing dataframes, and the final training and testing inputs and targets are obtained by removing the location names and target columns.

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.



Setting-1: The best setting came out

- **with learning rate as 0.005**
- **Score method RMSE = 0.04650748762711367**

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

```
(base) raviailani@Ravis-MacBook-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
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Running epoch: 57 / 100
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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: [4.25898376e-03 -1.64734749e-02 -1.99546671e-02 -2.00252921e-02
-4.86481322e-02 -4.74083482e-02 2.86266863e-02 1.53660684e-01
3.02623319e-01 5.74369248e-01 -2.13893855e-03 6.50591203e-05
8.66175778e-04 1.91154107e-03 2.78158639e-03 -1.47286894e-02
2.33023377e-02 8.32504772e-02 2.38513241e-02 1.84177106e-02
7.24991677e-03 -4.02141110e-03 5.46768644e-04 1.17835662e-02
1.21258517e-02 1.86569159e-02 3.46937043e-02 7.17219928e-03
1.18915028e-02 8.70190216e-03 -5.40034686e-03 -1.89002210e-02
-3.30742468e-02 -1.60202745e-02 -2.35246271e-02 -4.49744621e-02
-4.47080991e-02 -3.14241798e-02 -2.13821957e-02 5.58719841e-03
-2.85482686e-04 5.35831798e-03 -6.90082238e-04 -8.97329245e-04
3.99155146e-03 3.91201596e-04 -3.68877837e-03 2.79144912e-03
3.48542381e-03]

Score: Final validation Loss: 0.0021629464053861307

Score method RMSE= 0.04650748762711367

Setting-2:
Learning_rate= 0.0001
Regularization = 0
Output = Score method RMSE= 0.07477962889294897

Setting-3:
Learning_rate= 0.0001
Regularization = 0.05
Output = Score method RMSE= 0.0840226919704098

Setting-4:
Learning_rate= 0.01
Regularization = 0.5
Output = Score method RMSE= 0.13324944422208923