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Assignment Number: Assignment 1 Part 1 Regression

Module Code: ECS708U/ECS708P

Report for Assignment 1 Part 1 Regression

Q5. What conclusion if any can be drawn from the weight values? How does gender and BMI affect blood sugar levels?

AGE	SEX	BMI	BP	S1	S2	S3	S4	S5	S6
25	F	18	79	130	64.8	61	2	4.1897	68
50	M	28	103	229	162.2	60	4.5	6.107	124

Weights : ([[1.9400, -11.4488, 26.3048, 16.6306, -9.8810, -2.3180, -7.6995,

8.2121, 21.9769, 2.6065, 153.7365]])

Weight values determine the unit of slope,i.e the larger the weight the more influence it has on the predictions. Weight determines how much of an influence the input will have on the output.

Looking at the weight vector we can see that the weight values for BMI are larger, which means that the influence of BMI is more on the predicted results. A person with higher BMI is more likely to have higher sugar levels.

Whereas the Gender on the other hand has the lowest weight values which means that it has the least influence of all the other features on the sugar values.

What are the estimated blood sugar levels for the below examples? [2 marks]

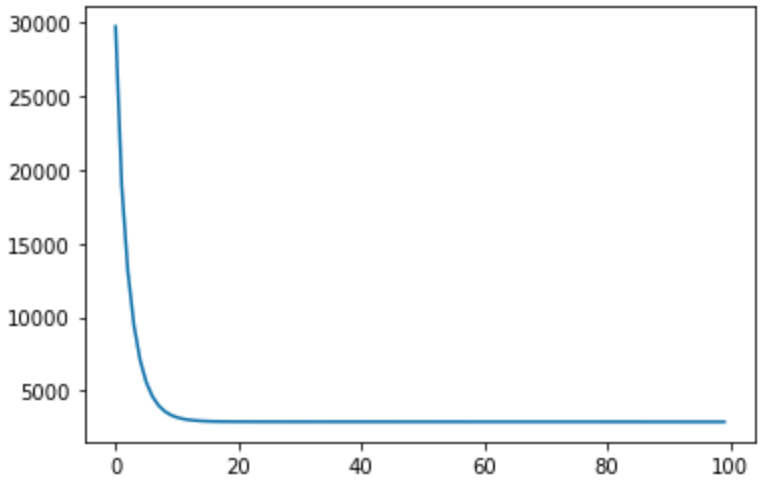
Estimated Blood Sugar Levels are: tensor([[93.9010],   [213.5721]])

Q6. Try the code with a number of learning rates that differ by orders of magnitude and record the error of the training and test sets. What do you observe on the training error? What about the error on the test set? [3 marks]

The Learning rate determines how much the model should change in response to the estimated error every time when the weights of the model are updated. Learning rate has an impact on how fast an algorithm learns and whether the error is minimized. For an optimal value of the learning rate, the error value is minimized in a few iterations. If the learning rate is not optimal, the number of iterations required to minimize the error value is high.

Observations

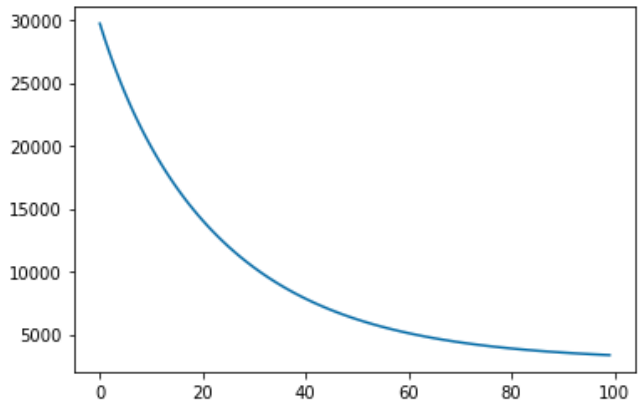
When learning rate is 0.1




```
Minimum cost for the selected alpha is 0.1: 2890.406494140625
Minimum Train Error for 0.1 learning rate are : 2890.406494140625
Test Error for 0.1 learning rate are : 2929.982421875
```

When the learning rate is 0.1, after about 15 minimizations the gradient descent starts to converge.

When learning rate is 0.01

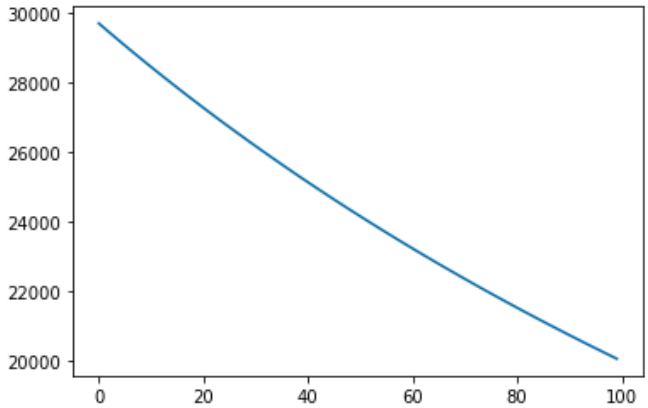



```
Minimum cost for the selected alpha is 0.1: 3356.77783203125
Minimum Train Error for 0.01 learning rate are : 3356.77783203125
Test Error for 0.01 learning rate are : 3005.350830078125
```

When learning rate is 0.01, after about 80 minimization the curve starts to converge but the error is high

at 3356.777

When learning rate is 0.001




```
Minimum cost for the selected alpha is 0.1: 20040.5859375
Minimum Train Error for 0.001 learning rate are : 20040.5859375
Test Error for 0.001 learning rate are : 17473.318359375
```

When the learning rate is 0.001, after even 100 iteration the curve does not converge and train error is increased to 20040.585