REPORT ON PROGRAMMING ASSIGNMENT MODULE 2

This is a report to write a computer program to implement linear regression with gradient descent using Python

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This report is based on the task given to work on the attached file "M2_Assign_Updated2022".

Linear Regression:

The supervised learning method known as linear regression is both a statistical and a machine learning technique. Based on the supplied input value x, it is used to forecast the real-valued output y. It shows how the dependent variable y and the independent variables xi are related (or features). H stands for the hypothetical function utilized for prediction (x).
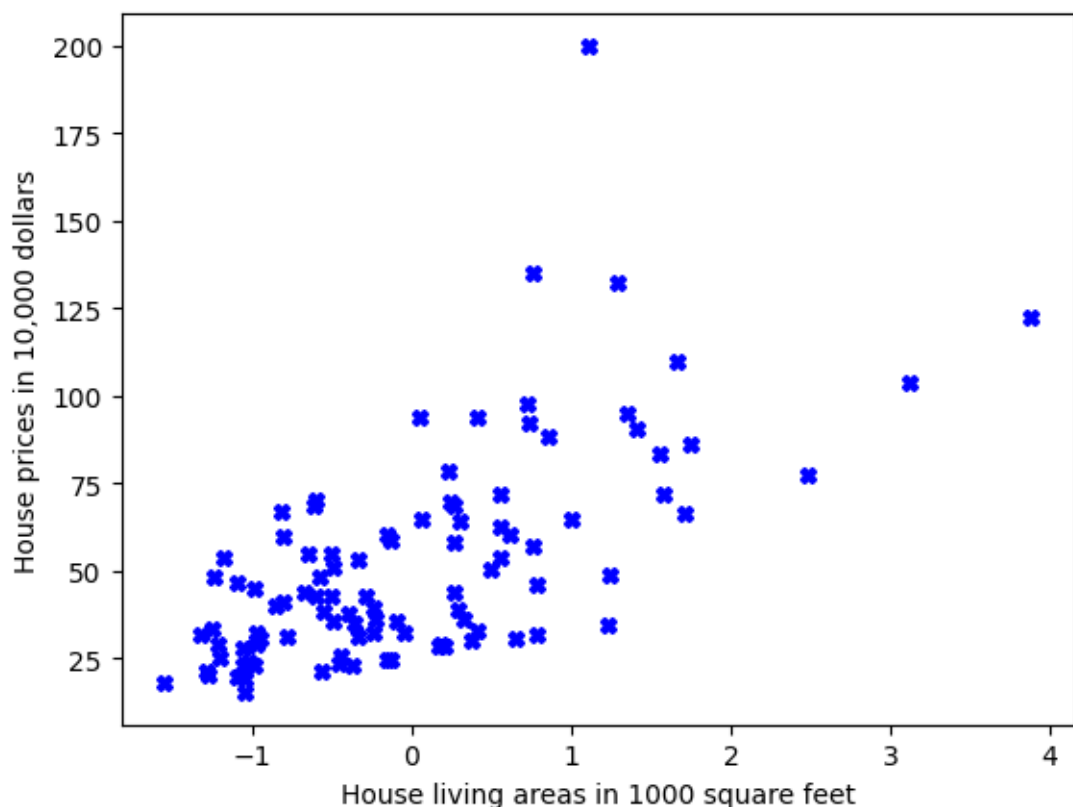
h(x) = w * x + b

here, b is the bias.

x represents the feature vector

w represents the weight vector.
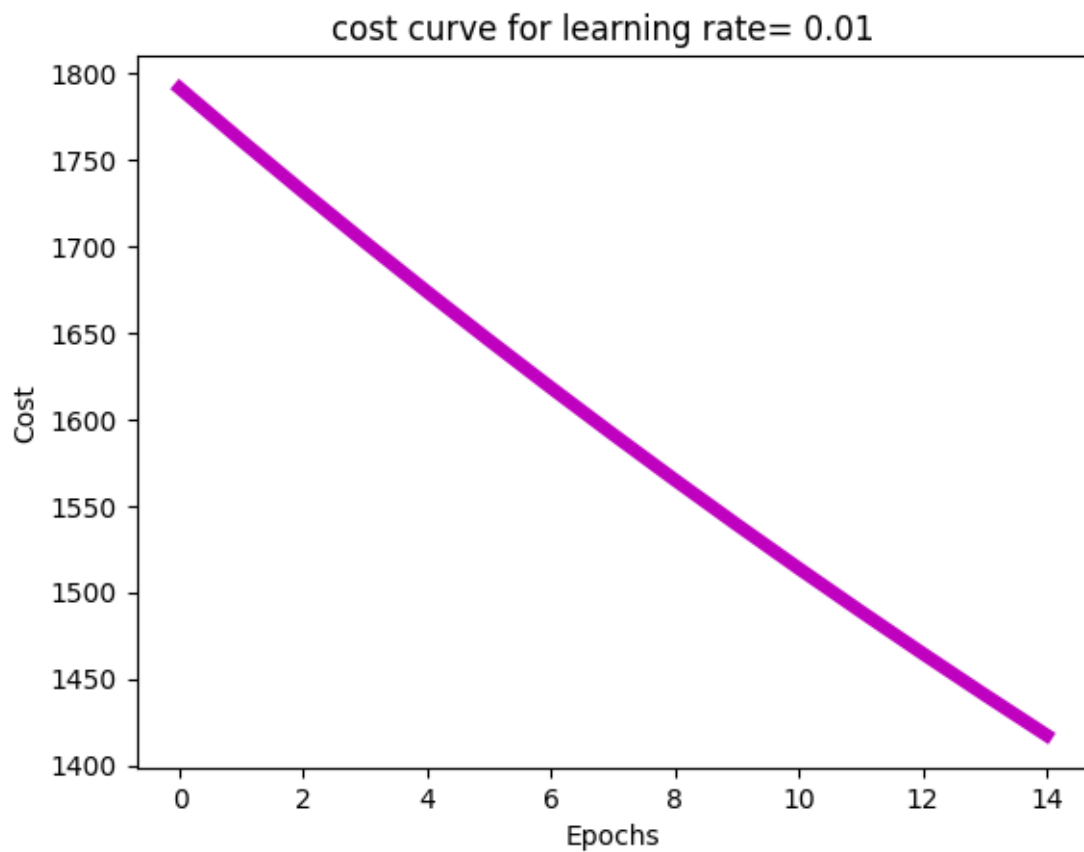
Results:

Linear Regression Programming Assignment A

final theta: [[7.30707916]

 [2.74320932]]

loss J_theta :1417.4566869539947

final Cost J_theta: [[1417.45668695]]

 theta: [[7.30707916]

cost curve for learning rate= 0.01

 [2.74320932]]

Predicted y value for x= 3.5 : 16.908311780899226

Predicted y value for x=7 : 26.509544398681825

loss function value Jtheta for (0,0):

loss J_theta :1822.3117130164142

loss function value Jtheta for (-1,20):

loss J_theta :1682.9764402331787

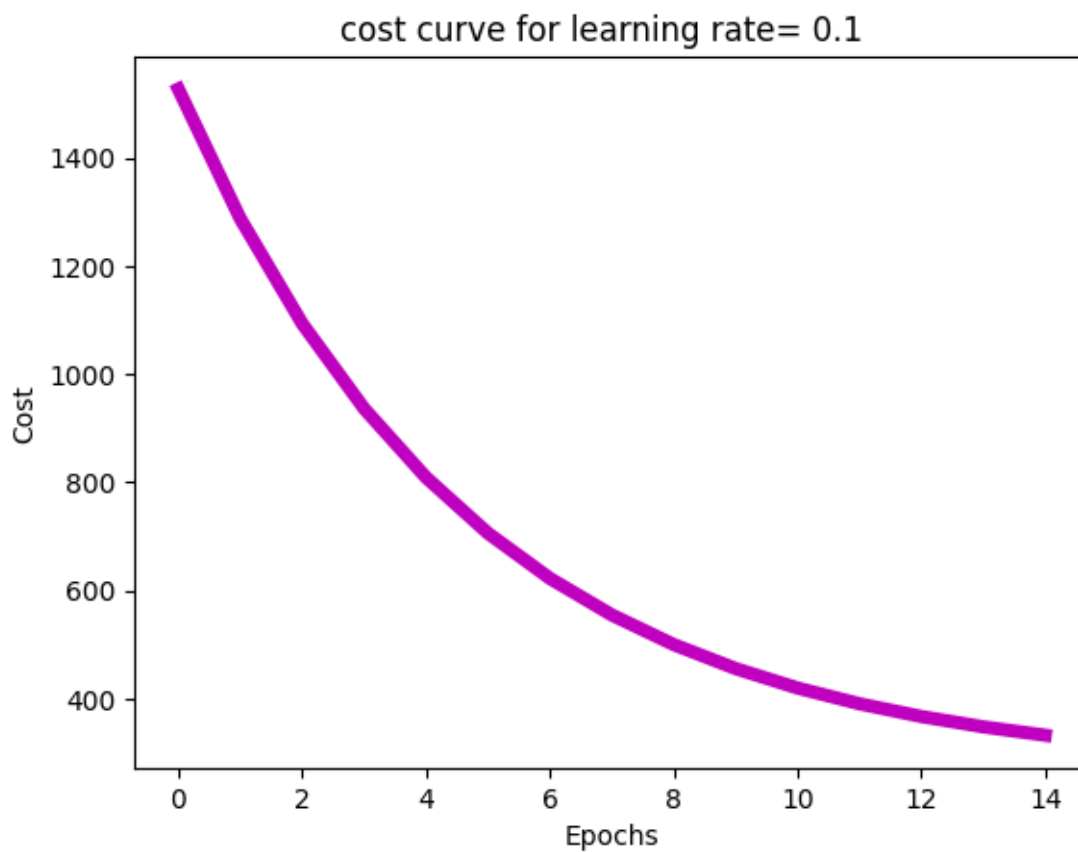## computing for lr : 0.1 ##

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final theta: [[41.46454293]

 [15.56653733]]

loss J_theta :332.90215211681607

final Cost J_theta: [[332.90215212]]

 theta: [[41.46454293]

[15.56653733]]

cost curve for learning rate= 0.1

Predicted y value for x= 3.5 : 95.94742360005236

Predicted y value for x=7 : 150.43030426834545

loss function value Jtheta for (0,0):

loss J_theta :1822.3117130164142

loss function value Jtheta for (-1,20):

loss J_theta :1682.9764402331787

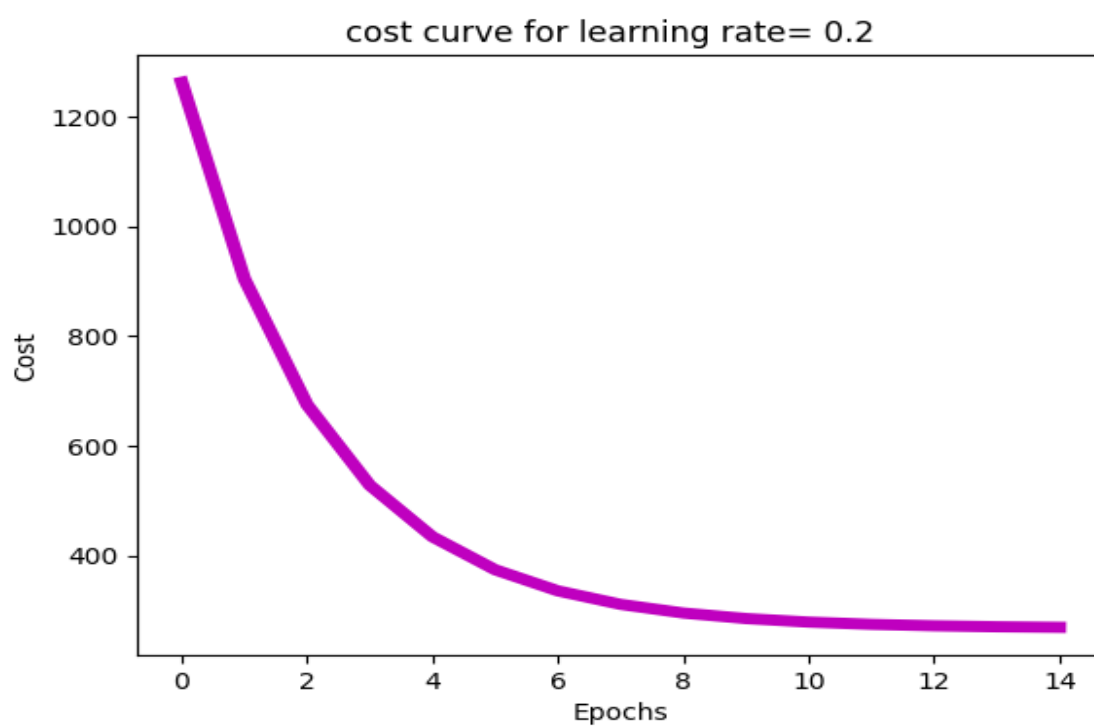## computing for lr : 0.2   ##

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final theta: [[50.37802831]

[18.91282052]]

loss J_theta :268.89481004593017

final Cost J_theta: [[268.89481005]]

theta: [[50.37802831]

[18.91282052]]

cost curve for learning rate= 0.2

Predicted y value for x= 3.5 : 116.57290012554907

Predicted y value for x=7 : 182.76777194588706

loss function value Jtheta for (0,0):

loss J_theta :1822.3117130164142

loss function value Jtheta for (-1,20):

loss J_theta :1682.9764402331787
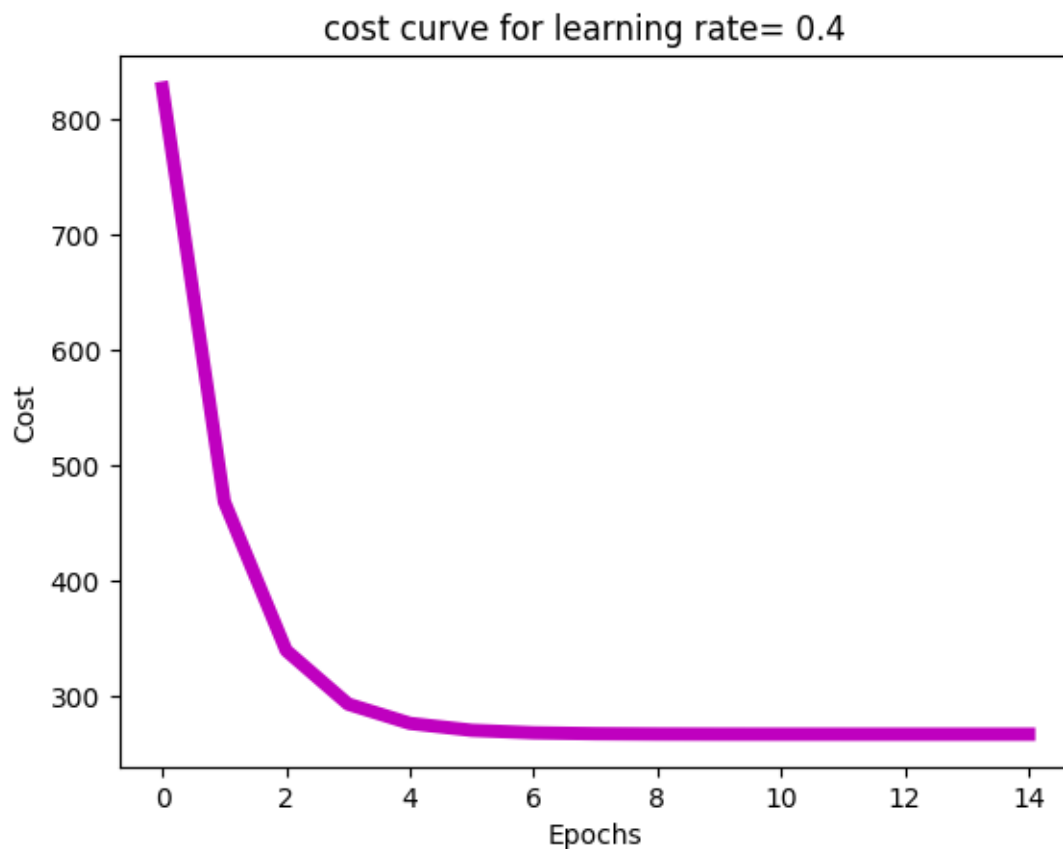
computing for lr : 0.4

final theta: [[52.19063607]

 [19.59330617]]

loss J_theta :266.96973335448905

final Cost J_theta: [[266.96973335]]

 theta: [[52.19063607]

 [19.59330617]]

cost curve for learning rate= 0.4

Predicted y value for x= 3.5 : 120.76720766905896

Predicted y value for x=7 : 189.34377926626357

loss function value Jtheta for (0,0):

loss J_theta :1822.3117130164142

loss function value Jtheta for (-1,20):

loss J_theta :1682.9764402331787

Results:

Linear Regression Programming Assignment B

```
df1.head():
     n_bed  liv_area  lot_area    h_price
0      3       2570      7242    538000.0
1      2        770     10000    180000.0
2      4       1960      5000    604000.0
3      3       1680      8080    510000.0
4      4       5420    101930   1230000.0

df_normalize.head():
          0         1         2          3
0 -0.511226  0.551763 -0.307827   538000.0
1 -1.776512 -1.551968 -0.121316   180000.0
2  0.754059 -0.161168 -0.459444   604000.0
3 -0.511226 -0.488415 -0.251157   510000.0
4  0.754059  3.882672  6.095496  1230000.0
```

computing for lr : 0.01

loss function value Jtheta for (0,0,0,0):

loss J_theta :182361544966.28787

J_0000 : [[1.82361545e+11]]

running epoch: 49

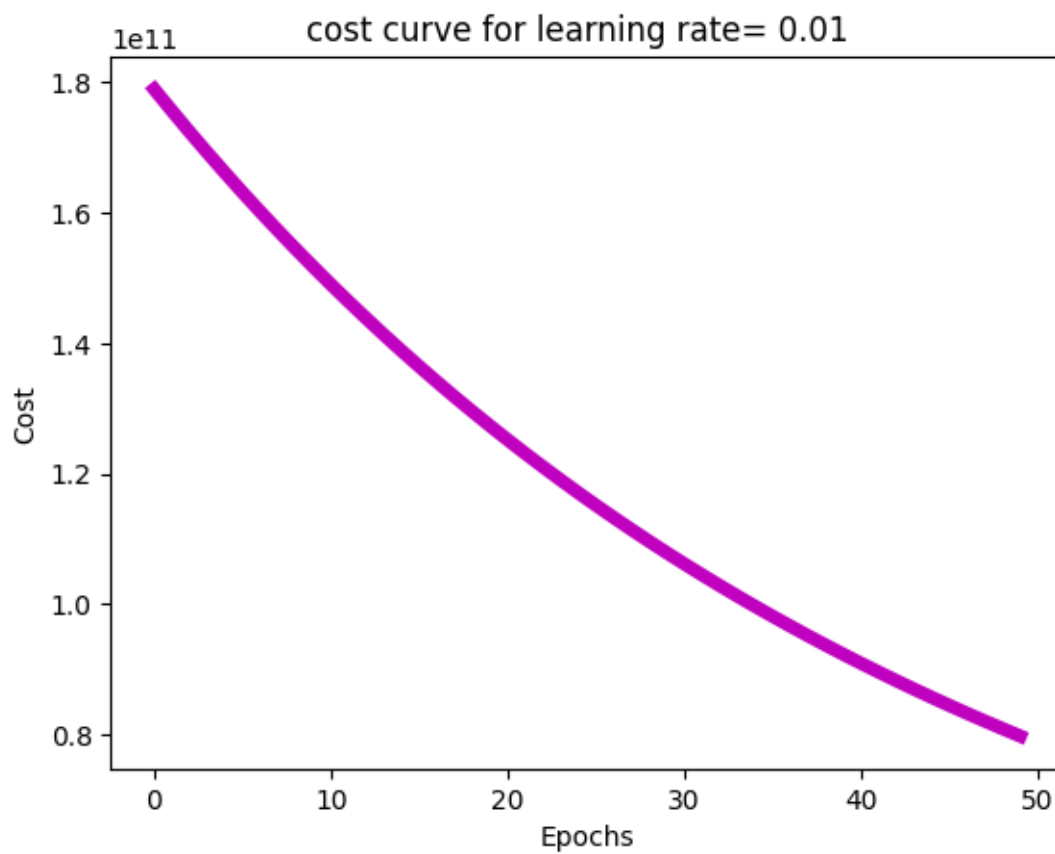loss J_theta :79743285170.01535

loss J_theta :79743285170.01535

Cost J_theta : [[7.97432852e+10]]

final theta : [[206287.19732169]

 [31850.90191939]

 [67730.71821818]

 [45234.30085283]]

cost curve for learning rate= 0.01

=== values for n_bed = 3, liv_area=2000, lot_area=8550 ====

Predicted y value for n_bed = 3, liv_area=2000, lot_area=8550 : 153551.7049690136

computing for lr : 0.1

loss function value Jtheta for (0,0,0,0):

loss J_theta :182361544966.28787

J_0000 : [[1.82361545e+11]]

running epoch: 49

loss J_theta :25728453544.504074
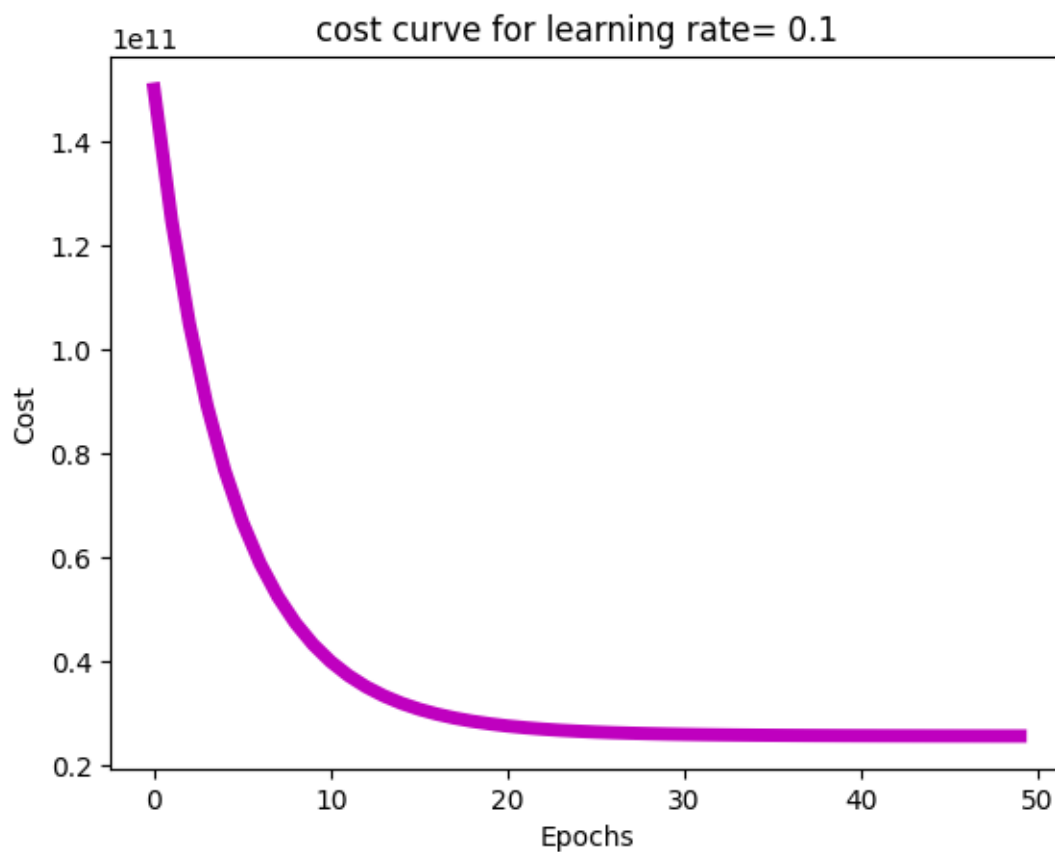
loss J_theta :25728453544.504074

Cost J_theta : [[2.57284535e+10]]

final theta : [[519562.51072344]

 [18228.40031615]

 [150702.64354424]

 [62426.19053609]]

=== values for n_bed = 3, liv_area=2000, lot_area=8550 ====

test_point after standarized [-0.5086379605860134, -0.11383911085656796, -0.21826227540368884]

Predicted y value for n_bed = 3, liv_area=2000, lot_area=8550 : -10002.163703319246

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computing for lr : 0.5

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loss function value Jtheta for (0,0,0,0):

loss J_theta :182361544966.28787

J_0000 : [[1.82361545e+11]]

running epoch: 49

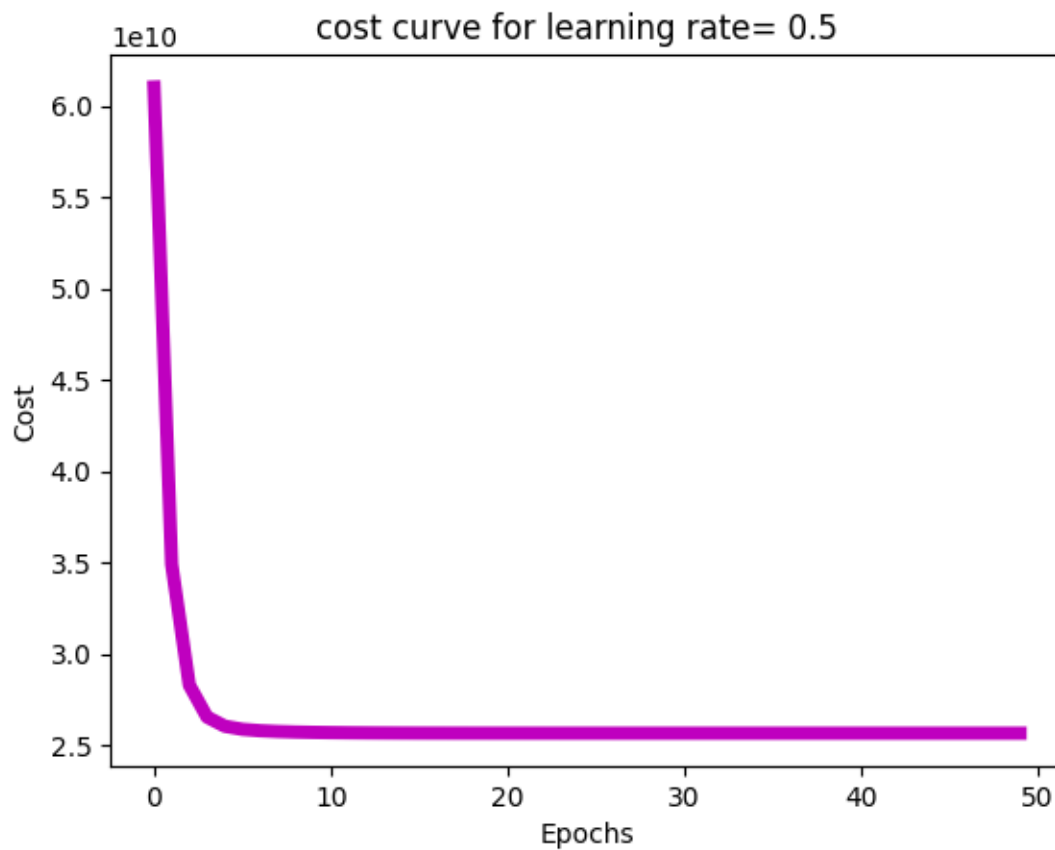loss J_theta :25666248945.917126

loss J_theta :25666248945.917126

Cost J_theta : [[2.56662489e+10]]

final theta : [[522254.09090909]

 [7927.27490228]

 [164988.05567258]

 [54120.52532063]]

cost curve for learning rate= 0.5

=== values for n_bed = 3, liv_area=2000, lot_area=8550 ====

test_point after standarized [-0.5086379605860134, -0.11383911085656796, -0.21826227540368884]

Predicted y value for n_bed = 3, liv_area=2000, lot_area=8550 : -35287.26952662078

computing for lr : 1.0

loss function value Jtheta for (0,0,0,0):

loss J_theta :182361544966.28787

J_0000 : [[1.82361545e+11]]

running epoch: 49

loss J_theta :25666248883.628536
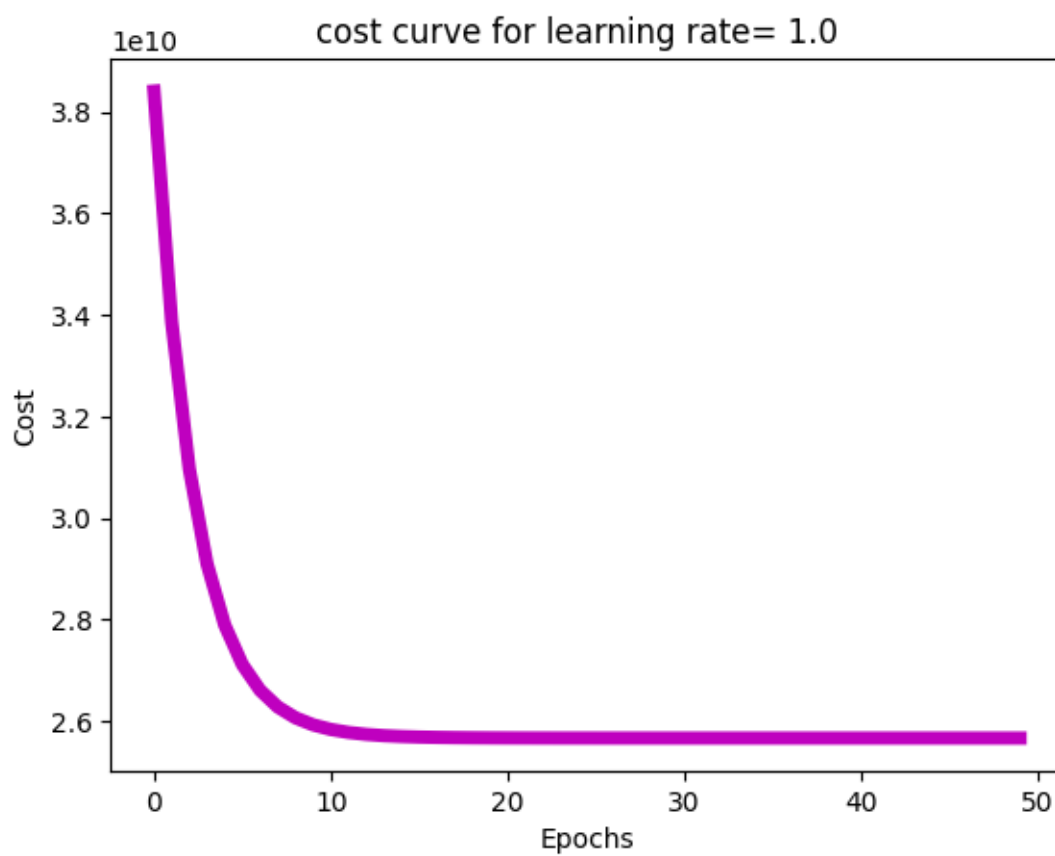
loss J_theta :25666248883.628536

Cost J_theta : [[2.56662489e+10]]

final theta : [[522254.09090909]

 [7914.22668879]

 [165001.6901855]

 [54109.35838828]]

=== values for n_bed = 3, liv_area=2000, lot_area=8550 ====

test_point after standarized [-0.5086379605860134, -0.11383911085656796, -0.21826227540368884]

Predicted y value for n_bed = 3, liv_area=2000, lot_area=8550 : -35327.34106947171

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computing for lr : 1.5

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loss function value Jtheta for (0,0,0,0):

loss J_theta :182361544966.28787

J_0000 : [[1.82361545e+11]]

running epoch: 49

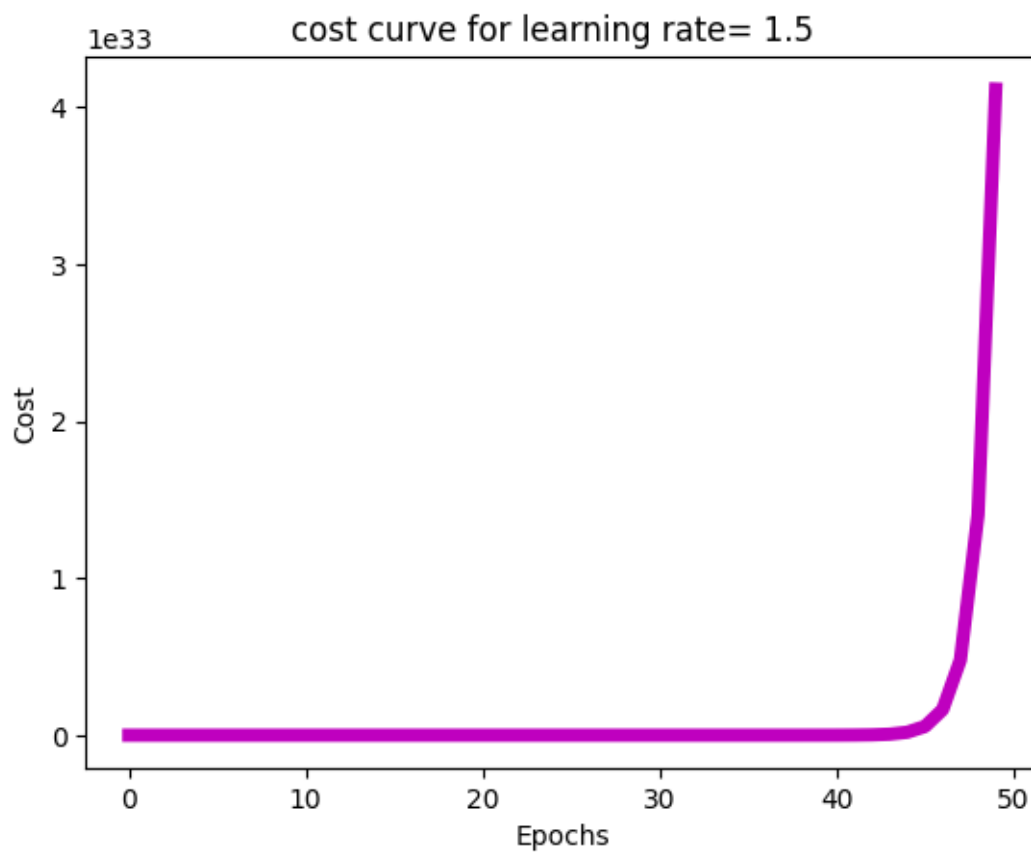loss J_theta :4.117057322458976e+33

loss J_theta :4.117057322458976e+33

Cost J_theta : [[4.11705732e+33]]

final theta : [[5.22240900e+05]

 [-3.65432540e+16]

 [-4.58295210e+16]

 [-3.34476917e+16]]

cost curve for learning rate= 1.5

test_point after standarized [-0.5086379605860134, -0.11383911085656796, -0.21826227540368884]

Predicted y value for n_bed = 3, liv_area=2000, lot_area=8550 : -3.19965868970862e+17