

Report

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Hw02

Feature Scaling

- Done in code

Simple Regression

- Output screenshotted from the console

Params: [2544.5 933.08920106]

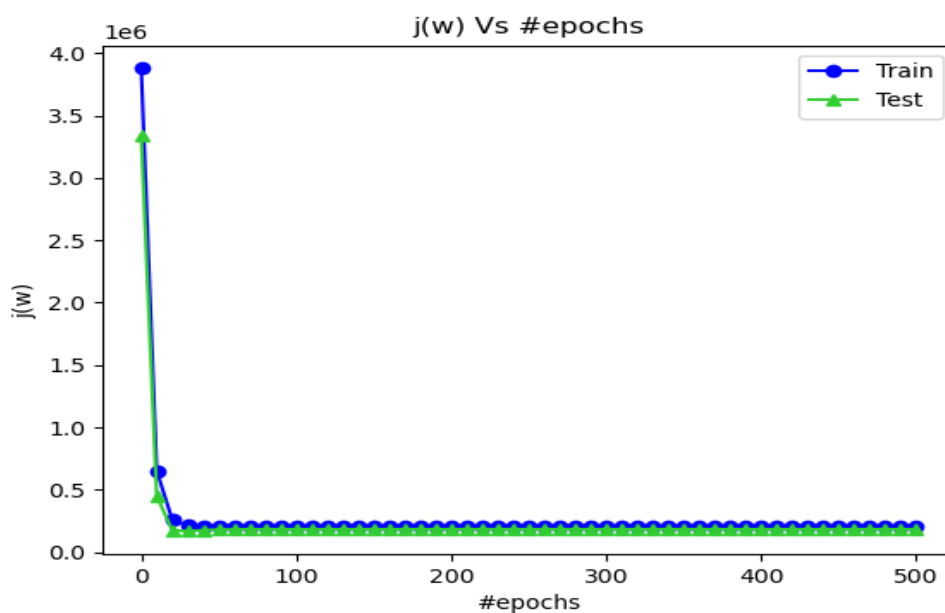
Training RMSE: 640.84.

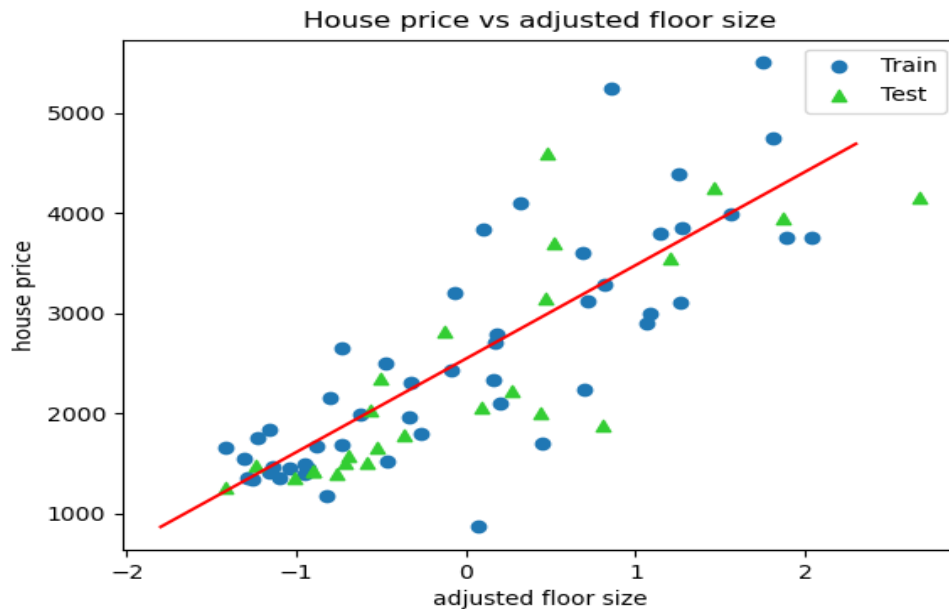
Training cost: 205334.84.

Test RMSE: 605.38.

Test cost: 183241.51.

```
Params: [2544.5     933.08920106]
Training RMSE: 640.84.
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Test RMSE: 605.38.
Test cost: 183241.51.
```





Multiple Regression

- Output Screenshotted from the console

Params: [2544.4999982 780.79181067 244.42575838 20.75956367]

Training RMSE: 610.71.

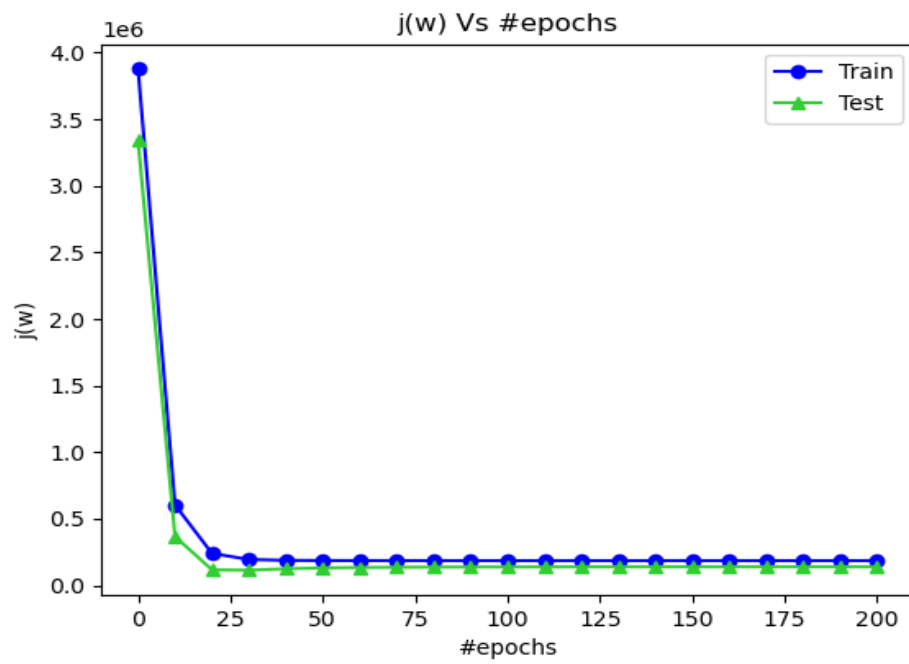
Training cost: 186481.03.

Test RMSE: 529.69.

Test cost: 140286.96.

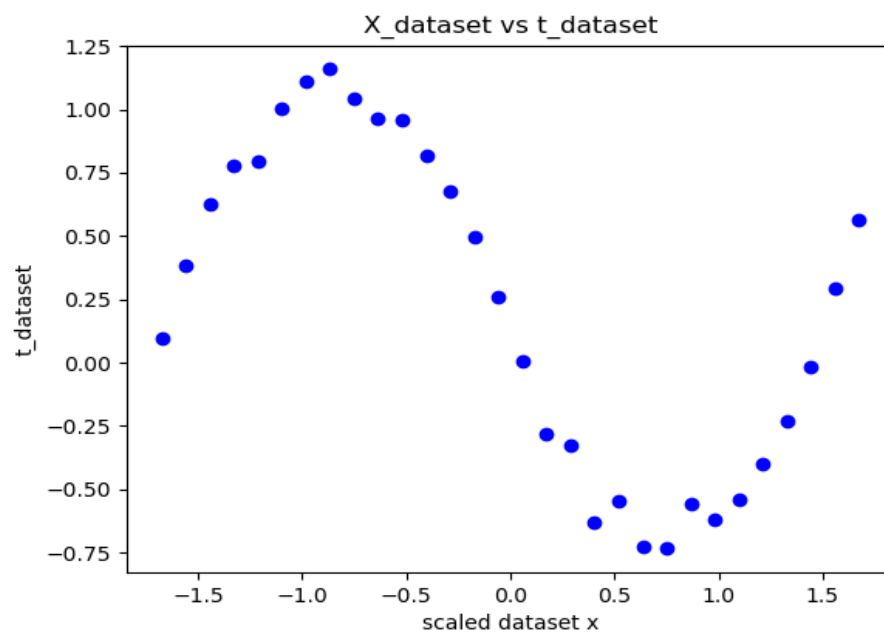
```
(base) yogesh@mbp:code$ yogeshyadav$ /opt/anaconda5/bin/python /usr/bin/jupyter-lab --ip=0.0.0.0 --port=8888 --no-browser --allow-root --log-file=/dev/null --show-file=/dev/null --show-stderr=/dev/null --show-stdout=/dev/null --show-stdin=/dev/null --show-stderr=/dev/null --show-stdout=/dev/null --show-stdin=/dev/null  
Params: [2544.4999982 780.79181067 244.42575838 20.75956367]  
Training RMSE: 610.71.  
Training cost: 186481.03.  
Test RMSE: 529.69.  
Test cost: 140286.96.
```

- In Multiple there are 4 parameters instead of 2. You can see that the training RMSE in simple and multiple are almost the same. We are also able to say that the training and the test RMSE in simple was greater in comparison to multiple.

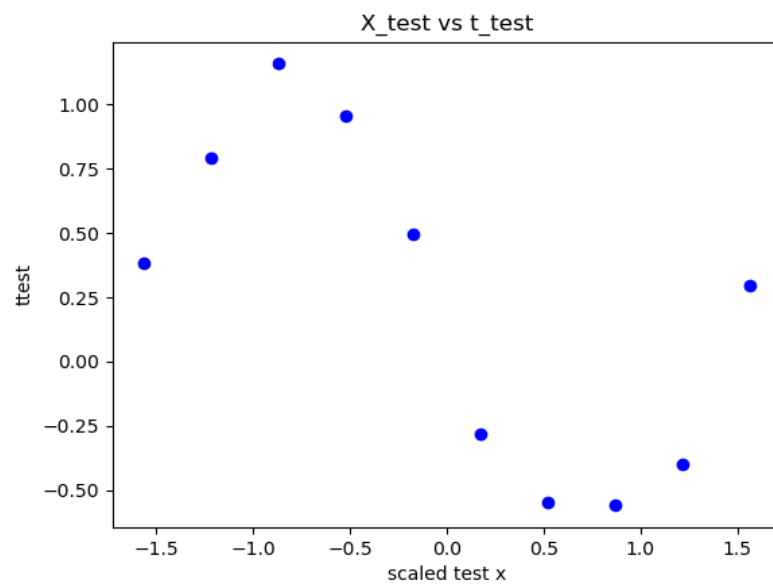
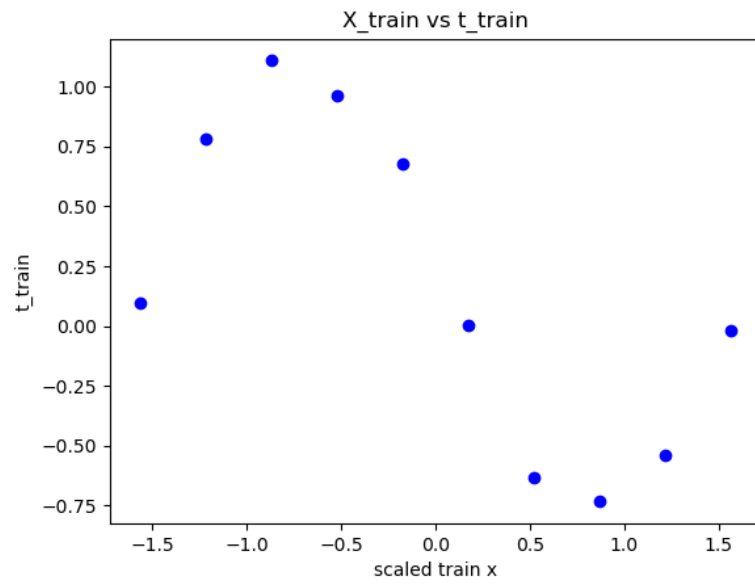


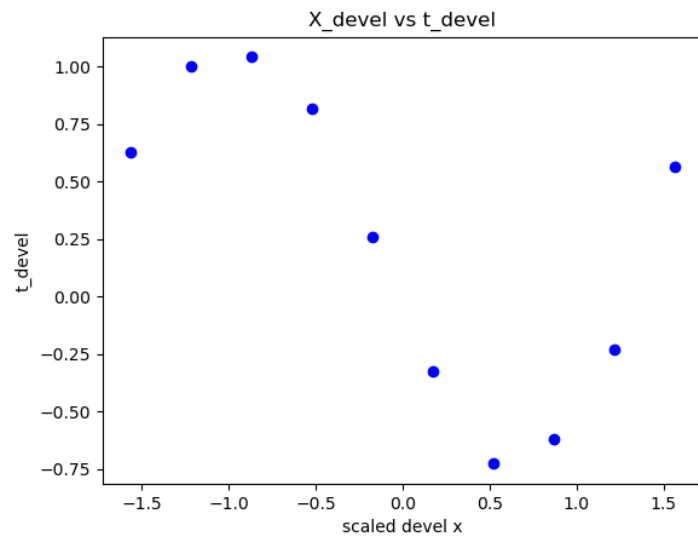
Polynomial Curve Fitting

- Part A



- Part B





- Part C

$$\mathbf{w}^{\tau+1} = \mathbf{w}^{\tau} - \eta \left(\lambda \mathbf{w} + \frac{1}{N} \sum_{n=1}^N (h_{\mathbf{w}}(\mathbf{x}^{(n)}) - t_n) \mathbf{x}^{(n)} \right)$$

- Part D

Without Regularization

- Output screenshotted from console

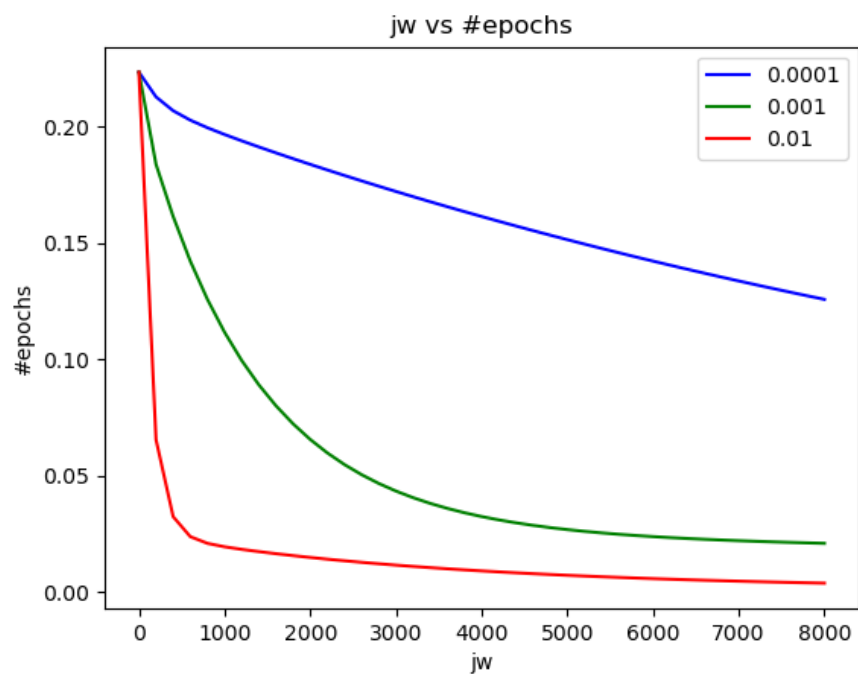
Without Regular

[0.2912743 -1.80520422 -0.17450611 1.06490006 0.03057246 -0.14038882]

Training RMSE: 0.04696.

Testing RMSE: 0.18019.

```
Without Regular  
[ 0.2912743 -1.80520422 -0.17450611 1.06490006 0.03057246 -0.14038882]  
Training RMSE: 0.04696.  
Testing RMSE: 0.18019.
```



With Regularization

- Output Screenshotted from console

With Regular

[0.30027835 -1.46785991 -0.24221905 0.17953092 0.03720108 0.27959863
0.0675683 0.11602806 -0.02451251 -0.06639438]

Training RMSE: 0.07124.

Testing RMSE: 0.19532.

```
With Regular
[ 0.30027835 -1.46785991 -0.24221905 0.17953092 0.03720108 0.27959863
 0.0675683 0.11602806 -0.02451251 -0.06639438]
Training RMSE: 0.07124.
Testing RMSE: 0.19532.
```

