

Homework 1

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1. Code: Part1.ipynb

Cut offs for each Category:

Low - 17.0

Med - 22.75

High - 29.0

Very High - 46.6

Bin sizes:

high 101

low 99

medium 97

very high 95

Graphs at bottom

2. Code: Part2.ipynb

GRAPHS: part2.png

Weight+Displacement and Weight+Horsepower pairs look most informative.

3. Code: Part3.ipynb

Graphs at bottom

4. Code: Part4.ipynb

GRAPHS: Part4Plot.pdf

cylinders train data MSE 0-order : 60.70968697222743

cylinders test data MSE 0-order : 60.929283575717776

cylinders train data MSE 1-order : 24.396566146233173

cylinders test data MSE 1-order : 22.926875687221933

cylinders train data MSE 2-order : 24.096383426493833

cylinders test data MSE 2-order : 23.21421758390178

cylinders train data MSE 3-order : 22.12637208568825

cylinders test data MSE 3-order : 20.910250976659675

displacement train data MSE 0-order : 60.70968697222743

displacement test data MSE 0-order : 60.929283575717776
displacement train data MSE 1-order : 21.418198865163465
displacement test data MSE 1-order : 21.397638053344693
displacement train data MSE 2-order : 18.92742722510475
displacement test data MSE 2-order : 18.947021423053798
displacement train data MSE 3-order : 32.340624262694625
displacement test data MSE 3-order : 39.096889071974886

horsepower train data MSE 0-order : 60.70968697222743
horsepower test data MSE 0-order : 60.929283575717776
horsepower train data MSE 1-order : 24.771124548238937
horsepower test data MSE 1-order : 21.819889438529295
horsepower train data MSE 2-order : 20.80204875939535
horsepower test data MSE 2-order : 13.766662814383267
horsepower train data MSE 3-order : 28.22772891865271
horsepower test data MSE 3-order : 26.63451562991671

weight train data MSE 0-order : 60.70968697222743
weight test data MSE 0-order : 60.929283575717776
weight train data MSE 1-order : 18.657570068329402
weight test data MSE 1-order : 18.9551078756951
weight train data MSE 2-order : 36.4699613209395
weight test data MSE 2-order : 37.79488418929586
weight train data MSE 3-order : 88.18910088889236
weight test data MSE 3-order : 98.05058857175298

acceleration train data MSE 0-order : 60.70968697222743
acceleration test data MSE 0-order : 60.929283575717776
acceleration train data MSE 1-order : 50.650394668976574
acceleration test data MSE 1-order : 47.63229461694219
acceleration train data MSE 2-order : 49.16701028072591
acceleration test data MSE 2-order : 49.14373990987934
acceleration train data MSE 3-order : 49.15242843248649
acceleration test data MSE 3-order : 49.713252446021485

model_year train data MSE 0-order : 60.70968697222743
model_year test data MSE 0-order : 60.929283575717776
model_year train data MSE 1-order : 40.33284929127318
model_year test data MSE 1-order : 40.22255828510213

model_year train data MSE 2-order : 38.889656011345046
model_year test data MSE 2-order : 37.21569046687062
model_year train data MSE 3-order : 38.94960156514158
model_year test data MSE 3-order : 37.18231997708316

origin train data MSE 0-order : 60.70968697222743
origin test data MSE 0-order : 60.929283575717776
origin train data MSE 1-order : 39.22836735189238
origin test data MSE 1-order : 47.716918285794655
origin train data MSE 2-order : 39.04390948853484
origin test data MSE 2-order : 46.03598745281911
origin train data MSE 3-order : 39.04390948853484
origin test data MSE 3-order : 46.03598745282042

5. Code: Part5.ipynb

MSE Order 0 Training: 62.66369440795646 Testing: 55.697724770125724
MSE Order 1 Training: 11.706025597264109 Testing: 8.900090532241807
MSE Order 2 Training: 9.045409569363379 Testing: 6.4086271807724335

Note: The first section of Part8 is done in this File

Part 8: The MPG value predicted is 20.84423677671065

6. Code: Part6.ipynb

Training precision for class 1 is 0.9104477611940298
Testing precision for class 1 is 0.9104477611940298

Training precision for class 2 is 0.726027397260274
Testing precision for class 2 is 0.726027397260274

Training precision for class 3 is 0.6285714285714286
Testing precision for class 3 is 0.6285714285714286

Training precision for class 4 is 0.8292682926829268
Testing precision for class 4 is 0.8292682926829268

Training set accuracy: 0.773972602739726

Test set accuracy: 0.76

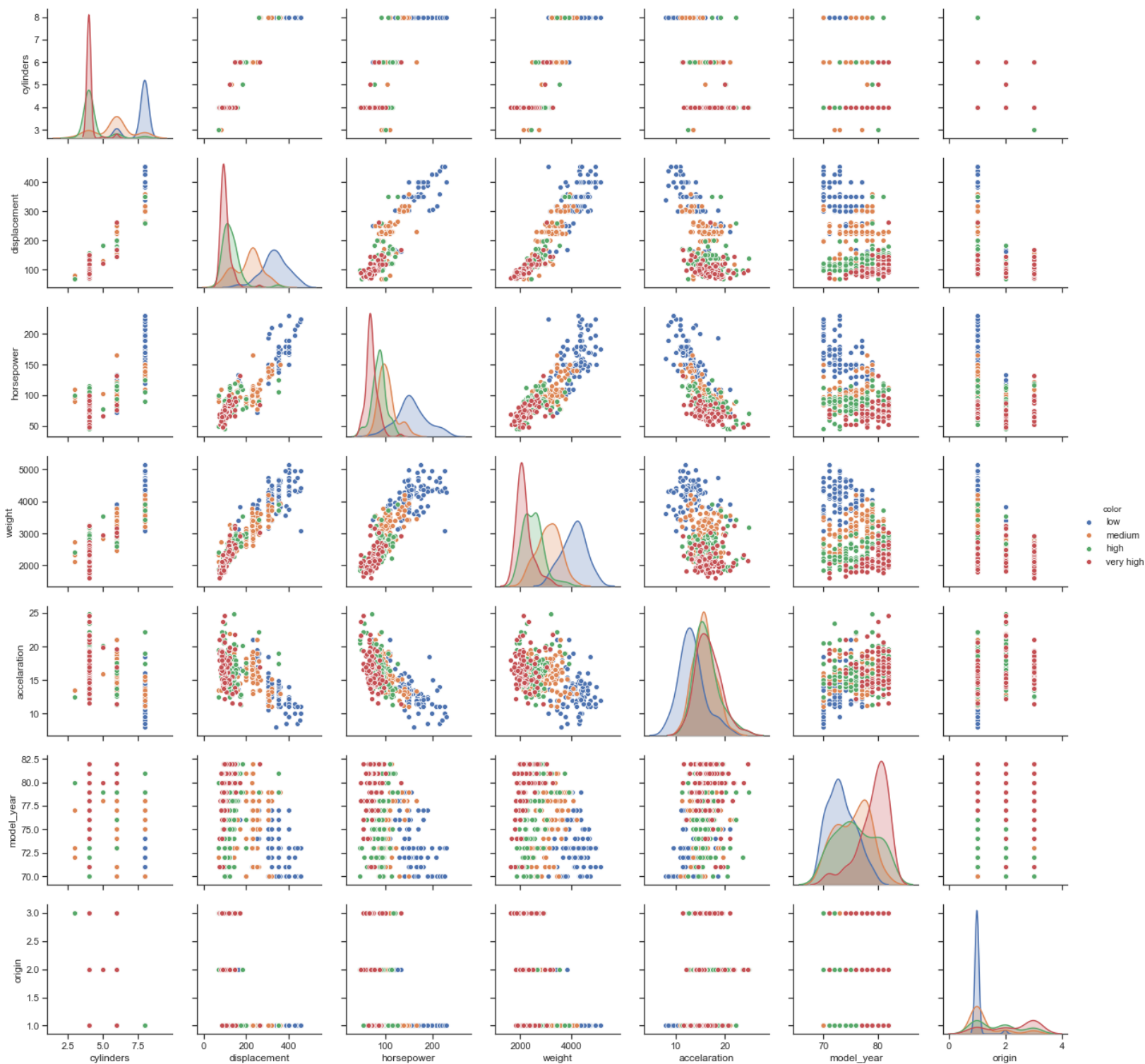
Note: Part 8 Logistic Regression code is at the bottom of Part6.ipynb. The Car has Medium MPG.

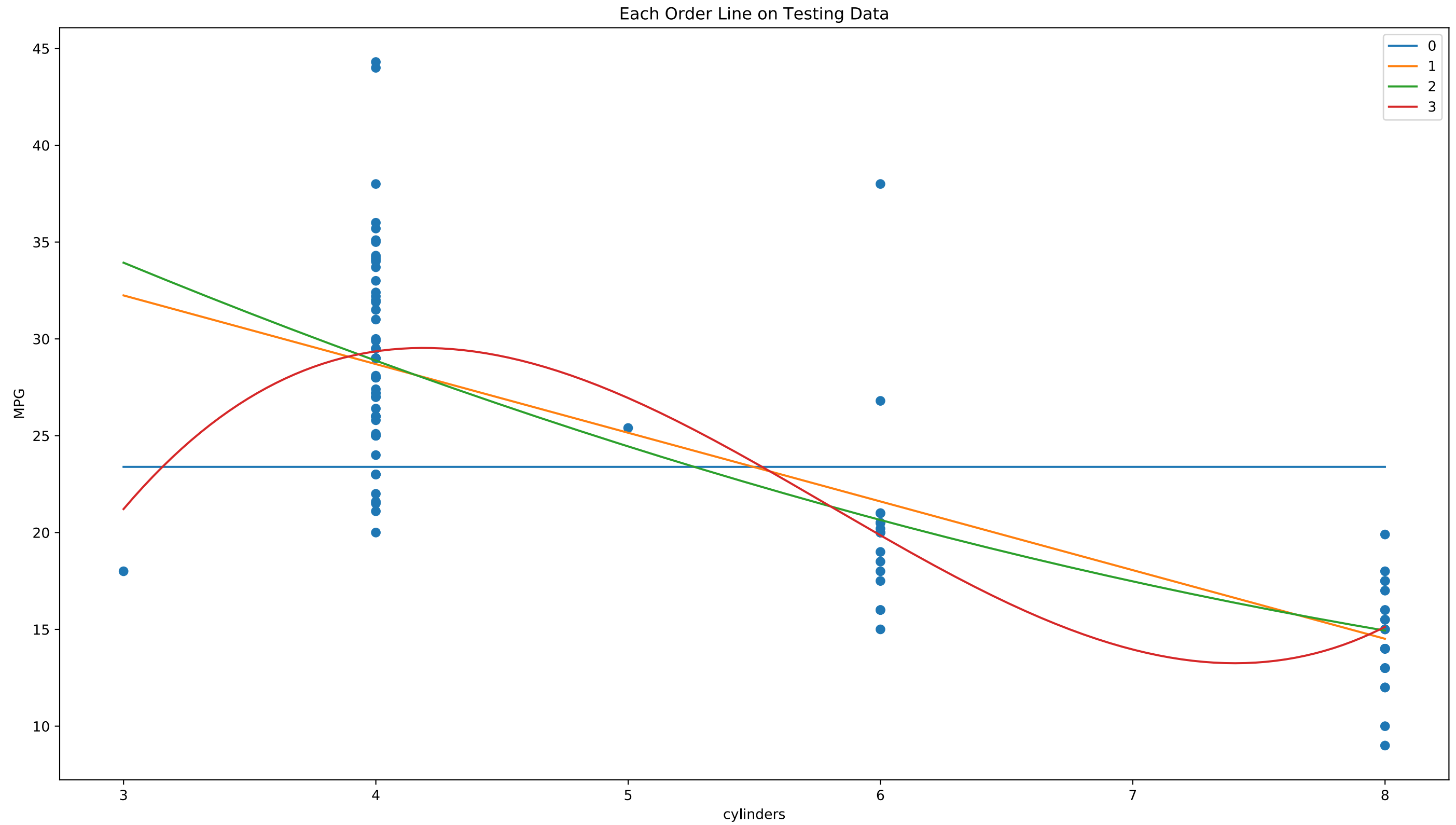
7. Code: Included in bottom of Part5.ipynb

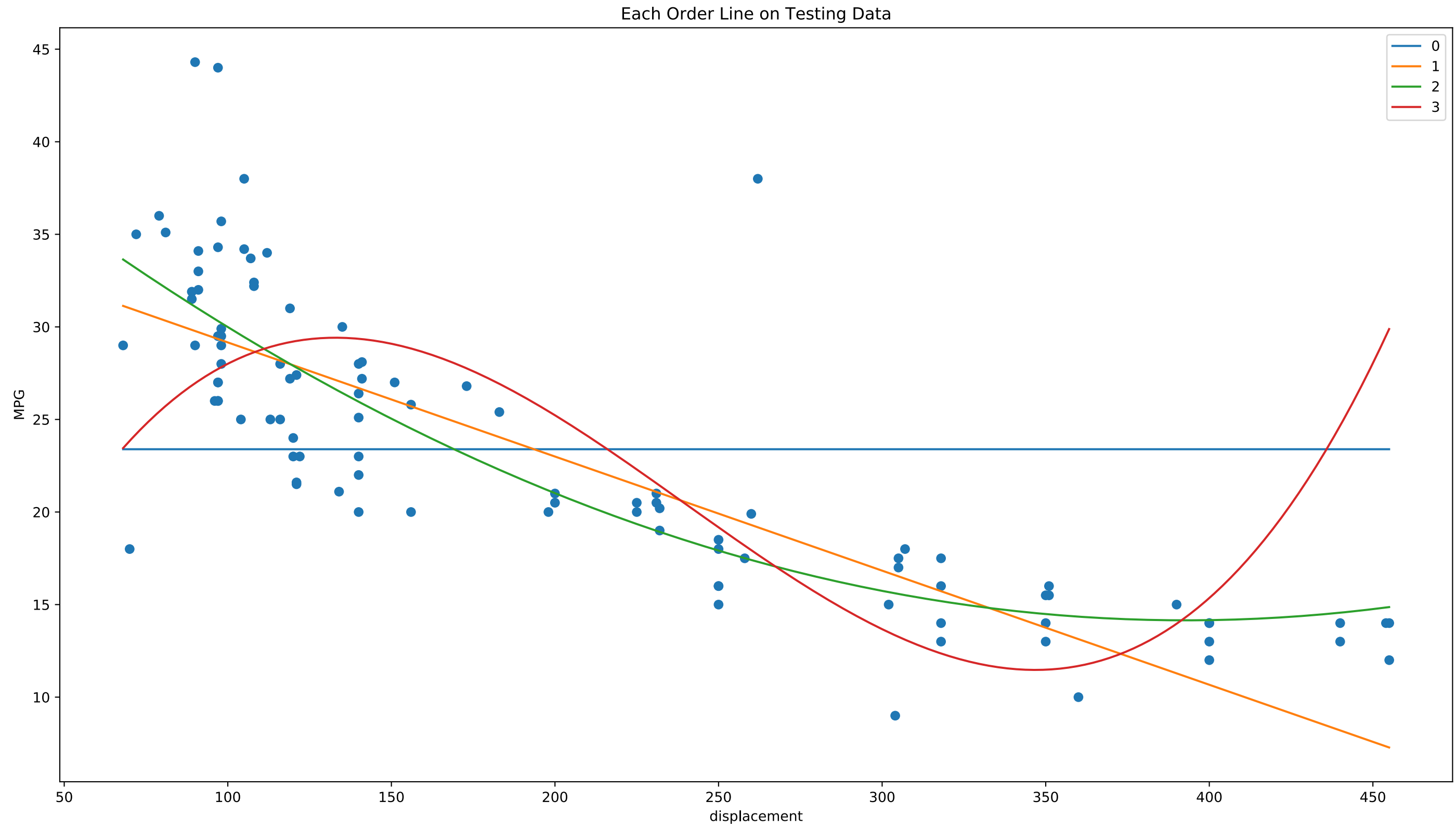
- a. Only did 2 order
- b. Results: MSE Order 2 Training W Normalization : 0.04370611150757158
Testing: 0.062447536684333935
- c. The MSE is a lot lower with Normalization

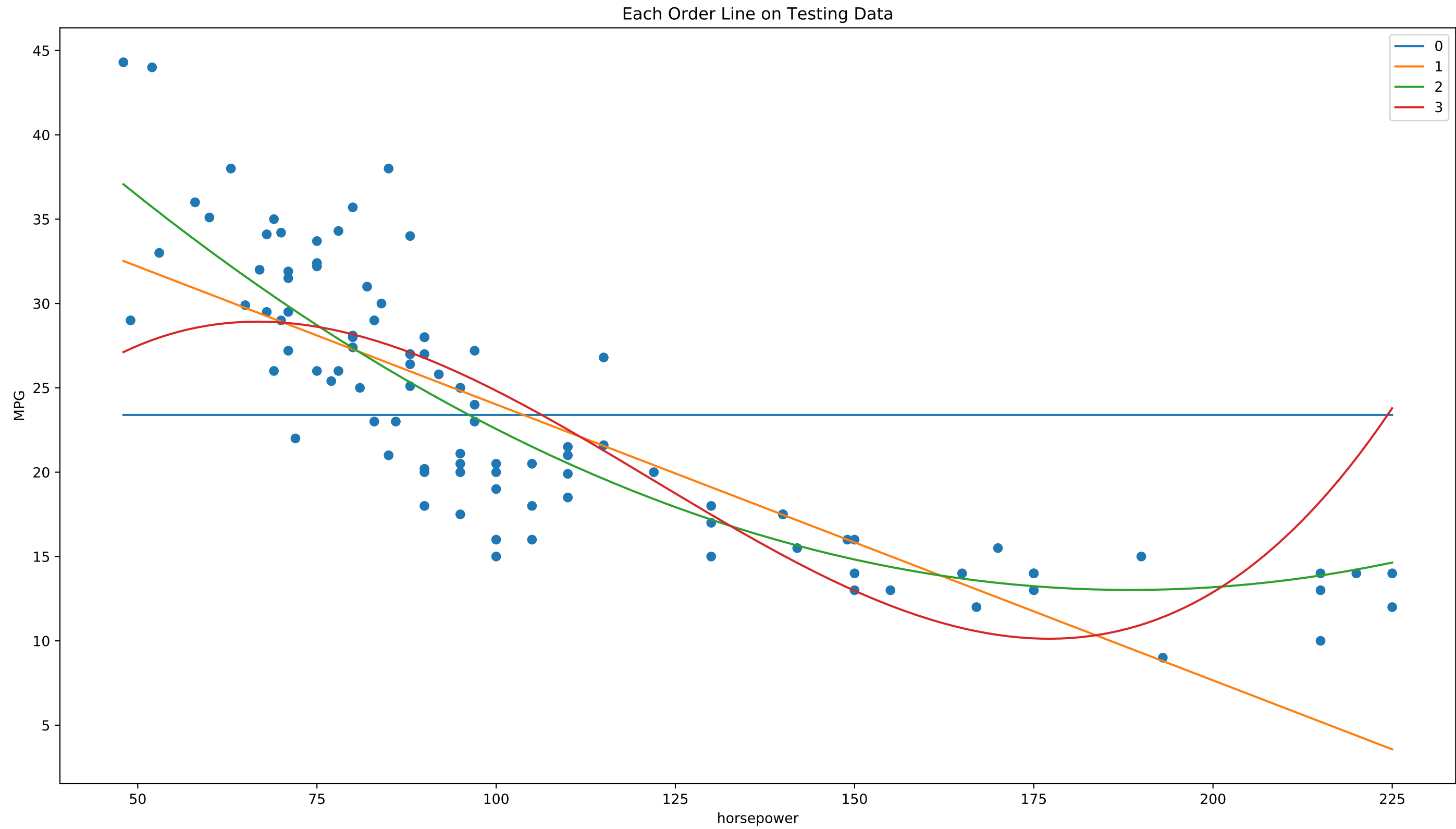
8. Code: Included at the bottom of Part5.ipynb and Part6.ipynb

- a. MPG: 20.84423677671065 (Part5.ipynb)
- b. Class: Medium (Part6.ipynb)









Each Order Line on Testing Data

