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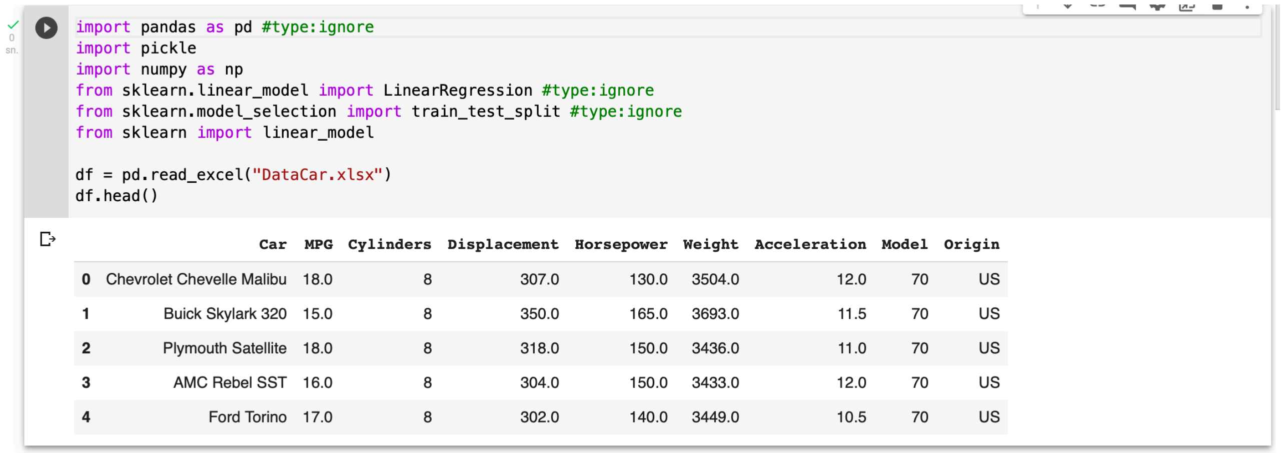
BATCH CODE: LISUM14
SUBMISSION DATE: OCTOBER 2022
SUBMITTED TO: DATA GLACIER

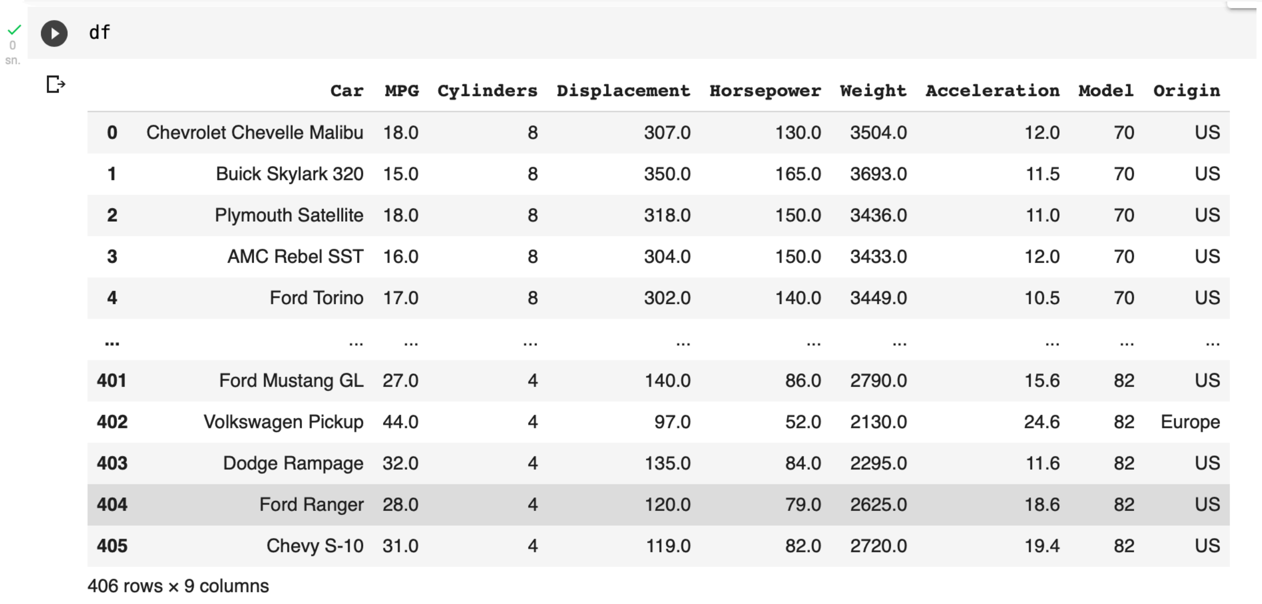
CAR PROPERTIES DATASET



```
import pandas as pd #type:ignore
import pickle
import numpy as np
from sklearn.linear_model import LinearRegression #type:ignore
from sklearn.model_selection import train_test_split #type:ignore
from sklearn import linear_model

df = pd.read_excel("DataCar.xlsx")
df.head()
```

	Car	MPG	Cylinders	Displacement	Horsepower	Weight	Acceleration	Model	Origin
0	Chevrolet Chevelle Malibu	18.0	8	307.0	130.0	3504.0	12.0	70	US
1	Buick Skylark 320	15.0	8	350.0	165.0	3693.0	11.5	70	US
2	Plymouth Satellite	18.0	8	318.0	150.0	3436.0	11.0	70	US
3	AMC Rebel SST	16.0	8	304.0	150.0	3433.0	12.0	70	US
4	Ford Torino	17.0	8	302.0	140.0	3449.0	10.5	70	US



```
df
```

	Car	MPG	Cylinders	Displacement	Horsepower	Weight	Acceleration	Model	Origin
0	Chevrolet Chevelle Malibu	18.0	8	307.0	130.0	3504.0	12.0	70	US
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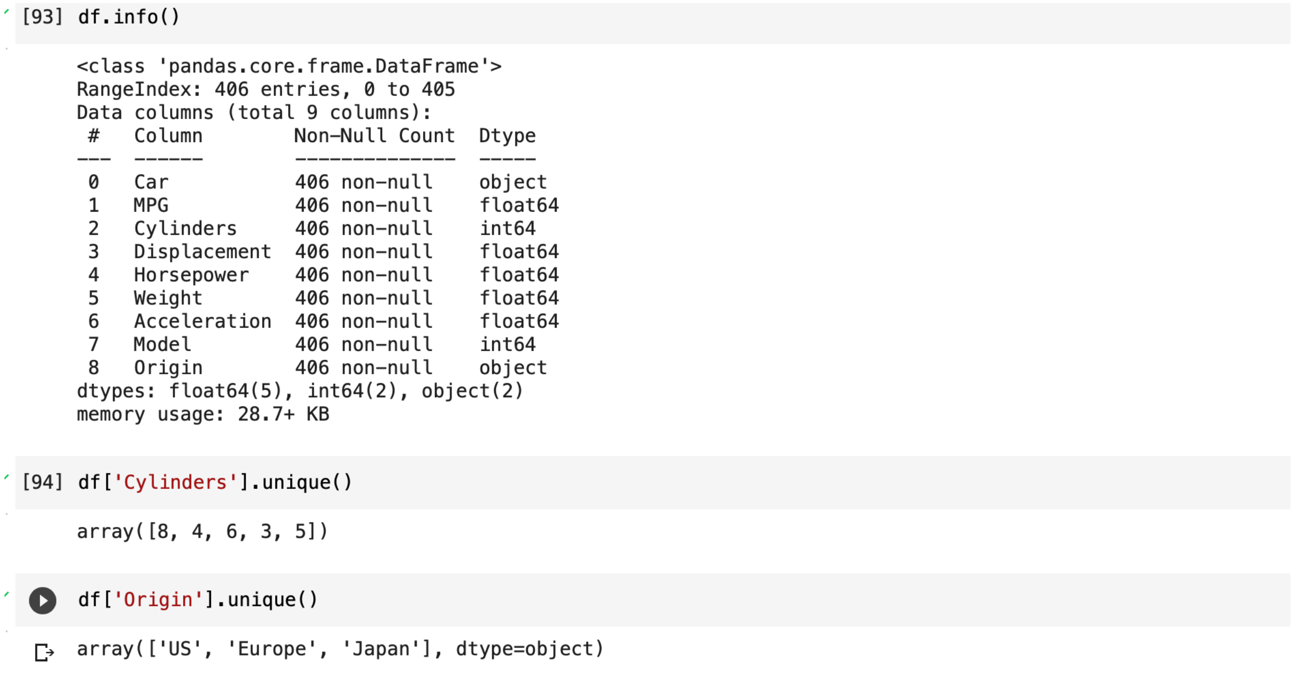
4	Ford Torino	17.0	8	302.0	140.0	3449.0	10.5	70	US
...	...	...	...	...	...	...	...	...	...
401	Ford Mustang GL	27.0	4	140.0	86.0	2790.0	15.6	82	US
402	Volkswagen Pickup	44.0	4	97.0	52.0	2130.0	24.6	82	Europe
403	Dodge Rampage	32.0	4	135.0	84.0	2295.0	11.6	82	US
404	Ford Ranger	28.0	4	120.0	79.0	2625.0	18.6	82	US
405	Chevy S-10	31.0	4	119.0	82.0	2720.0	19.4	82	US

406 rows × 9 columns



```
[93] df.info()
```

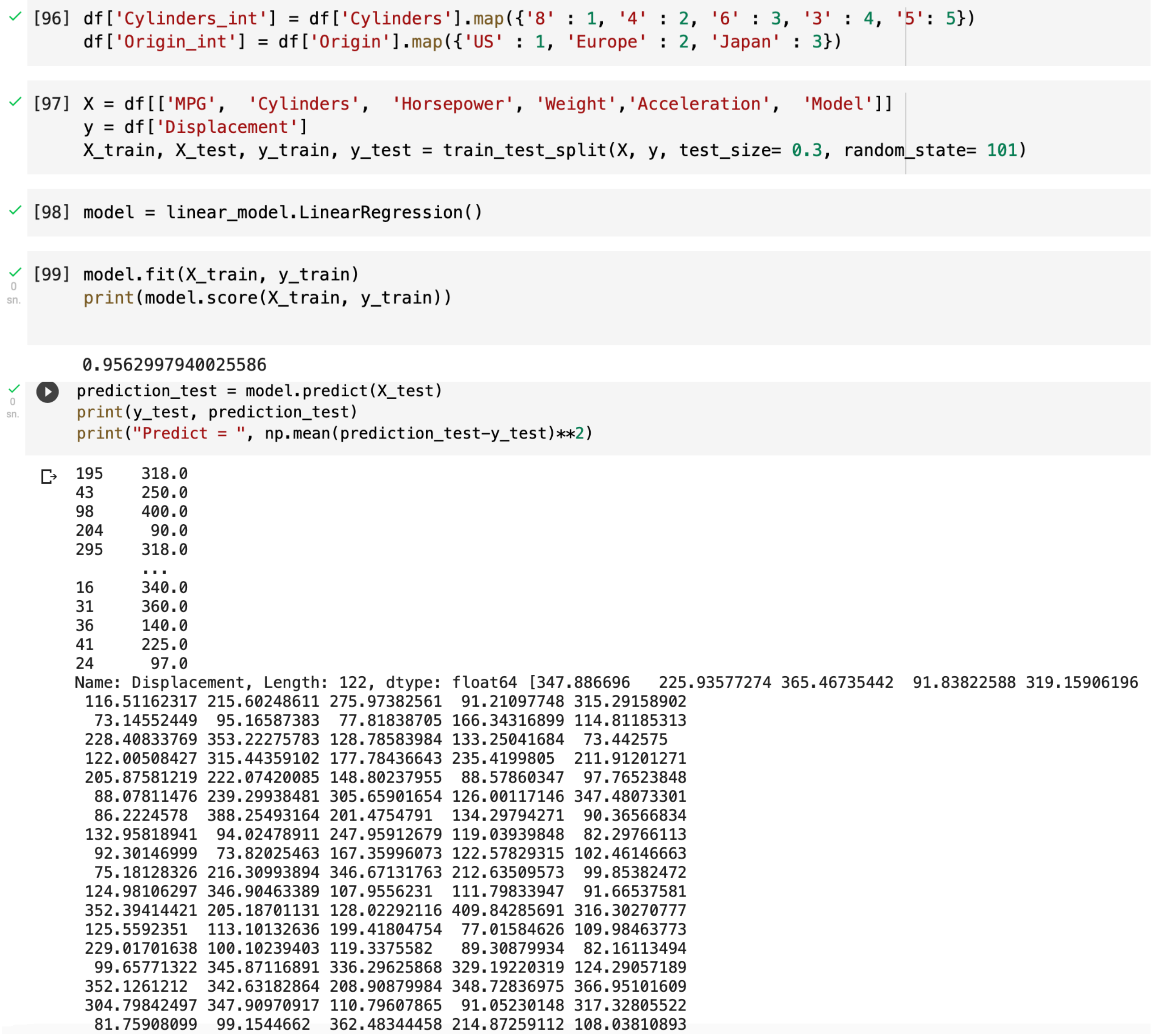
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 406 entries, 0 to 405
Data columns (total 9 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Car           406 non-null    object
 1   MPG           406 non-null    float64
 2   Cylinders     406 non-null    int64
 3   Displacement  406 non-null    float64
 4   Horsepower    406 non-null    float64
 5   Weight        406 non-null    float64
 6   Acceleration  406 non-null    float64
 7   Model         406 non-null    int64
 8   Origin        406 non-null    object
dtypes: float64(5), int64(2), object(2)
memory usage: 28.7+ KB
```

```
[94] df['Cylinders'].unique()
```

```
array([8, 4, 6, 3, 5])
```

```
df['Origin'].unique()
```

```
array(['US', 'Europe', 'Japan'], dtype=object)
```



```
[96] df['Cylinders_int'] = df['Cylinders'].map({'8' : 1, '4' : 2, '6' : 3, '3' : 4, '5': 5})
     df['Origin_int'] = df['Origin'].map({'US' : 1, 'Europe' : 2, 'Japan' : 3})
```

```
[97] X = df[['MPG',  'Cylinders',  'Horsepower', 'Weight','Acceleration',  'Model']]
     y = df['Displacement']
     X_train, X_test, y_train, y_test = train_test_split(X, y, test_size= 0.3, random_state= 101)
```

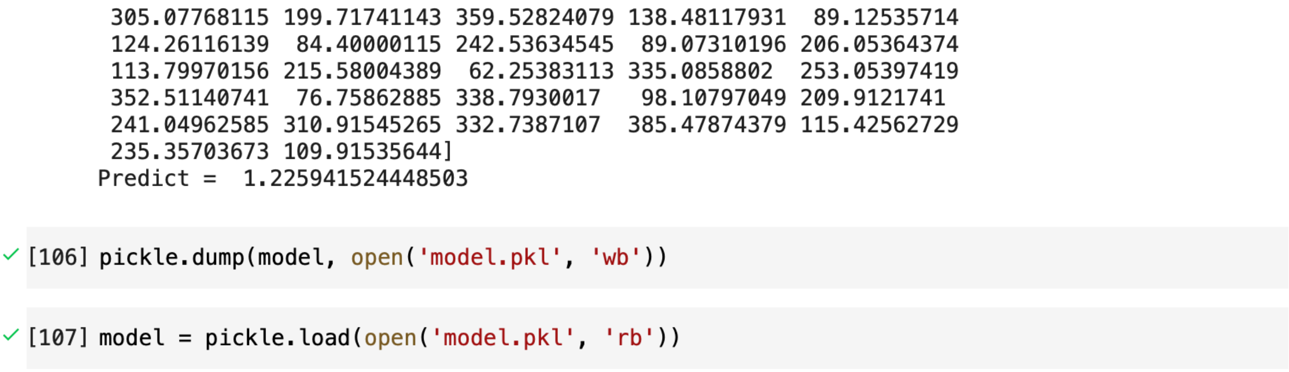
```
[98] model = linear_model.LinearRegression()
```

```
[99] model.fit(X_train, y_train)
     print(model.score(X_train, y_train))
```

```
0.9562997940025586
```

```
prediction_test = model.predict(X_test)
print(y_test, prediction_test)
print("Predict = ", np.mean(prediction_test-y_test)**2)
```

```
195    318.0
43     250.0
98     400.0
204     90.0
295    318.0
       ...  
16     340.0
31     360.0
36     140.0
41     225.0
24      97.0
Name: Displacement, Length: 122, dtype: float64 [347.886696   225.93577274 365.46735442  91.83822588 319.15906196
 116.51162317 215.60248611 275.97382561  91.21097748 315.29158902
  73.14552449  95.16587383  77.81838705 166.34316899 114.81185313
 228.40833769 353.22275783 128.78583984 133.25041684  73.442575
 122.00508427 315.44359102 177.78436643 235.4199805  211.91201271
 205.87581219 222.07420085 148.80237955  88.57860347  97.76523848
  88.07811476 239.29938481 305.65901654 126.00117146 347.48073301
  86.2224578  388.25493164 201.4754791  134.29794271  90.36566834
 132.95818941  94.02478911 247.95912679 119.03939848  82.29766113
  92.30146999  73.82025463 167.35996073 122.57829315 102.46146663
  75.18128326 216.30993894 346.67131763 212.63509573  99.85382472
 124.98106297 346.90463389 107.9556231  111.79833947  91.66537581
 352.39414421 205.18701131 128.02292116 409.84285691 316.30270777
 125.5592351  113.10132636 199.41804754  77.01584626 109.98463773
 229.01701638 100.10239403 119.3375582   89.30879934  82.16113494
  99.65771322 345.87116891 336.29625868 329.19220319 124.29057189
 352.1261212  342.63182864 208.90879984 348.72836975 366.95101609
 304.79842497 347.90970917 110.79607865  91.05230148 317.32805522
  81.75908099  99.1544662  362.48344458 214.87259112 108.03810893
```

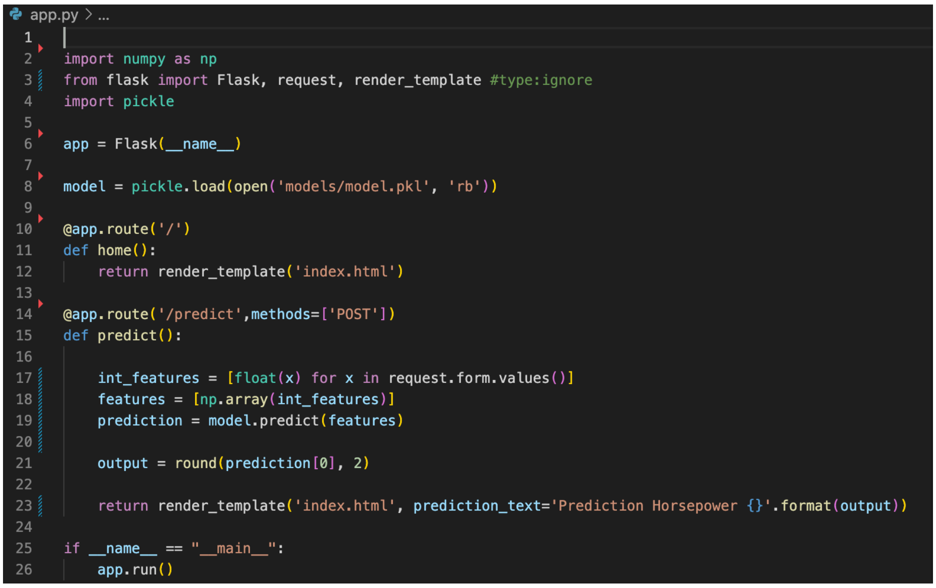


```
 305.07768115 199.71741143 359.52824079 138.48117931  89.12535714
 124.26116139  84.40000115 242.53634545  89.07310196 206.05364374
 113.79970156 215.58004389  62.25383113 335.0858802  253.05397419
 352.51140741  76.75862885 338.7930017   98.10797049 209.9121741
 241.04962585 310.91545265 332.7387107  385.47874379 115.42562729
 235.35703673 109.91535644]
Predict =  1.225941524448503
```

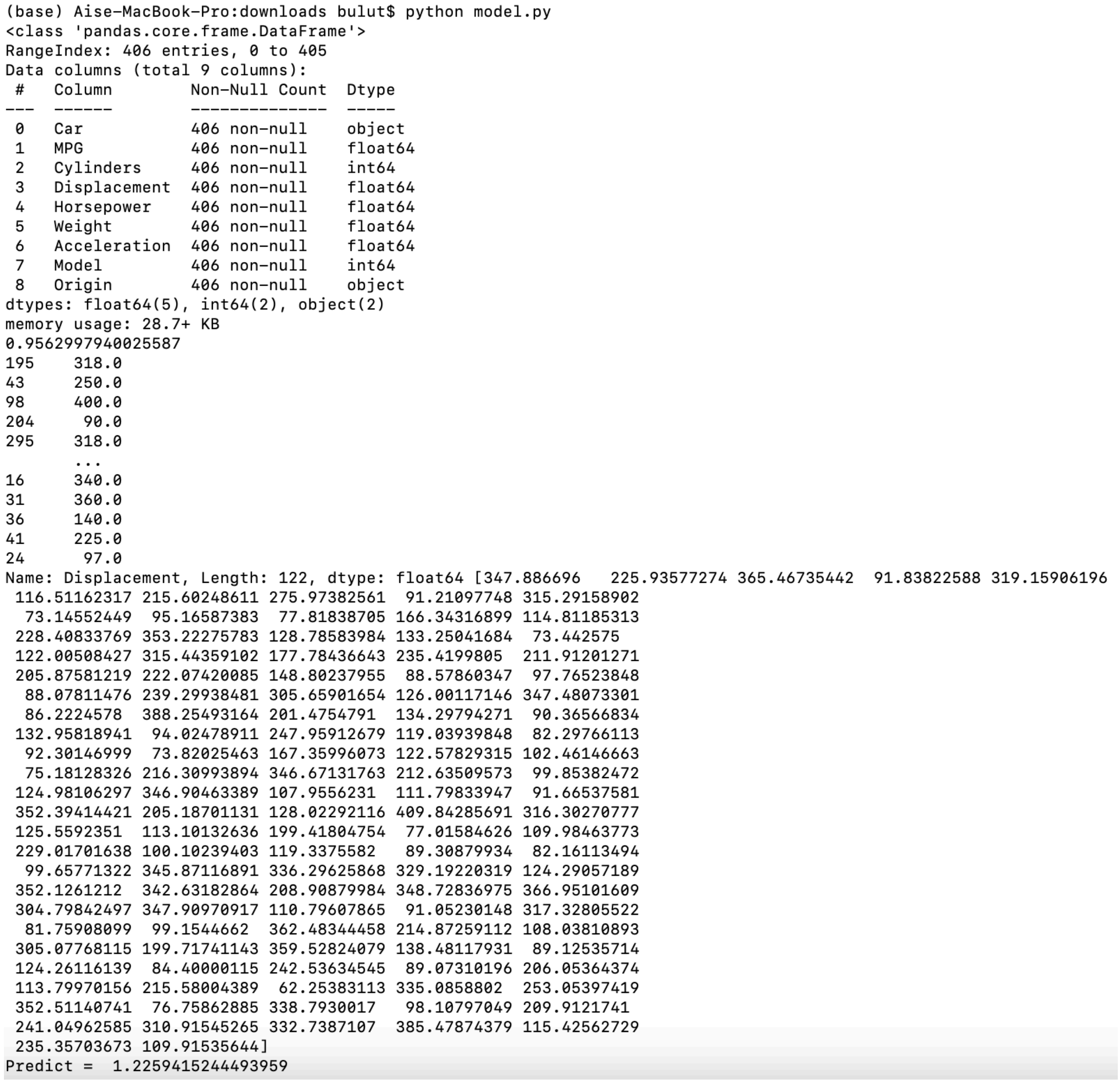
```
[106] pickle.dump(model, open('model.pkl', 'wb'))
```

```
[107] model = pickle.load(open('model.pkl', 'rb'))
```

DEPLOY THE MODEL ON FLASK



```python

import numpy as np
from flask import Flask, request, render_template #type:ignore
import pickle

app = Flask(__name__)

model = pickle.load(open('models/model.pkl', 'rb'))

@app.route('/')
def home():
    return render_template('index.html')

@app.route('/predict',methods=['POST'])
def predict():

    int_features = [float(x) for x in request.form.values()]
    features = [np.array(int_features)]
    prediction = model.predict(features)

    output = round(prediction[0], 2)

    return render_template('index.html', prediction_text='Prediction Horsepower {}'.format(output))

if __name__ == "__main__":
    app.run()
```



```
(base) Aise-MacBook-Pro:downloads bulut$ python model.py
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 406 entries, 0 to 405
Data columns (total 9 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   Car           406 non-null    object 
 1   MPG           406 non-null    float64
 2   Cylinders     406 non-null    int64  
 3   Displacement  406 non-null    float64
 4   Horsepower    406 non-null    float64
 5   Weight        406 non-null    float64
 6   Acceleration  406 non-null    float64
 7   Model         406 non-null    int64  
 8   Origin        406 non-null    object 
dtypes: float64(5), int64(2), object(2)
memory usage: 28.7+ KB
0.9562997940025587
195    318.0
43     250.0
98     400.0
204     90.0
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       ...  
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Name: Displacement, Length: 122, dtype: float64 [347.886696   225.93577274 365.46735442  91.83822588 319.15906196
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  86.2224578  388.25493164 201.4754791  134.29794271  90.36566834
 132.95818941  94.02478911 247.95912679 119.03939848  82.29766113
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  75.18128326 216.30993894 346.67131763 212.63509573  99.85382472
 124.98106297 346.90463389 107.9556231  111.79833947  91.66537581
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  81.75908099  99.1544662  362.48344458 214.87259112 108.03810893
 305.07768115 199.71741143 359.52824079 138.48117931  89.12535714
 124.26116139  84.40000115 242.53634545  89.07310196 206.05364374
 113.79970156 215.58004389  62.25383113 335.0858802  253.05397419
 352.51140741  76.75862885 338.7930017   98.10797049 209.9121741
 241.04962585 310.91545265 332.7387107  385.47874379 115.42562729
 235.35703673 109.91535644]
Predict =  1.2259415244493959
```
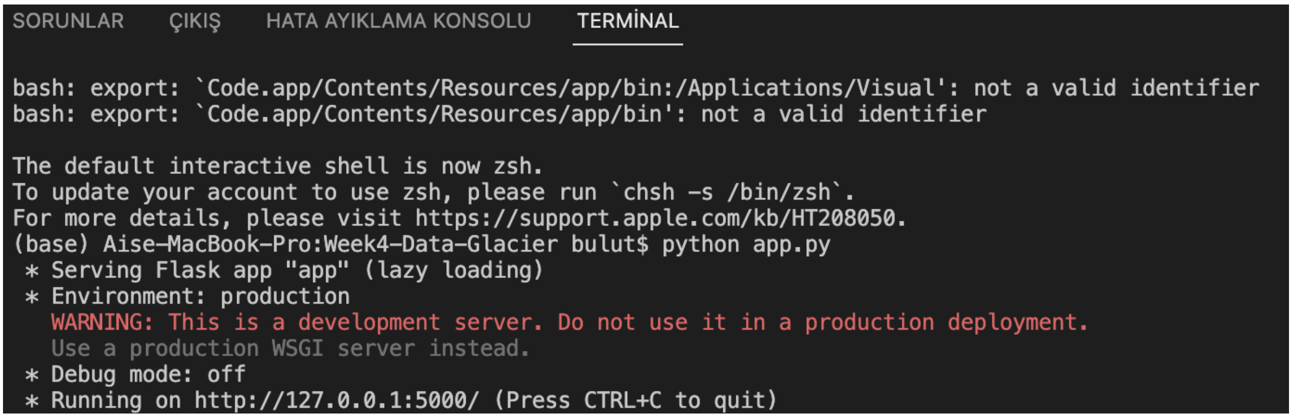
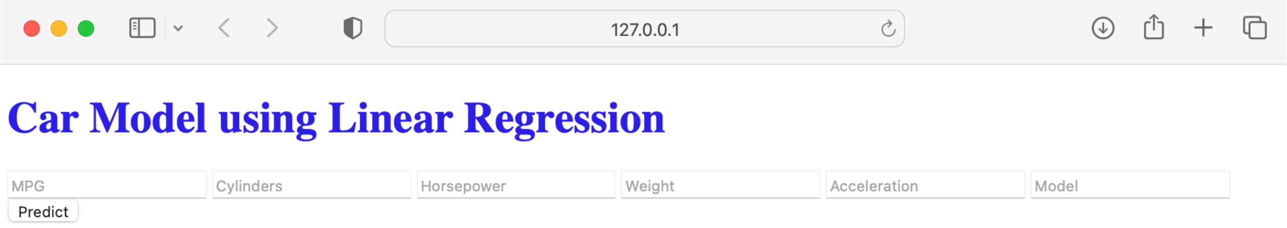
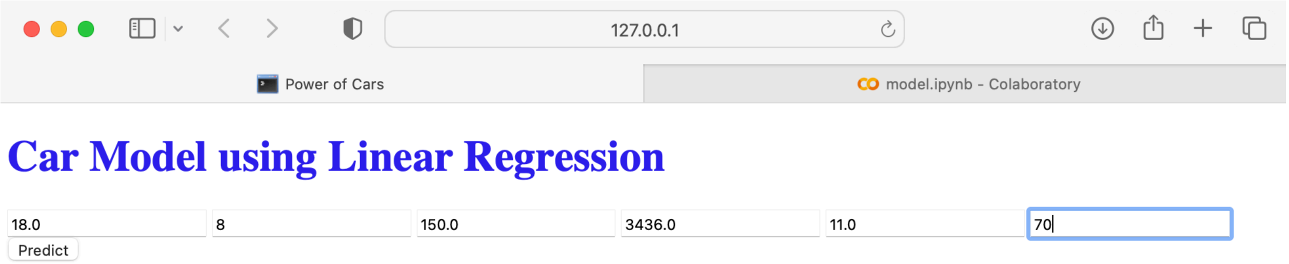



```
bash: export: `Code.app/Contents/Resources/app/bin:/Applications/Visual': not a valid identifier
bash: export: `Code.app/Contents/Resources/app/bin': not a valid identifier

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) Aise-MacBook-Pro:Week4-Data-Glacier bulut$ python app.py
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

TEST THE APPLICATION

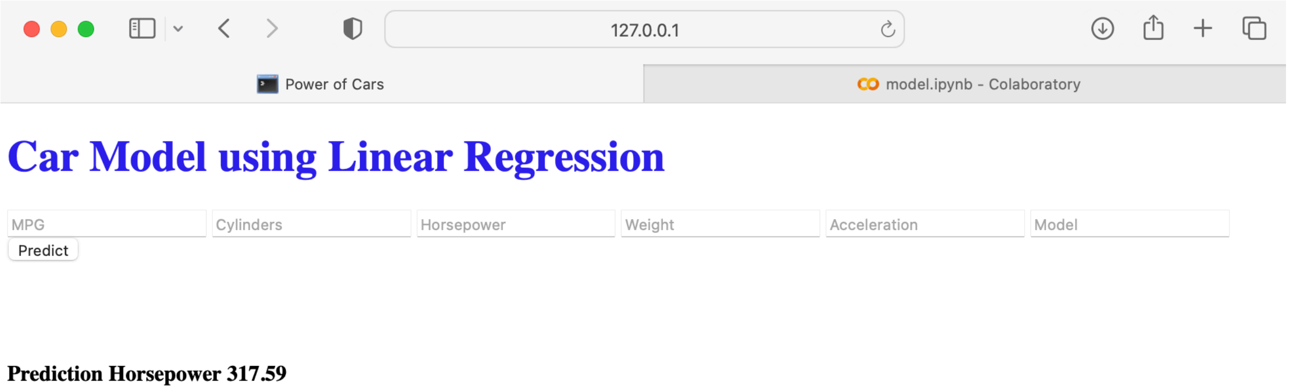


Car Model using Linear Regression



Car Model using Linear Regression

18.0	8	150.0	3436.0	11.0	70



Car Model using Linear Regression

Prediction Horsepower 317.59