multiple-linear-regression

November 10, 2024

```python
[4]: import matplotlib.pyplot as plt
     import numpy as np
     import pandas as pd
```

```python
[11]: df=pd.read_csv('insurance.csv')
      df.head()
```

```
[11]:    age     sex     bmi  children smoker     region      charges
     0   19  female  27.900         0    yes  southwest  16884.92400
     1   18    male  33.770         1     no  southeast   1725.55230
     2   28    male  33.000         3     no  southeast   4449.46200
     3   33    male  22.705         0     no  northwest  21984.47061
     4   32    male  28.880         0     no  northwest   3866.85520
```

```python
[17]: df['sex']=df['sex'].astype('category')
      df['sex']=df['sex'].cat.codes
      df['smoker']=df['smoker'].astype('category')
      df['smoker']=df['smoker'].cat.codes
      df['region']=df['region'].astype('category')
      df['region']=df['region'].cat.codes
      df
```

```
[17]:        age  sex     bmi  children  smoker  region      charges
      0       19    0  27.900         0       1       3  16884.92400
      1       18    1  33.770         1       0       2   1725.55230
      2       28    1  33.000         3       0       2   4449.46200
      3       33    1  22.705         0       0       1  21984.47061
      4       32    1  28.880         0       0       1   3866.85520
      ...    ...  ...     ...       ...     ...     ...          ...
      1333    50    1  30.970         3       0       1  10600.54830
      1334    18    0  31.920         0       0       0   2205.98080
      1335    18    0  36.850         0       0       2   1629.83350
      1336    21    0  25.800         0       0       3   2007.94500
      1337    61    0  29.070         0       1       1  29141.36030

      [1338 rows x 7 columns]
```

```
[19]: df.isnull().sum()
```

```
[19]: age         0
      sex         0
      bmi         0
      children    0
      smoker      0
      region      0
      charges     0
      dtype: int64
```

```
[21]: x=df.drop(columns='charges')
      x
```

```
[21]:       age  sex     bmi  children  smoker  region
      0      19    0  27.900         0       1       3
      1      18    1  33.770         1       0       2
      2      28    1  33.000         3       0       2
      3      33    1  22.705         0       0       1
      4      32    1  28.880         0       0       1
      ...   ...  ...     ...       ...     ...     ...
      1333   50    1  30.970         3       0       1
      1334   18    0  31.920         0       0       0
      1335   18    0  36.850         0       0       2
      1336   21    0  25.800         0       0       3
      1337   61    0  29.070         0       1       1

      [1338 rows x 6 columns]
```

```
[24]: y=df['charges']
```

```
[27]: from sklearn.model_selection import train_test_split
      x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3,random_state=0)
```

```
[28]: from sklearn.linear_model import LinearRegression
      lr=LinearRegression()
```

```
[29]: lr.fit(x_train,y_train)
```

```
[29]: LinearRegression()
```

```
[31]: c=lr.intercept_
      c
```

```
[31]: -11827.7331417957
```

```
[34]: m=lr.coef_
      m
```

```
[34]: array([  256.5772619 ,   -49.39232379,   329.02381564,   479.08499828,
              23400.28378787,  -276.31576201])
```

```
[36]: y_predict_train=lr.predict(x_train)
      y_predict_train
```

```
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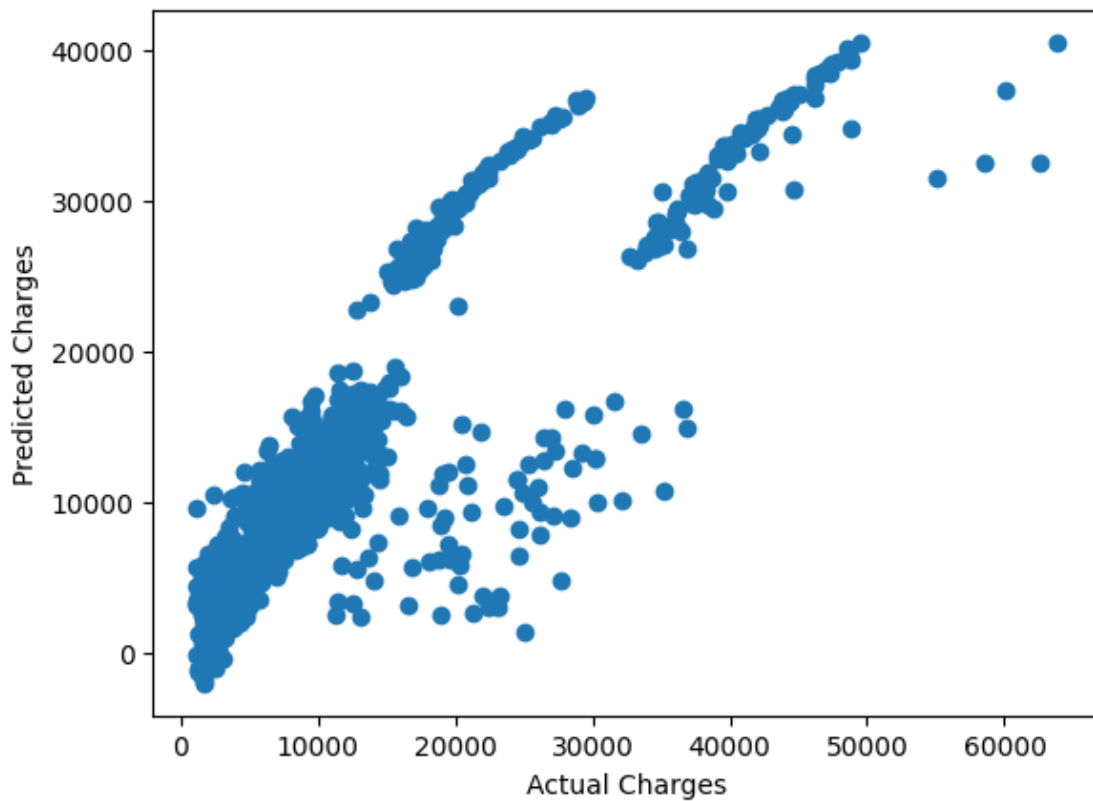
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      3285.00775314, 31519.53149568, 14184.46131254,  3881.66997242,
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     12765.64430125, 11624.73866694, 37091.3776533 , 10040.56284824,
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     11139.64465512,  6085.25078246,  4411.74291809,  2376.39480234])
```

[42]:
```python
plt.scatter(y_train,y_predict_train)
plt.xlabel("Actual Charges")
plt.ylabel("Predicted Charges")
plt.show()
```


[44]:
```python
from sklearn.metrics import r2_score
r2_score(y_train,y_predict_train)
```

[44]: 0.7306840408360217