boston-house-price-prediction

April 8, 2025

[1]:
```
import pandas as pd
import numpy as np
from sklearn.preprocessing import PolynomialFeatures
from sklearn.preprocessing import LabelEncoder, StandardScaler
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
import matplotlib.pyplot as plt
import seaborn as sns
df=pd.read_csv("/content/Boston.csv")
df
```

[1]:

	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	\
0	0.00632	18.0	2.31	0	0.538	6.575	65.2	4.0900	1	296	
1	0.02731	0.0	7.07	0	0.469	6.421	78.9	4.9671	2	242	
2	0.02729	0.0	7.07	0	0.469	7.185	61.1	4.9671	2	242	
3	0.03237	0.0	2.18	0	0.458	6.998	45.8	6.0622	3	222	
4	0.06905	0.0	2.18	0	0.458	7.147	54.2	6.0622	3	222	
..	…	…	…	…	…	…	…	…	…	…	
501	0.06263	0.0	11.93	0	0.573	6.593	69.1	2.4786	1	273	
502	0.04527	0.0	11.93	0	0.573	6.120	76.7	2.2875	1	273	
503	0.06076	0.0	11.93	0	0.573	6.976	91.0	2.1675	1	273	
504	0.10959	0.0	11.93	0	0.573	6.794	89.3	2.3889	1	273	
505	0.04741	0.0	11.93	0	0.573	6.030	80.8	2.5050	1	273	

	PTRATIO	LSTAT	PRICE
0	15.3	4.98	24.0
1	17.8	9.14	21.6
2	17.8	4.03	34.7
3	18.7	2.94	33.4
4	18.7	5.33	36.2
..	…	…	…
501	21.0	9.67	22.4
502	21.0	9.08	20.6
503	21.0	5.64	23.9
504	21.0	6.48	22.0
505	21.0	7.88	11.9

```
[506 rows x 13 columns]
```

[2]:
```
print("Missing values:\n", df.isnull().sum())
```

```
Missing values:
 CRIM       0
ZN          0
INDUS       0
CHAS        0
NOX         0
RM          0
AGE         0
DIS         0
RAD         0
TAX         0
PTRATIO     0
LSTAT       0
PRICE       0
dtype: int64
```

[3]:
```
df.fillna(df.mean(numeric_only=True), inplace=True)
df
```

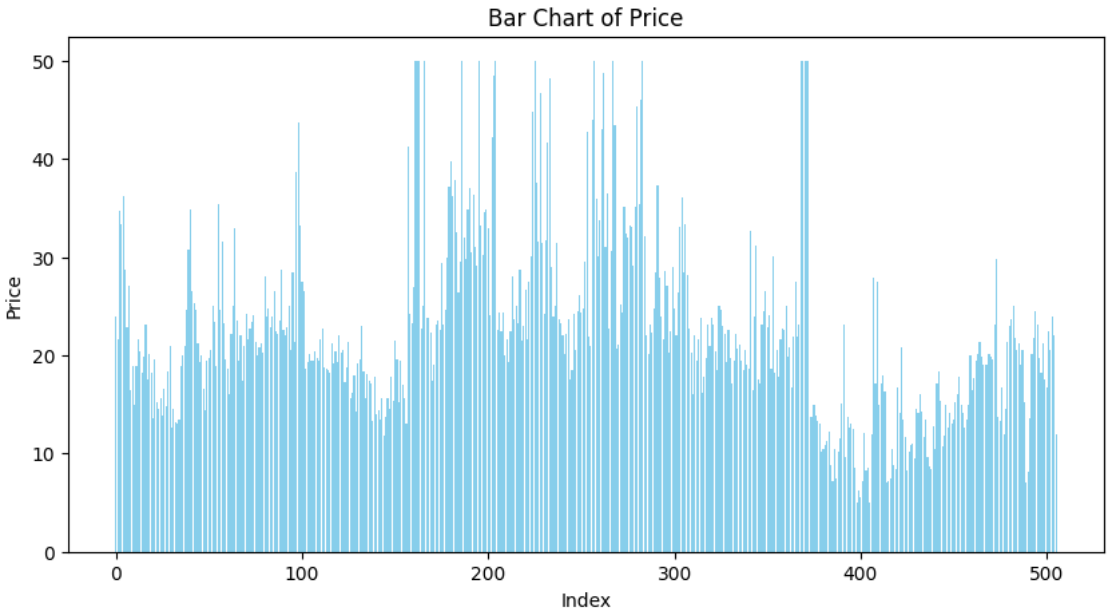
[3]:

	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	LSTAT	PRICE
0	0.00632	18.0	2.31	0	0.538	6.575	65.2	4.0900	1	296	15.3	4.98	24.0
1	0.02731	0.0	7.07	0	0.469	6.421	78.9	4.9671	2	242	17.8	9.14	21.6
2	0.02729	0.0	7.07	0	0.469	7.185	61.1	4.9671	2	242	17.8	4.03	34.7
3	0.03237	0.0	2.18	0	0.458	6.998	45.8	6.0622	3	222	18.7	2.94	33.4
4	0.06905	0.0	2.18	0	0.458	7.147	54.2	6.0622	3	222	18.7	5.33	36.2
..	…	…	…	…	…	…	…	…	…	…	…	…	…
501	0.06263	0.0	11.93	0	0.573	6.593	69.1	2.4786	1	273	21.0	9.67	22.4
502	0.04527	0.0	11.93	0	0.573	6.120	76.7	2.2875	1	273	21.0	9.08	20.6
503	0.06076	0.0	11.93	0	0.573	6.976	91.0	2.1675	1	273	21.0	5.64	23.9
504	0.10959	0.0	11.93	0	0.573	6.794	89.3	2.3889	1	273	21.0	6.48	22.0
505	0.04741	0.0	11.93	0	0.573	6.030	80.8	2.5050	1	273			

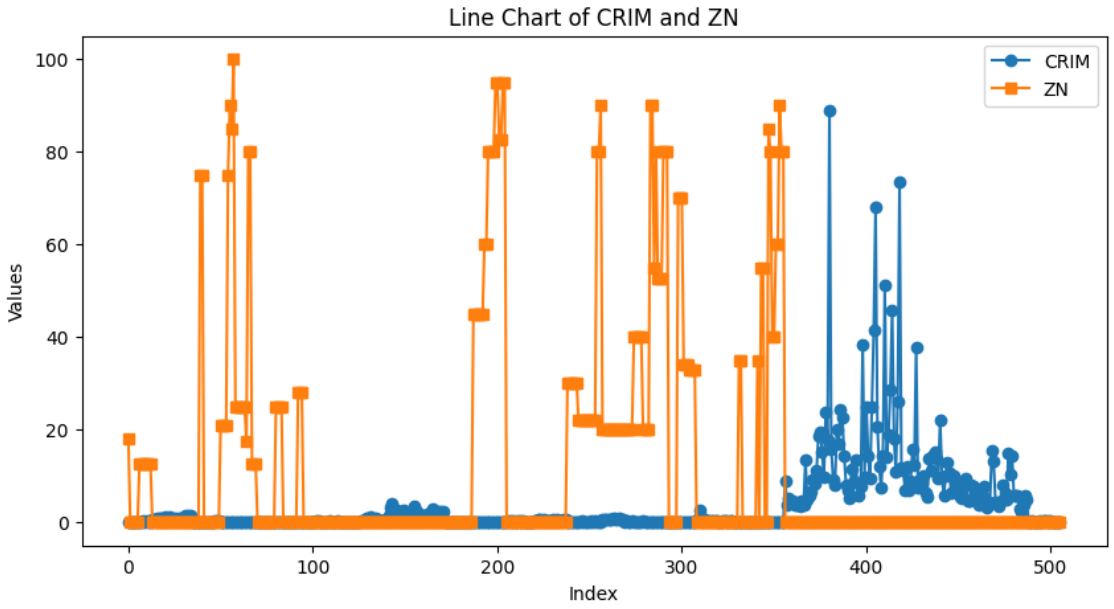
```
505     21.0   7.88   11.9

[506 rows x 13 columns]
```

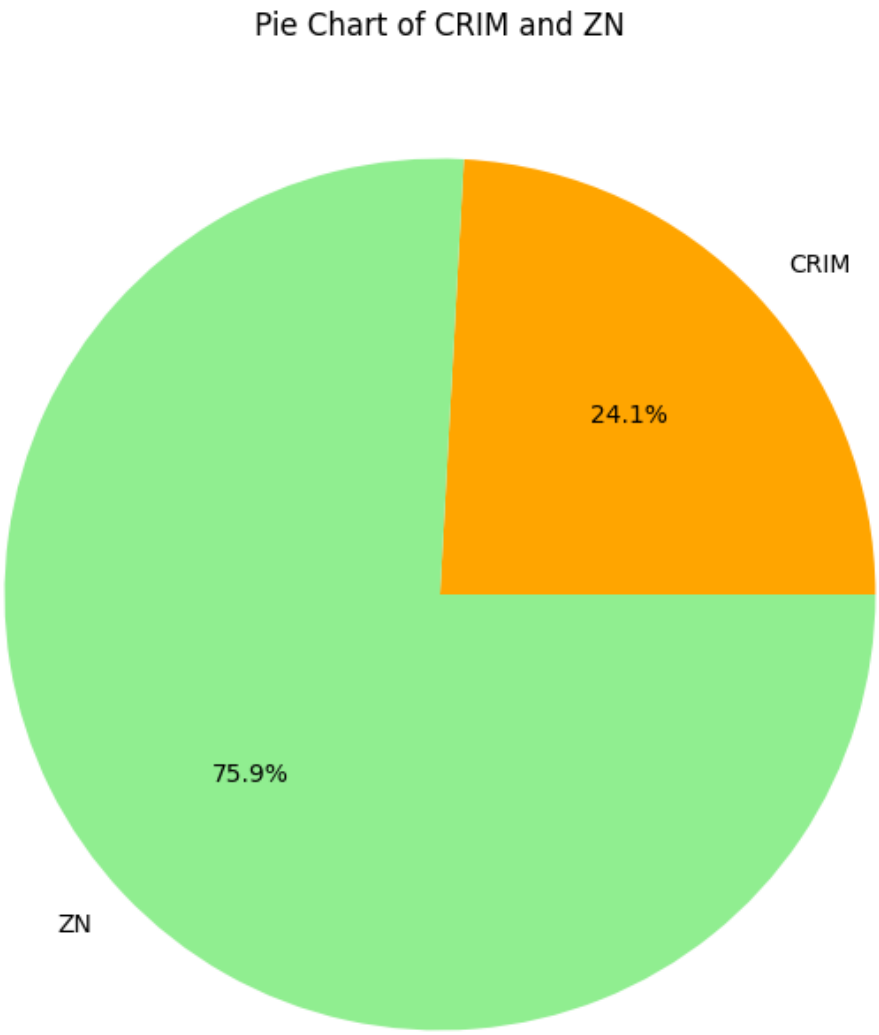
[4]:
```
plt.figure(figsize=(10, 5))
plt.bar(df.index, df["PRICE"], color='skyblue')
plt.xlabel('Index')
plt.ylabel('Price')
plt.title('Bar Chart of Price')
plt.show()
```



[5]:
```
plt.figure(figsize=(10, 5))
plt.plot(df.index, df["CRIM"], marker='o', label='CRIM')
plt.plot(df.index, df["ZN"], marker='s', label='ZN')
plt.xlabel('Index')
plt.ylabel('Values')
plt.title('Line Chart of CRIM and ZN')
plt.legend()
plt.show()
```



[6]:
```
plt.figure(figsize=(8, 8))
df_sum = df[['CRIM', 'ZN']].sum()
plt.pie(df_sum, labels=df_sum.index, autopct='%1.1f%%', colors=['orange',␣
 ↪'lightgreen'])
plt.title('Pie Chart of CRIM and ZN')
plt.show()
```



[7]:
```
X = df[['RM']]
Y= df['PRICE']
```

[9]:
```
```

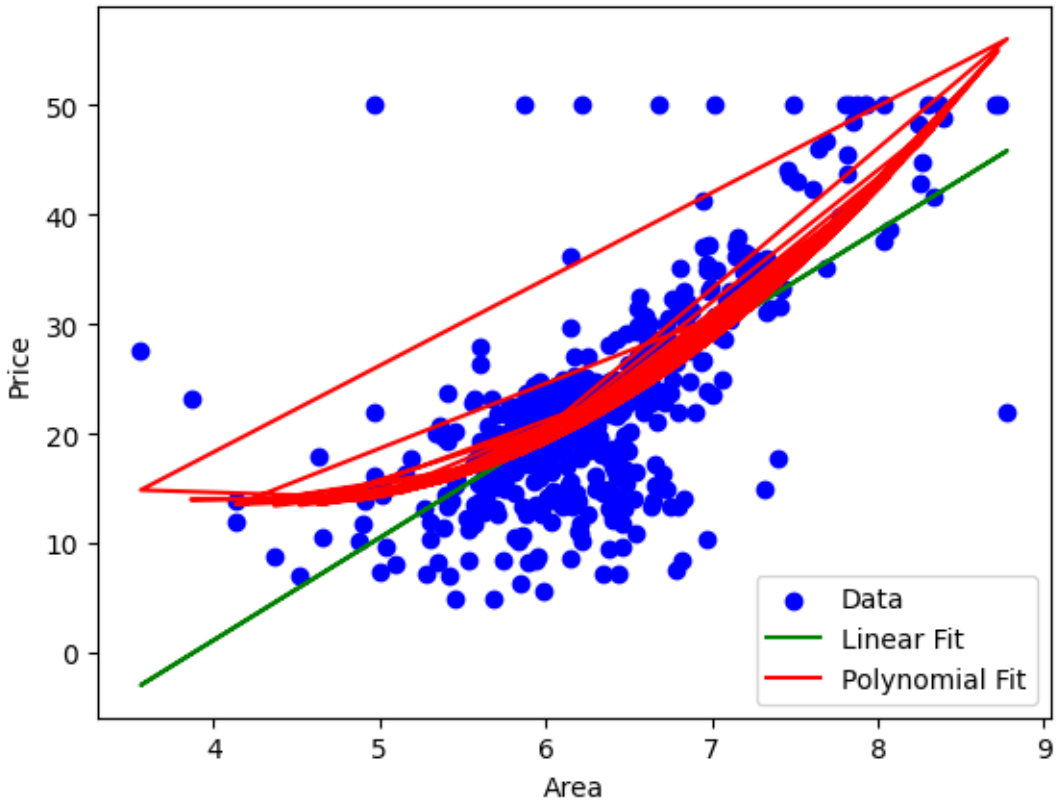
[16]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2,␣
 ↪random_state=42)
model = LinearRegression()
model.fit(X_train,Y_train)
```

[16]:
```
LinearRegression()
```

[17]:
```
poly =  PolynomialFeatures(degree=2)
X_train_poly = poly.fit_transform(X_train)
X_test_poly = poly.transform(X_test)
model_poly = LinearRegression()
model_poly.fit(X_train_poly,Y_train)
Y_pred_poly = model_poly.predict(X_test_poly)
Y_pred_poly
```

[17]:
```
array([22.57044085, 25.89363925, 19.09936696, 19.69354895, 21.53450285,
       21.38321761, 18.62224744, 20.52906029, 20.97044158, 19.41452738,
       18.87549604, 19.24872456, 13.45760258, 20.99489874, 17.32211331,
       28.32555269, 18.38821771, 13.97502443, 40.32360816, 20.61627449,
       21.06031093, 23.17178765, 17.35146465, 24.22625593, 19.26305004,
       15.84891892, 18.35522376, 25.58159155, 18.93800551, 17.84224211,
       16.56583571, 22.66032517, 32.37897075, 15.55749524, 19.24156841,
       17.3279748 , 30.76332053, 18.32233953, 19.68612508, 21.10133618,
       15.68075825, 26.86434588, 42.82284781, 16.68267131, 22.57940953,
       17.35146465, 17.28120576, 22.57940953, 20.47383684, 24.05158774,
       19.28457116, 28.18856816, 20.27836569, 26.13555073, 34.4588527 ,
       21.6616601 , 20.88920298, 26.99506336, 22.32994534, 16.74188566,
       25.93554404, 31.5621576 , 23.83046987, 15.9849205 , 24.09028001,
       15.48007165, 23.0702356 , 21.57677888, 24.24575128, 19.05001119,
       17.79248877, 25.81004033, 18.22434513, 18.77210355, 20.2628465 ,
       15.97068021, 20.47383684, 39.9865393 , 23.76363394, 15.7891508 ,
       18.42795528, 16.80708878, 18.36840817, 14.37559779, 19.38552533,
       25.56092881, 25.30412571, 22.56147655, 20.82452809, 22.91433604,
       19.36381988, 15.3131101 , 21.78123109, 18.51459534, 14.85727864,
       22.18016361, 20.86491698, 13.55355818, 22.97837637, 24.8588143 ,
       19.32773191, 21.44188179])
```

[15]:
```
plt.scatter(X, Y, color='blue', label='Data')
plt.plot(X, model.predict(X), color='green', label='Linear Fit')
plt.plot(X, model_poly.predict(poly.transform(X)), color='red',␣
 ↪label='Polynomial Fit')
plt.xlabel('Area')
plt.ylabel('Price')
plt.legend()
plt.show()
```


Price
Area
Data
Linear Fit
Polynomial Fit
0
10
20
30
40
50
4
5
6
7
8
9