gpquaf5pj

February 5, 2025

1 Machine Learning Part 3

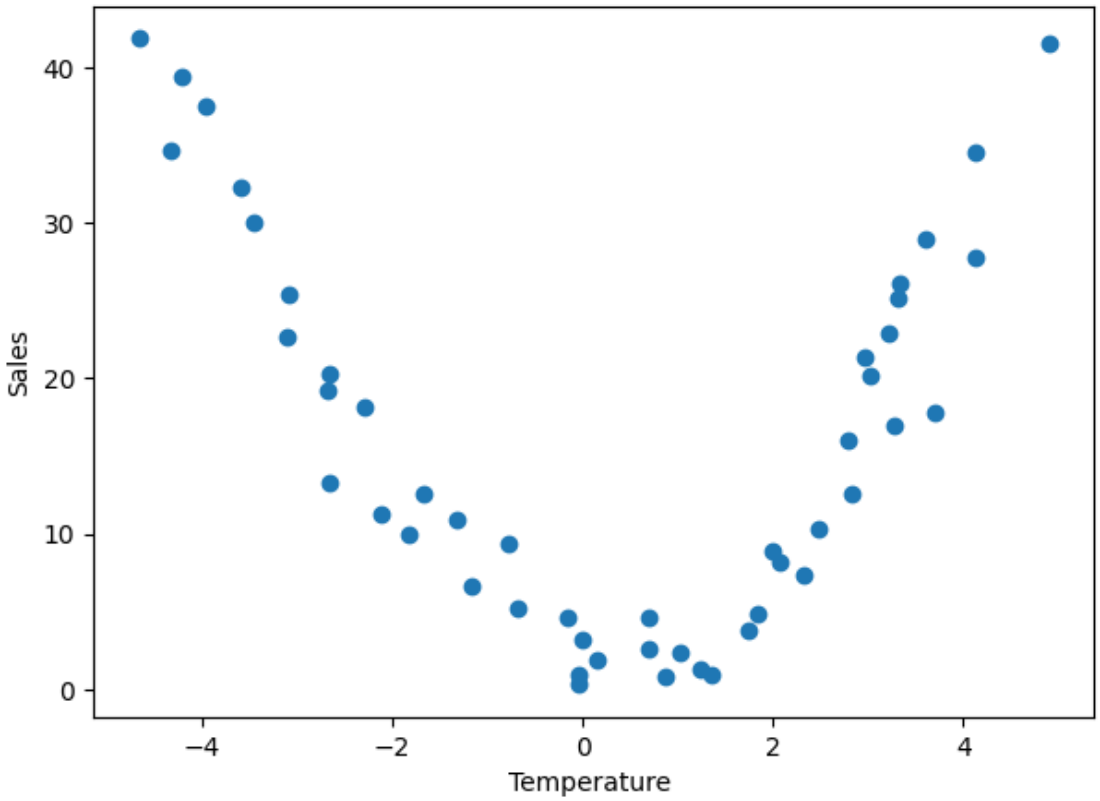
[79]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
from sklearn.preprocessing import PolynomialFeatures
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression , Lasso , Ridge
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import mean_squared_error, mean_absolute_error

data = pd.read_csv("Ice_cream selling data.csv")
data.head()
```

[79]:

	Temperature (°C)	Ice Cream Sales (units)
0	-4.662263	41.842986
1	-4.316559	34.661120
2	-4.213985	39.383001
3	-3.949661	37.539845
4	-3.578554	32.284531

2 Polynomial Regression

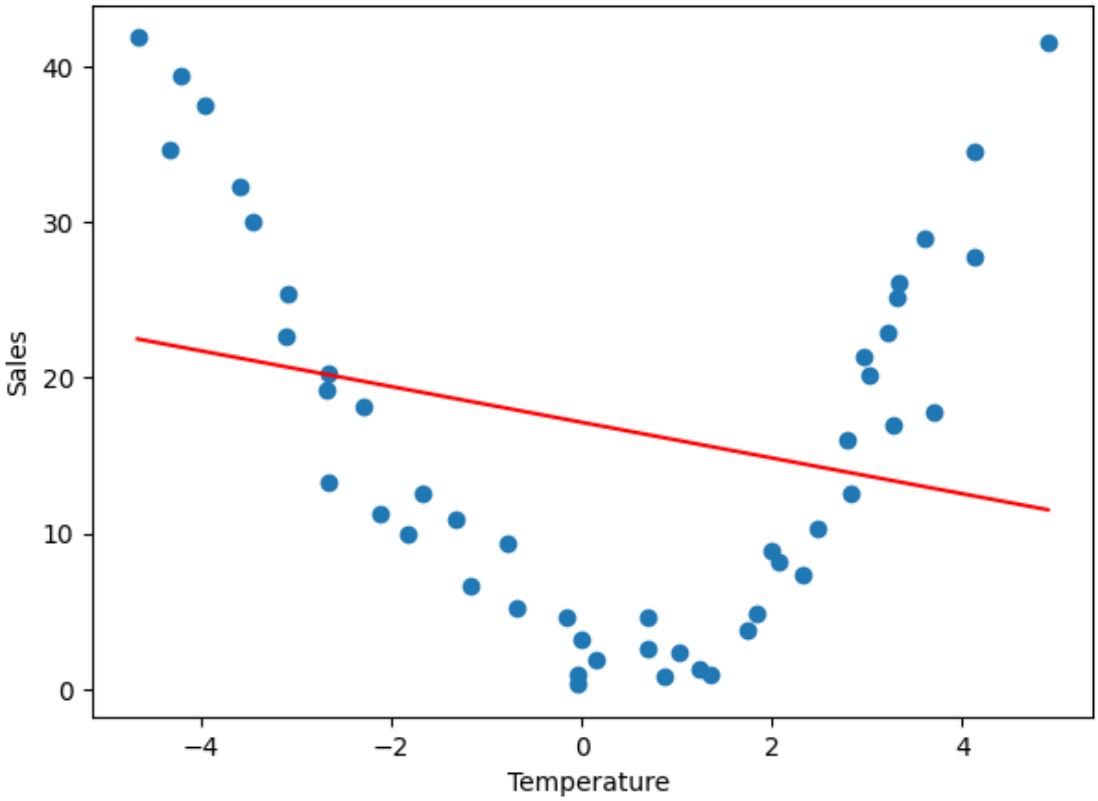
[5]:
```
plt.figure(figsize = (7 ,5))
plt.scatter(data["Temperature (°C)"],data["Ice Cream Sales (units)"])
plt.xlabel("Temperature ")
plt.ylabel("Sales")
plt.show()
```



[7]:
```
x = data[["Temperature (°C)"]]
y = data["Ice Cream Sales (units)"]

pf = PolynomialFeatures(degree = 2)

pf.fit(x)

pf.transform(x)

x_train,x_test,y_train,y_test = train_test_split(x,y,test_size = 0.
↪2,random_state = 42)

lr = LinearRegression()

lr.fit(x_train,y_train)

lr.score(x_test,y_test) * 100
```

[7]:
```
-57.512701901882245
```

[9]:
```
plt.figure(figsize = (7 ,5))
pred = lr.predict(x)
plt.scatter(data["Temperature (°C)"],data["Ice Cream Sales (units)"])
plt.plot(data["Temperature (°C)"],pred,c = "red")
plt.xlabel("Temperature ")
plt.ylabel("Sales")
plt.show()
```



3 Cost Function

[10]:
```
# Two Type of Cost Function
# Regression Cost Function
# Classification Cost Function

# Regression Cost Function

# 1. MSE (Mean Square Error)
# 2. RMSE (Root Mean Square Error)
# 3. MAE (Mean Absolute Error)
# 4. R^2 Accuracy
```

```
# Classification Cost Function

# 1. Binary Classification Cost Function(determine 0 or 1)
# 2. Multi-Class Classification Cost Function (use Binary cross entropy , Log␣
 ↪loss )
```

4 Regularization Technique

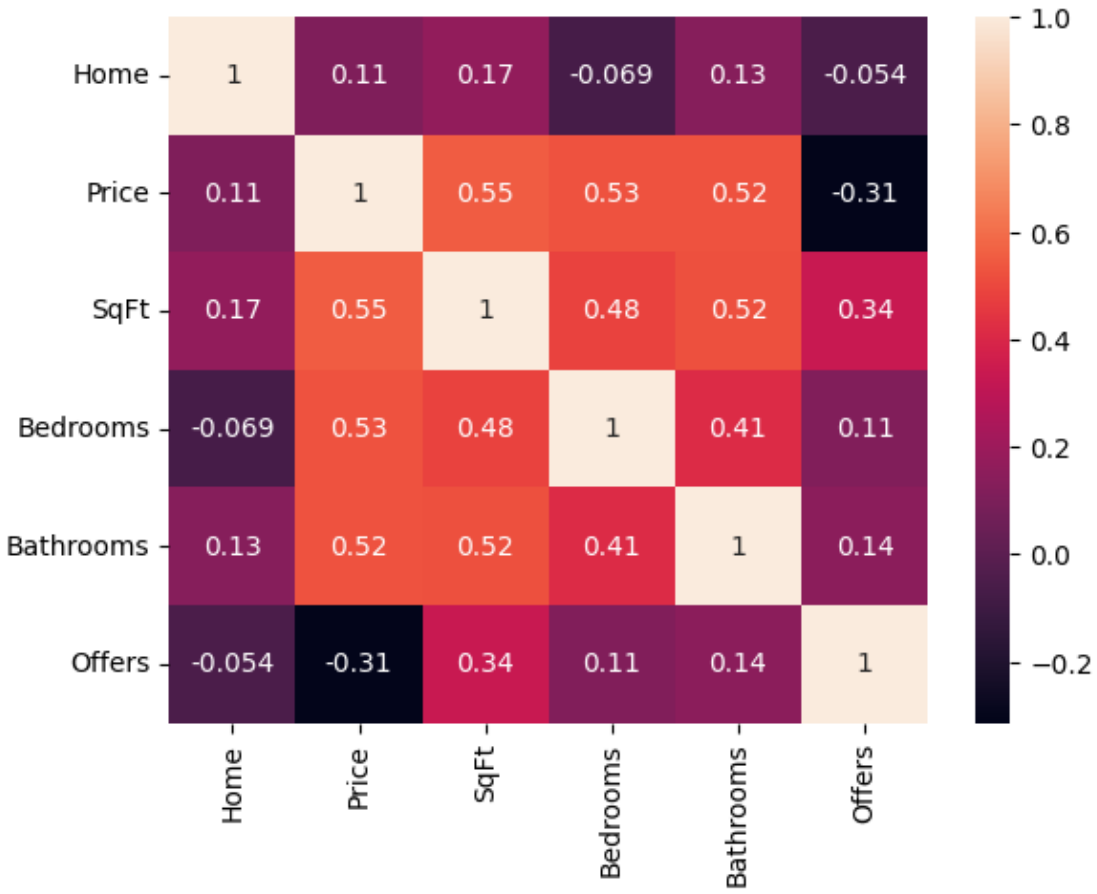
[11]:
```
# 1.Lasso Regularization L1 (Feature Selection )

    # cost Function = loss + meu * ==||w||

    # loss = sum of squared residual
    # meu = penalty
    # w = slope of the curve

# 2.Ridge Regularization L2

     # cost Function = loss + meu * ==||w||^2

    # loss = sum of squared residual
    # meu = penalty
    # w = slope of the curve
```

[38]:
```
dataset = pd.read_csv("/Users/ratnadeepgurav/Desktop/AIDS/Study for carrer␣
 ↪material/WSCUBE_Data_Analyst/ML/house-prices.csv")


# dataset.drop(columns = ["Brick","Neighborhood"],inplace = True)
dataset.head(3)
```

[38]:

	Home	Price	SqFt	Bedrooms	Bathrooms	Offers	Brick	Neighborhood
0	1	114300	1790	2	2	2	No	East
1	2	114200	2030	4	2	3	No	East
2	3	114800	1740	3	2	1	No	East

[20]:
```
numeric_dataset = dataset.select_dtypes(include=['number'])
sns.heatmap(data=numeric_dataset.corr(), annot=True)
plt.show()
```



[39]:
```
x1 = numeric_dataset.iloc[:,:-1]
y1 = numeric_dataset["Price"]
```

[62]:
```
sc1 = StandardScaler()

sc1.fit(x1)
sc1.transform(x1)
```

[62]:
```
array([[-1.71857161, -0.6025848 , -1.00091648, -1.41532739, -0.86893879],
       [-1.69150749, -0.60632122,  0.13790405,  1.35050324, -0.86893879],
       [-1.66444337, -0.58390272, -1.23817076, -0.03241208, -0.86893879],
       [-1.63737925, -1.33492252, -0.09935023, -0.03241208, -0.86893879],
       [-1.61031513, -0.39708187,  0.6124126 , -0.03241208,  1.08236235],
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       [-1.44793041,  0.07744308,  0.13790405, -0.03241208, -0.86893879],
```

```
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```

```
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```

```
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[ 1.28554569, -0.5801663 , -1.23817076, -1.41532739, -0.86893879],
[ 1.31260981, -0.25509803, -0.28915365, -1.41532739, -0.86893879],
[ 1.33967393, -0.55027497, -0.00444852, -0.03241208, -0.86893879],
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[ 1.71857161, -0.21773386,  1.18182287, -0.03241208,  1.08236235]])
```

[77]:
```
x_train,x_test,y_train,y_test = train_test_split(x1,y1,test_size = 0.
↪2,random_state = 42)

lr1 = LinearRegression()

lr1.fit(x_train, y_train)

print("Accuracy Are :- ",lr1.score(x_test,y_test)*100,"%")
```

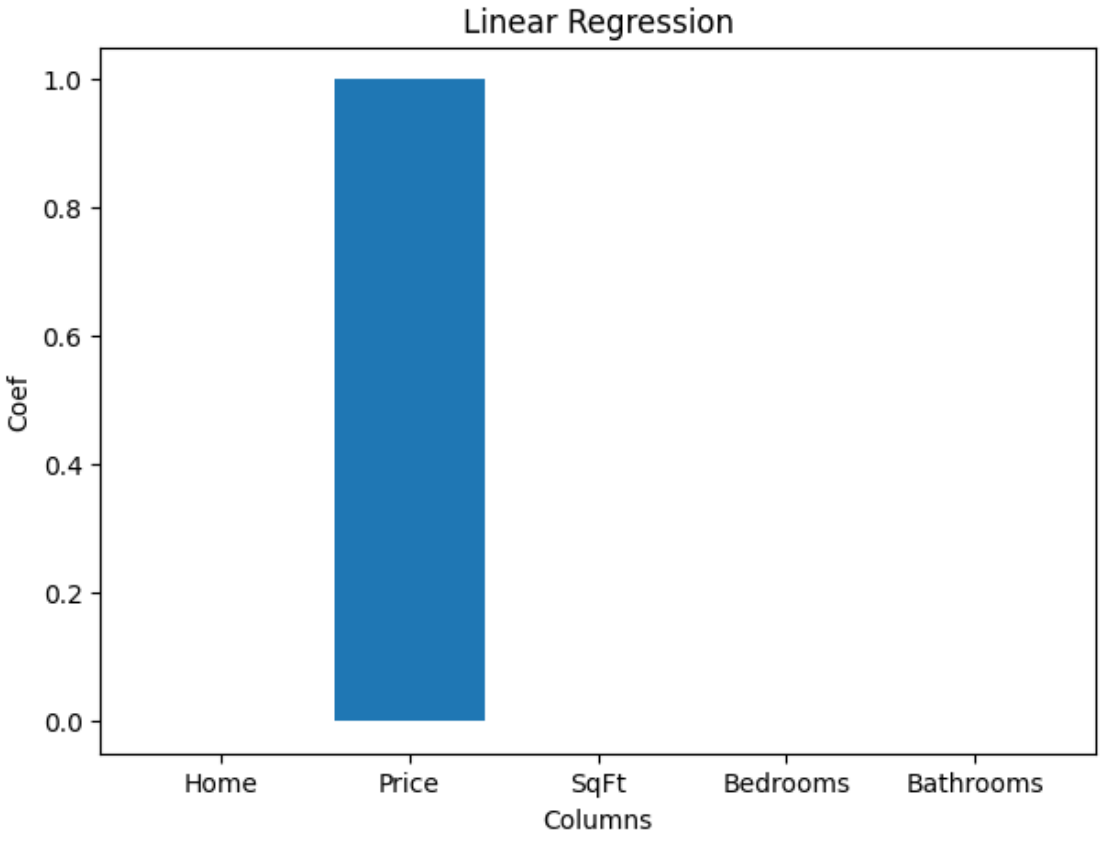
```
Accuracy Are :-  100.0 %
```

5 MSE , MAE , Sqrt (Linear Regression)

[81]:
```
print(mean_squared_error(y_test,lr1.predict(x_test)))
print(mean_absolute_error(y_test,lr1.predict(x_test)))
print(np.sqrt(mean_squared_error(y_test,lr1.predict(x_test))))
```

```
4.072273784876444e-23
2.7984452362243947e-12
6.381436973657613e-12
```

[58]:
```
plt.figure(figsize = (7,5))
plt.bar(x1.columns , lr1.coef_)
plt.title("Linear Regression")
plt.xlabel("Columns")
plt.ylabel("Coef")
plt.show()
```



6 Lasso Regularization

[82]:
```
ls = Lasso(alpha = 0.01)
ls.fit(x_train,y_train)
ls.score(x_test,y_test)*100
```

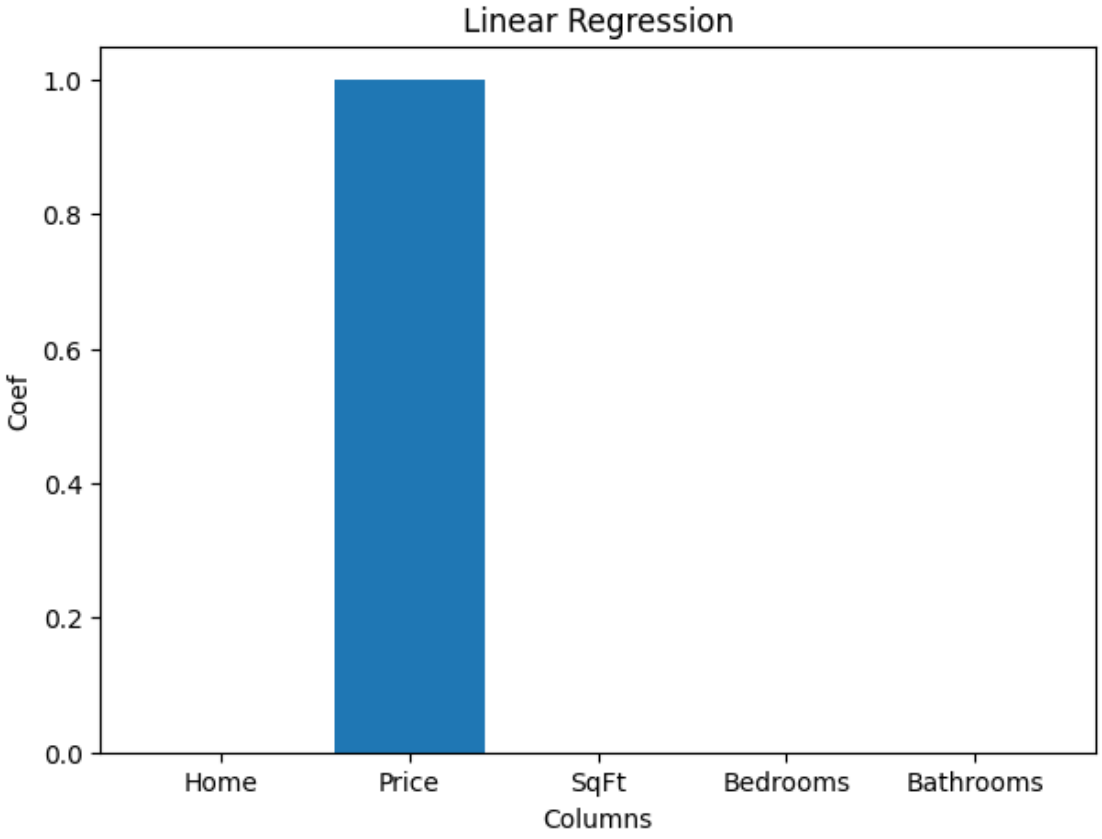
[82]: 99.99999999999237

7 MSE , MAE , Sqrt (Lasso Regularization)

[84]:
```
print(mean_squared_error(y_test,ls.predict(x_test)))
print(mean_absolute_error(y_test,ls.predict(x_test)))
print(np.sqrt(mean_squared_error(y_test,ls.predict(x_test))))
```

```
4.49281312773769e-05
0.005261028317573409
0.00670284501367717
```

[71]:
```
plt.figure(figsize = (7,5))
plt.bar(x1.columns , ls.coef_)
plt.title("Linear Regression")
plt.xlabel("Lasso")
plt.ylabel("Coef")
plt.show()
```



8 Ridge Regularization

[83]:
```
ri = Ridge(alpha = 10)
ri.fit(x_train,y_train)
ri.score(x_test,y_test)*100
```

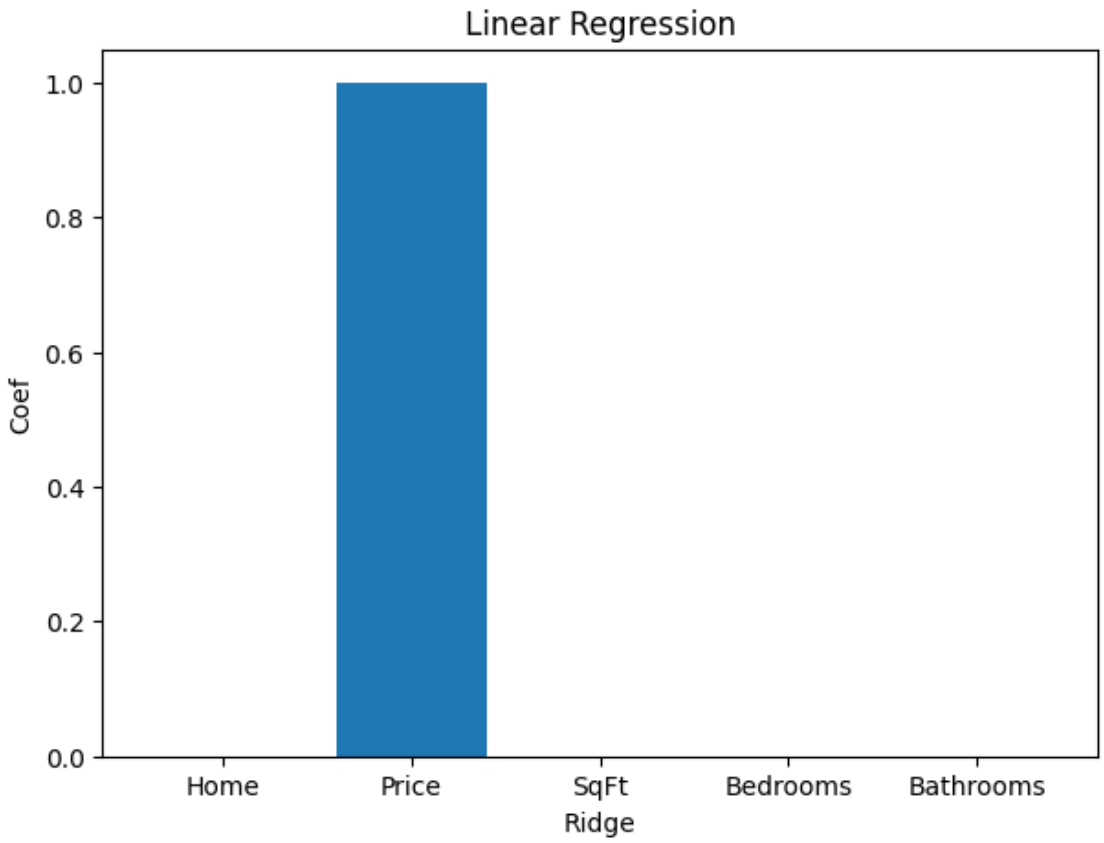
[83]: 100.0

9 MSE , MAE , Sqrt (Ridge Regularization)

[86]:
```
print(mean_squared_error(y_test,ri.predict(x_test)))
print(mean_absolute_error(y_test,ri.predict(x_test)))
print(np.sqrt(mean_squared_error(y_test,ri.predict(x_test))))
```

```
1.699484056352091e-11
3.4043461290331415e-06
4.122479904562411e-06
```

[75]:
```
plt.figure(figsize = (7,5))
plt.bar(x1.columns , ls.coef_)
plt.title("Linear Regression")
plt.xlabel("Ridge")
plt.ylabel("Coef")
plt.show()
```



[92]:
```
data_show = pd.DataFrame({"Columns ":x1.columns,"Linear Regression":lr1.
 ↪coef_,"Lasso":ls.coef_,"Ridge":ri.coef_})
data_show
```

[92]:

	Columns	Linear Regression	Lasso	Ridge
0	Home	2.326706e-14	0.000031	1.310271e-08
1	Price	1.000000e+00	1.000000	1.000000e+00
2	SqFt	1.185332e-14	0.000023	1.048505e-08
3	Bedrooms	4.666661e-13	0.000000	2.093017e-06
4	Bathrooms	-5.045109e-12	0.000000	1.943074e-06