exp2

September 22, 2023

[1]:
```
#part 1
```

[2]:
```
X=[2,3,4,5,6,7,8,9,10]
Y=[1,3,6,9,11,13,15,17,20]
```

[4]:
```
def eqOfLine(m,c,x):
    return m*x+c
```

[11]:
```
def fancyPrint(x,y,xy,xsquar):
    print('\tX\tY\tXY\tX^2')
    for i in range(len(x)):
        print('\t',x[i],'\t',y[i],'\t',xy[i],'\t',xsquar[i])
    print('sum :\t',sum(x),'\t',sum(y),'\t',sum(xsquar),'\t',sum(xsquar))
```

[22]:
```
def leastSquareReg(X,Y):
    n=len(X)
    xsquar=[x*x for x in X]
    xy=[X[i]*Y[i] for i in range(n)]
    slope=(n*sum(xy)-sum(X)*sum(Y))/(n*sum(xsquar)-sum(X)**2)
    intercept=sum(Y)/n-slope*sum(X)/n
    fancyPrint(X,Y,xy,xsquar)
    print('\nslope     :',slope)
    print('intercept :',intercept)
    return slope,intercept
```

[23]:
```
m,c=leastSquareReg(X,Y)
```

```
        X       Y       XY      X^2
         2       1       2       4
         3       3       9       9
         4       6       24      16
         5       9       45      25
         6       11      66      36
         7       13      91      49
         8       15      120     64
         9       17      153     81
         10      20      200     100
sum :    54      95      710     384
```

```
slope     : 2.3333333333333335
intercept : -3.4444444444444464
```

[26]:
```
#prediction with custom model
y=eqOfLine(m,c,4)
print('predicted y = ',y)
print('actual y    = ',6)
```

```
predicted y =  5.8888888888888875
actual y    =  6
```

[27]:
```
#root mean squared error for custom model
rmse=(((y-6)**2)/1)**0.5
print('rmse = ',rmse)
```

```
rmse =  0.11111111111111249
```

[33]:
```
#part 2
#dataset : https://www.kaggle.com/datasets/mdrazakhan/linear-regression-dataset
```

[35]:
```
import pandas as pd
from sklearn import linear_model
import matplotlib.pyplot as plt
```

[36]:
```
df=pd.read_csv('dataset\cars.csv')
```

[38]:
```
df.head()
```

[38]:

	Car	Model	Volume	Weight	CO2
0	Toyoty	Aygo	1000	790	99
1	Mitsubishi	Space Star	1200	1160	95
2	Skoda	Citigo	1000	929	95
3	Fiat	500	900	865	90
4	Mini	Cooper	1500	1140	105

[43]:
```
x=df[['Weight']]
y=df['CO2']
```

[45]:
```
regrLine=linear_model.LinearRegression()
regrLine.fit(x, y)
```

[45]:
```
LinearRegression()
```

[54]:
```
# Coefficient
print("Coefficient : ",end=' ')
print(regrLine.coef_)
```

```
Coefficient :  [0.01699973]
```

[55]:
```
predictedCO2 = regrLine.predict([[990]])
print("predicted CO2 for weight=990kg :",end=' ')
print(predictedCO2)
```

```
predicted CO2 for weight=1000kg : [96.88913578]

c:\Users\HP\AppData\Local\Programs\Python\Python310\lib\site-
packages\sklearn\base.py:465: UserWarning: X does not have valid feature names,
but LinearRegression was fitted with feature names
  warnings.warn(
```

[59]:
```
print("actual CO2 for weight=990kg :")
print(df.iloc[11])
```

```
actual CO2 for weight=990kg :
Car       Suzuki
Model      Swift
Volume      1300
Weight       990
CO2          101
Name: 11, dtype: object
```