

Goeduhub_Assignment - 7

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Q. Prediction using Supervised Machine Learning using Simple Linear Regression

In this task we have to find the students scores based on their study hours. This is a simple Regression problem type because it has only two variables.

```
In [ ]: import pandas as pd  
import numpy as np  
import sklearn  
import matplotlib.pyplot as plt
```

```
In [ ]: df = pd.read_csv("/content/StudentHoursScores.csv")  
df
```

Out[]:

	Hours	Scores
0	7.7	79
1	5.9	60
2	4.5	45
3	3.3	33
4	1.1	12
5	8.9	87
6	2.5	21
7	1.9	19
8	2.7	29
9	8.3	81
10	5.5	58
11	9.2	88
12	1.5	14
13	3.5	34
14	8.5	85
15	3.2	32
16	6.5	66
17	2.5	21
18	9.6	96
19	4.3	42
20	4.1	40
21	3.0	30
22	2.6	25

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

Out[]:

	Hours	Scores
0	7.7	79
1	5.9	60
2	4.5	45
3	3.3	33
4	1.1	12

```
In [ ]: df.tail()
```

Out[]:

	Hours	Scores
18	9.6	96
19	4.3	42
20	4.1	40
21	3.0	30
22	2.6	25

```
In [ ]: df.columns
```

Out[]: Index(['Hours', 'Scores'], dtype='object')

```
In [ ]: df.shape
```

Out[]: (23, 2)

```
In [ ]: df.ndim
```

Out[]: 2

```
In [ ]: df.describe()
```

Out[]:

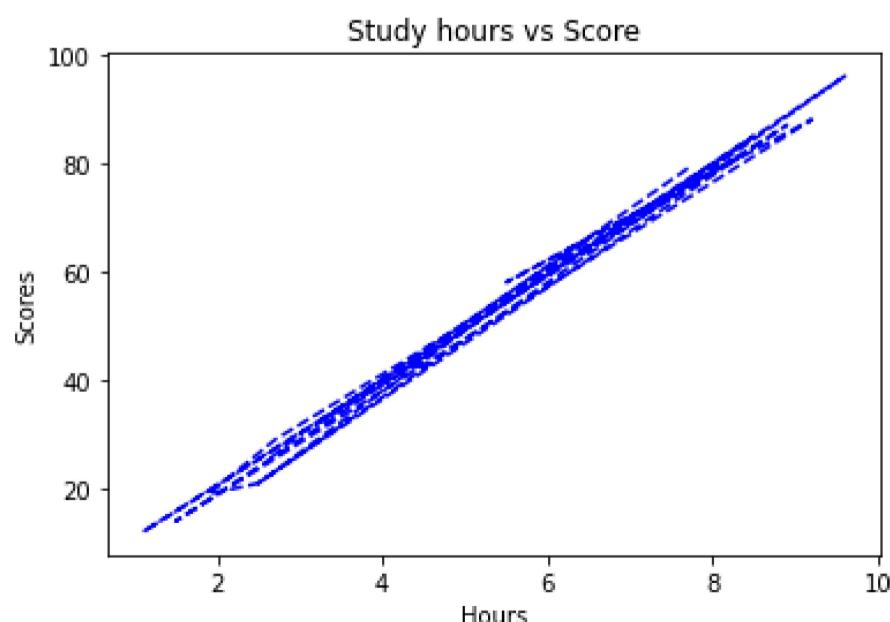
	Hours	Scores
count	23.000000	23.000000
mean	4.817391	47.695652
std	2.709688	27.103228
min	1.100000	12.000000
25%	2.650000	27.000000
50%	4.100000	40.000000
75%	7.100000	72.500000
max	9.600000	96.000000

```
In [ ]: df.corr()
```

Out[]:

	Hours	Scores
Hours	1.000000	0.997656
Scores	0.997656	1.000000

```
In [ ]: plt.title("Study hours vs Score")
plt.xlabel("Hours")
plt.ylabel("Scores")
plt.plot(df["Hours"], df["Scores"], "b--")
plt.show()
```



```
In [ ]: x = df.iloc[:, :-1]
y = df.iloc[:, 1]
print(x, "\n")
print(y)
```

```
Hours
0    7.7
1    5.9
2    4.5
3    3.3
4    1.1
5    8.9
6    2.5
7    1.9
8    2.7
9    8.3
10   5.5
11   9.2
12   1.5
13   3.5
14   8.5
15   3.2
16   6.5
17   2.5
18   9.6
19   4.3
20   4.1
21   3.0
22   2.6

0    79
1    60
2    45
3    33
4    12
5    87
6    21
7    19
8    29
9    81
10   58
11   88
12   14
13   34
14   85
15   32
16   66
17   21
18   96
19   42
20   40
21   30
22   25
Name: Scores, dtype: int64
```

```
In [ ]: from sklearn.model_selection import train_test_split

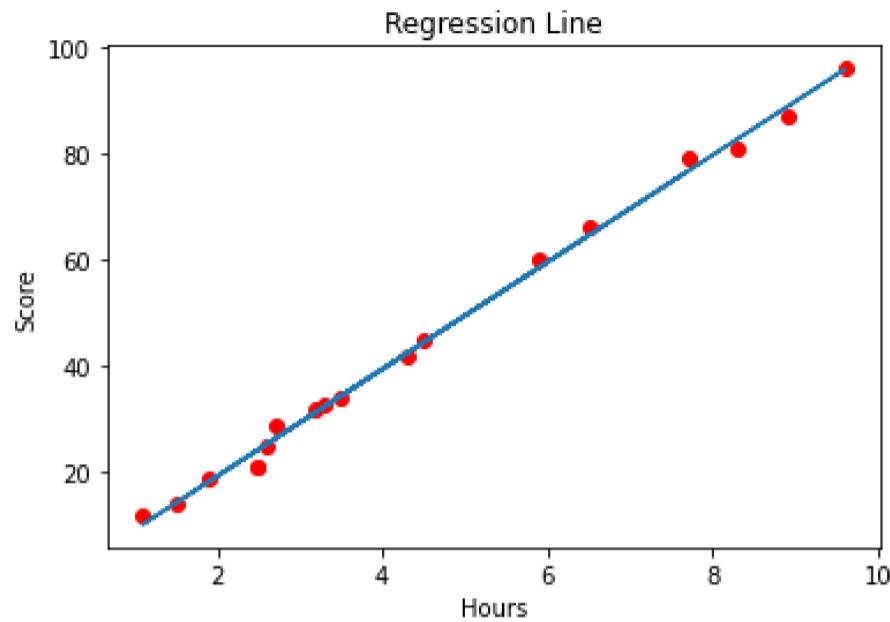
xtrain, xtest, ytrain, ytest = train_test_split(x, y, test_size = 0.2, random_state = 0)
```

```
In [ ]: from sklearn.linear_model import LinearRegression

model = LinearRegression()
model.fit(xtrain, ytrain)
y_pred = model.predict(xtest)
print("Prediction of testing data by model:\n", y_pred)
```

```
Prediction of testing data by model:
[91.81882791 54.56931042 29.40071751 84.7716219  40.47489839]
```

```
In [ ]: plt.scatter(xtrain,ytrain, color = 'red')
plt.plot(xtrain,model.predict(xtrain))
plt.title("Regression Line")
plt.xlabel("Hours")
plt.ylabel("Score")
plt.show()
```



```
In [ ]: print("Coefficient:", model.coef_)
print("Slope/Intercept:", model.intercept_)
```

```
Coefficient: [10.06743716]
Slope/Intercept: -0.8015939692559186
```

```
In [ ]: from sklearn.metrics import r2_score
accuracy = r2_score(ytest, y_pred)
print("Accuracy of model is:", accuracy*100, "%")
```

```
Accuracy of model is: 99.00509060111312 %
```

```
In [ ]: ip = float(input("Enter number of hours: "))
answer = model.predict([[ip]])
print("Predicted score is:", answer)
```

```
Enter number of hours: 6
Predicted score is: [59.603029]
```

```
In [ ]: import math
```

```
In [77]: x=np.array([1,2,3,4,5]) # y=3x+2  
y = np.array([5,8,11,14,17])
```

```
def gradient(x,y):  
    a=0  
    b=0  
    rate=0.01  
    n=len(x)  
    plt.scatter(x,y,color='red')  
    cost_old=0  
    for i in range(1000):  
        y_pred = a*x+b  
        cost = (1/n)*sum([value**2 for value in (y - y_pred)])  
        print(a,b,i,cost)  
        plt.plot(x,y_pred, cost)  
        ad = -(2/n)*sum(x*(y-y_pred))  
        yd = -(2/n)*sum(y-y_pred)  
        a = a - rate*ad  
        b = b-rate*yd  
        if math.isclose(cost,cost_old):  
            print(cost_old)  
            break  
        cost_old = cost  
    return a,b  
  
df = pd.read_csv("/content/salaryData.csv")  
x = np.array(df['YearsExperience'])  
y = np.array(df['Salary'])  
  
m,b = gradient(x,y)  
print(m,b)
```

0 0 0 6502955270.733334
9547.974 1520.06 1 595473385.3584363
12056.692352666667 1995.087429599997 2 183107992.77965578
12707.817670443617 2194.021173664622 3 153439943.15246922
12868.775691779305 2319.7833257455213 4 150431609.68263757
12900.425960385055 2425.925762384197 5 149287859.19466746
12897.99808257166 2526.581981746261 6 148281849.30853176
12886.622685165637 2625.4830792033877 7 147293253.18832058
12872.931475734644 2723.614980275718 8 146313625.0332805
12858.674350809822 2821.239162515469 9 145342311.18563533
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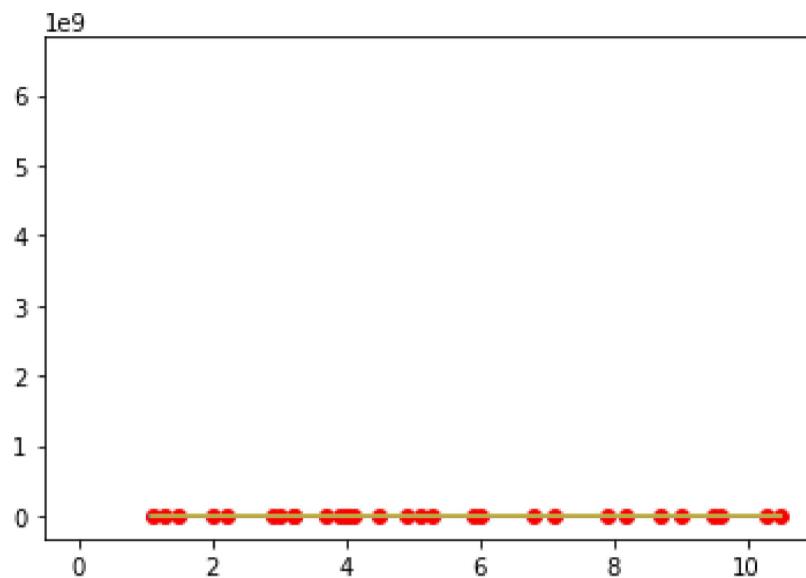
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```
9501.23010648545 25446.720202649136 999 31296754.38648182  
9501.013219578916 25448.181745946968
```



Pickle

```
In [ ]: import pickle  
  
In [ ]: with open("modelsave_pickle","wb") as file:  
        pickle.dump(model, file)  
  
In [ ]: with open("modelsave_pickle","rb") as file:  
        newmodel = pickle.load(file)  
  
In [ ]: newmodel.predict([[5]])  
Out[ ]: array([49.53559183])  
  
In [ ]: newmodel.coef_  
Out[ ]: array([10.06743716])
```

Joblib

```
In [ ]: from sklearn.externals import joblib  
joblib.dump(model, "model_joblib")  
  
Out[ ]: ['model_joblib']  
  
In [ ]: new_model = joblib.load("model_joblib")  
  
In [ ]: new_model  
Out[ ]: LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```