The Spark Foundation

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Task 1: Prediction using Supervised ML

This Task is to predict the percentage of a student based on the no. of study hours. This is a simple linear regression task as it involves just two variables.

In [14]:

```
#importing the libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:

```
#read the dataset
df=pd.read_csv("dataset.csv")
df
```

Out[3]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30
5	1.5	20
6	9.2	88
7	5.5	60
8	8.3	81
9	2.7	25
10	7.7	85
11	5.9	62
12	4.5	41
13	3.3	42
14	1.1	17
15	8.9	95
16	2.5	30
17	1.9	24
18	6.1	67

	Hours	Scores
19	7.4	69
20	2.7	30
21	4.8	54
22	3.8	35
23	6.9	76
24	7.8	86

In [4]:

```
df.shape
```

Out[4]:

```
(25, 2)
```

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25 entries, 0 to 24
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   Hours   25 non-null     float64
 1   Scores  25 non-null     int64  
dtypes: float64(1), int64(1)
memory usage: 464.0 bytes
```

In [7]:

```
df.describe()
```

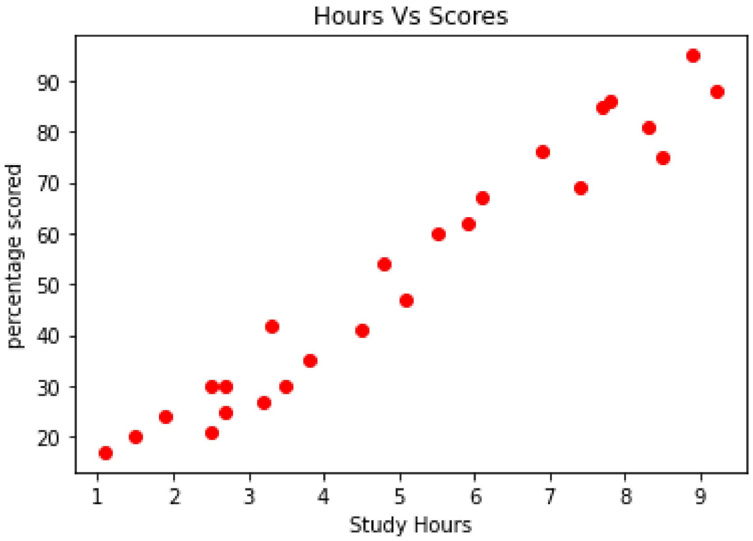
Out[7]:

	Hours	Scores
count	25.000000	25.000000
mean	5.012000	51.480000
std	2.525094	25.286887
min	1.100000	17.000000
25%	2.700000	30.000000
50%	4.800000	47.000000
75%	7.400000	75.000000
max	9.200000	95.000000

Exploring the dataset

In [12]:

```
plt.scatter(df['Hours'],df['Scores'],color="red",marker="o")
plt.title("Hours Vs Scores")
plt.xlabel("Study Hours")
plt.ylabel("percentage scored")
plt.show()
```



In [13]:

```
df.corr()
```

Out[13]:

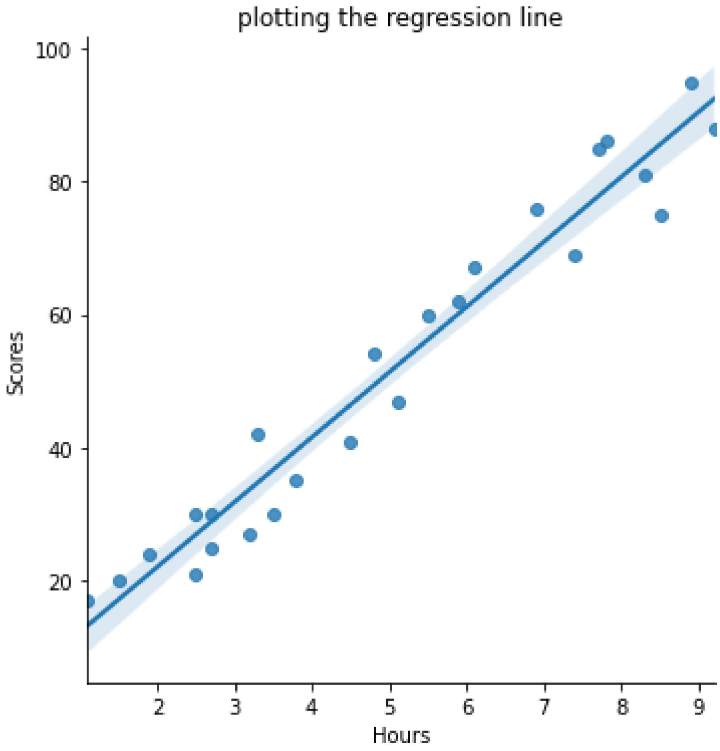
	Hours	Scores
Hours	1.000000	0.976191
Scores	0.976191	1.000000

In [15]:

```
sns.lmplot(x="Hours",y="Scores",data=df)
plt.title("plotting the regression line")
```

Out[15]:

```
Text(0.5, 1.0, 'plotting the regression line')
```



From the graph above, we can say that with the increase of Study Hours(x) there is an increase in the Scores obtained(y)

Extracting the independent and dependent variable

In [18]:

```
x=df.iloc[:, :-1].values
y=df.iloc[:, -1].values
```

Out[18]:

```
(array([[2.5],
        [5.1],
        [3.2],
        [8.5],
        [3.5],
        [1.5],
        [9.2],
        [5.5],
        [8.3],
        [2.7],
        [7.7],
        [5.9],
        [4.5],
        [3.3],
        [1.1],
        [8.9],
        [2.5],
        [1.9],
        [6.1],
        [7.4],
        [2.7],
        [4.8],
        [3.8],
        [6.9],
        [7.8]]),
 array([21, 47, 27, 75, 30, 20, 88, 60, 81, 25, 85, 62, 41, 42, 17, 95, 30,
        24, 67, 69, 30, 54, 35, 76, 86], dtype=int64))
```

Splitting dataset into training and testing set

In [19]:

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=1/3,random_state=0)
```

Training the Simple Linear Regression Model on the Training set

In [20]:

```
from sklearn.linear_model import LinearRegression
regressor=LinearRegression()
regressor.fit(x_train,y_train)
```

Out[20]:

```
LinearRegression()
```

Predicting the Test set results

In [22]:

```
y_pred=regressor.predict(x_test)
y_pred
```

Out[22]:

```
array([17.04289179, 33.51695377, 74.21757747, 26.73351648, 59.68164043,
       39.33132858, 20.91914167, 78.09382734, 69.37226512])
```

In [24]:

```
# comparison between actual and predicted Score
df1=pd.DataFrame({'Actual': y_test, 'predicted':y_pred})
df1
```

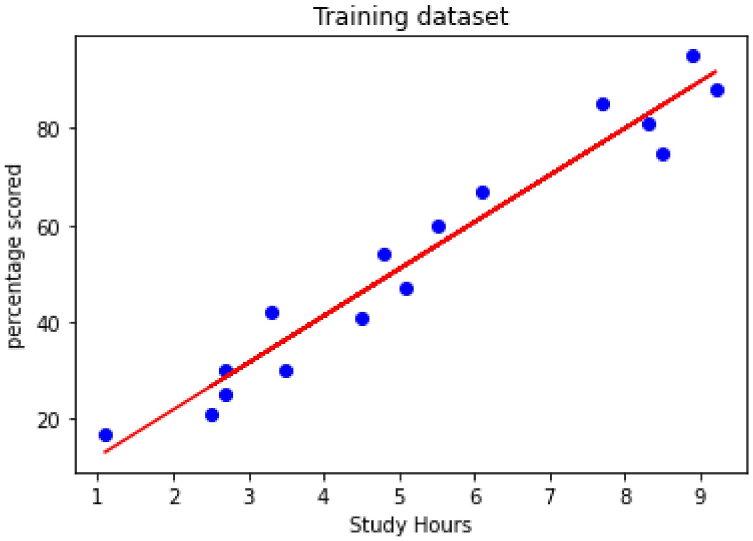
Out[24]:

	Actual	predicted
0	20	17.042892
1	27	33.516954
2	69	74.217577
3	30	26.733516
4	62	59.681640
5	35	39.331329
6	24	20.919142
7	86	78.093827
8	76	69.372265

Visualizing the Training set results

In [25]:

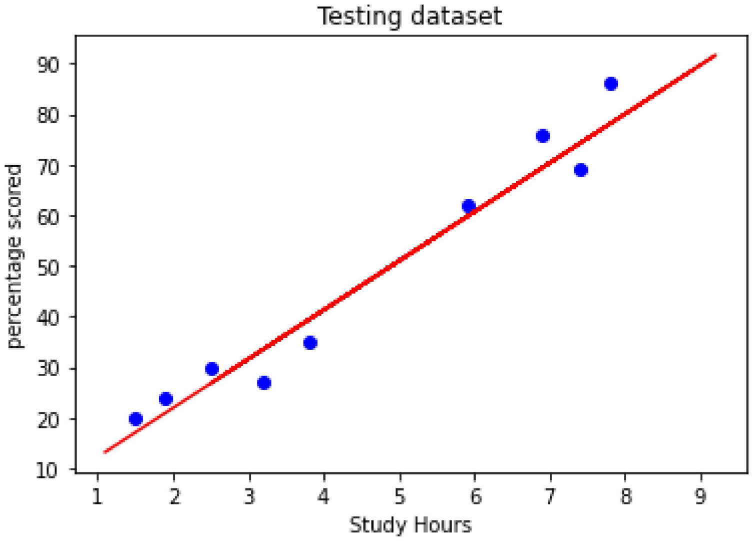
```
plt.scatter(x_train,y_train,color='blue')
plt.plot(x_train,regressor.predict(x_train),color='red')
plt.title("Training dataset")
plt.xlabel("Study Hours")
plt.ylabel("percentage scored")
plt.show()
```



Visualizing the Test set results

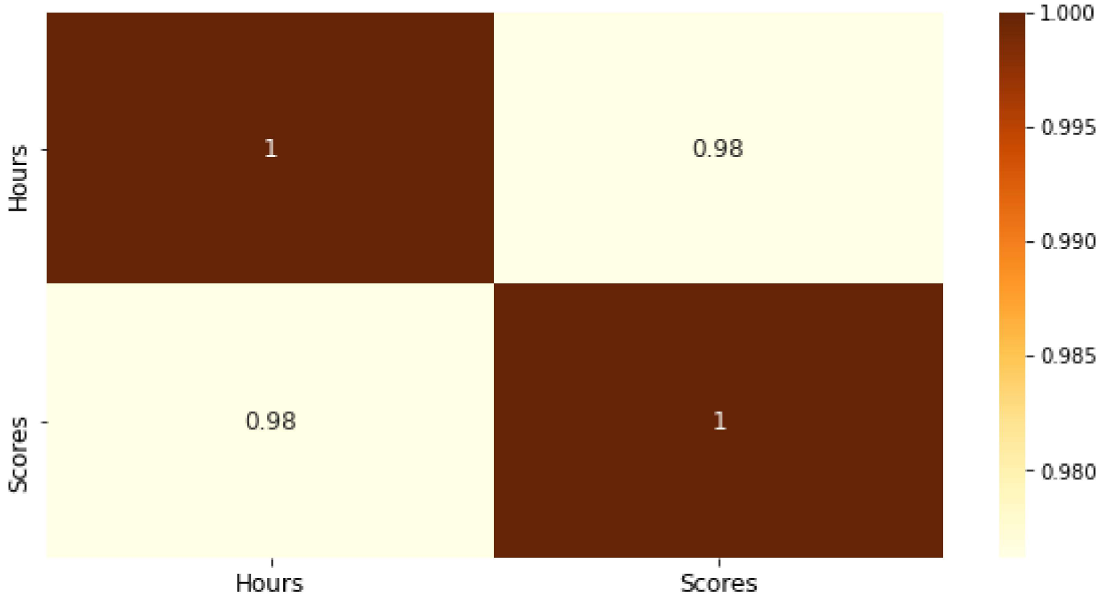
In [26]:

```
plt.scatter(x_test,y_test,color='blue')
plt.plot(x_train,regressor.predict(x_train),color='red')
plt.title("Testing dataset")
plt.xlabel("Study Hours")
plt.ylabel("percentage scored")
plt.show()
```



In [27]:

```
# checking for the correlations
plt.figure(figsize=(10,5))
sns.heatmap(df.corr(),annot=True,cmap="YlOrBr",annot_kws={'fontsize':12})
plt.xticks(fontsize=12)
plt.yticks(fontsize=12)
plt.show()
```



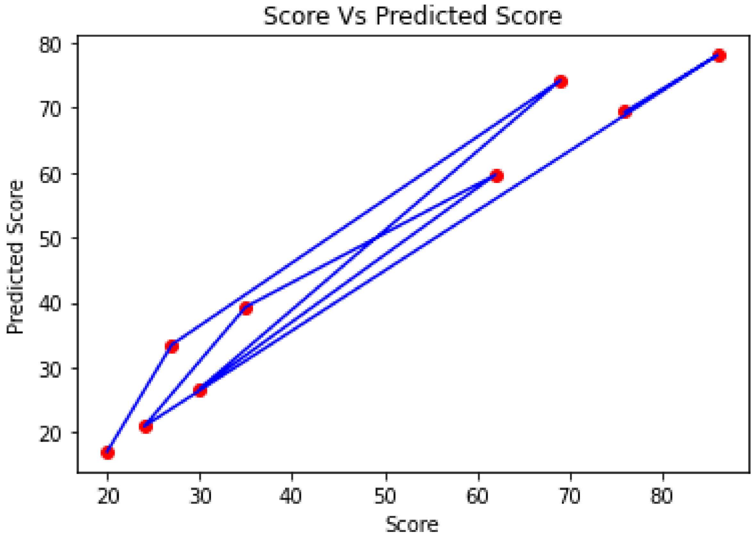
Visualizing the Comparison between actual and predicted scores

In [32]:

```
plt.scatter(y_test,y_pred,c='r')
plt.plot(y_test,y_pred,c='b')
plt.title("Score Vs Predicted Score")
plt.xlabel("Score")
plt.ylabel("Predicted Score")
```

Out[32]:

```
Text(0, 0.5, 'Predicted Score')
```



What will be predicted score if a student studies for 9.25 hrs/day?

prediction through our model

In [33]:

```
Hours=np.array([[9.25]])
predict=regressor.predict(Hours)
print("No of Hours:",format(Hours))
print("predicted Score:",format(predict[0]))
```

```
No of Hours: [[9.25]]
predicted Score: 92.14523314523314
```

Checking accuracy of our model

In [34]:

```
print("train:",regressor.score(x_train,y_train)*100)
print("test:",regressor.score(x_test,y_test)*100)
```

```
train: 95.01107277744313
test: 95.5570080138813
```

Finding mean absolute error, r^2 score error and mean squared error

In [36]:

```
from sklearn import metrics
from sklearn.metrics import r2_score
from sklearn.metrics import mean_squared_error

print("Mean absolute error:",metrics.mean_absolute_error(y_test,regressor.predict(x_
print("r^2 score error:",r2_score(y_test,regressor.predict(x_test)))
print("Mean square error:",mean_squared_error(y_test,regressor.predict(x_test)))
```

```
Mean absolute error: 4.691397441397438
r^2 score error: 0.955570080138813
Mean square error: 25.463280738222547
```

Mean absolute error: 4.69137441397438 which is quite accurate model for predicting the result