THE SPARKS FOUNDATION

Task - 1

Prediction using Supervised ML

Prediction of scores secured by the students based on the number of hours they spent

Author - DURLA MOHANAA VISHNU PRIYA

Importing libraries

In [2]:
```
#importing libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

In [4]:
```
data = pd.read_csv('http://bit.ly/w-data')
print("Data imported")
data
```

Out[4]:
```
Data imported
```

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

Describing the data

In [5]:
```
data.describe()
```

Out[5]:

	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

Getting the data

In [7]:
```
data.head()
```

Out[7]:

	Hours	Scores
0	2.5	21
1	5.1	47
2	3.2	27
3	8.5	75
4	3.5	30

In [8]:
```
data.tail()
```

Out[8]:

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

In [9]:
```
data.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: 528.0 bytes
```

To check for any null data

In [10]:
```
data.isnull() == True
```

Out[10]:
```
False
```

VISUALING THE DATA

In [11]:
```
#imported seaborn library to plot the graphs
import seaborn as sns
```

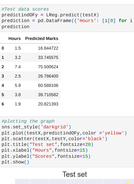
In [12]:
```
plt.boxplot(data)
```

Out[12]:
```
{'whiskers': [<matplotlib.lines.Line2D at 0x2c0f57eeba0>,
  <matplotlib.lines.Line2D at 0x2c0f57ee670>,
  <matplotlib.lines.Line2D at 0x2c0f57647c0>,
  <matplotlib.lines.Line2D at 0x2c0f5764b80>],
 'caps': [<matplotlib.lines.Line2D at 0x2c0f57ee940>,
  <matplotlib.lines.Line2D at 0x2c0f576ec10>,
  <matplotlib.lines.Line2D at 0x2c0f5764d00>,
  <matplotlib.lines.Line2D at 0x2c0f5770070>],
 'boxes': [<matplotlib.lines.Line2D at 0x2c0f57ee0d0>,
  <matplotlib.lines.Line2D at 0x2c0f5764f70>],
 'medians': [<matplotlib.lines.Line2D at 0x2c0f574eee0>,
  <matplotlib.lines.Line2D at 0x2c0f57703d0>],
 'fliers': [<matplotlib.lines.Line2D at 0x2c0f5764170>,
  <matplotlib.lines.Line2D at 0x2c0f5770190>],
 'means': []}
```

SCATTER PLOT

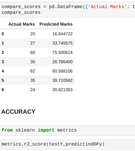
Scatter plot indicates the chance of high scoring with positive Linear relationship

In [14]:
```
#plotting the Scatter plot to visual the data
sns.set_style('dark')
sns.scatterplot(x=data['Hours'], y=data['Scores'])
plt.title('Hours spent vs Score secured',fontsize = 20)
plt.xlabel('Hours spent', fontsize = 15)
plt.ylabel('Score',fontsize = 15)
plt.show()
```



REGRESSION PLOT

In [15]:
```
#plotting the Regression plot plot to visual the data
sns.regplot(x= data['Hours'], y= data['Scores'])
plt.title('Regression Plot',size=20)
plt.ylabel('Score', size=15)
plt.xlabel('Hours spent', size=15)
plt.show()
print(data.corr())
```




```
            Hours    Scores
Hours    1.000000  0.976191
Scores   0.976191  1.000000
```

Training the model

In [16]:
```
#importing the libraries to get the dataset
from sklearn.model_selection import train_test_split
```

SPLITTING THE DATA

In [17]:
```
# X and y from the data
X = data.iloc[:, :-1].values
Y = data.iloc[:, 1].values
```

In [18]:
```
trainX,testX,trainY,testY = train_test_split(X,Y,random_state = 0)
```

In [19]:
```
#splitting the data using PARETO
print("X train.shape =", trainX.shape)
print("Y train.shape =", trainY.shape)
print("X test.shape  =", testX.shape)
print("Y test.shape  =", testY.shape)

X train.shape = (18, 1)
Y train.shape = (18,)
X test.shape  = (7, 1)
Y test.shape  = (7,)
```

In [20]:
```
#fitting the data into model
from sklearn.linear_model import LinearRegression
```

FITTING THE DATA

In [21]:
```
LReg = LinearRegression()
```

In [22]:
```
LReg.fit(trainX,trainY)
print("Data got fit")
```

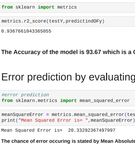
```
Data got fit
```

In [23]:
```
print("X1 =", LReg.intercept_,"+X2 =", LReg.coef_)
# X1 is Intercept & Slope of the line is X2.

X1 = 1.9322842531515646
X2 = [0.94167834]
```

In [24]:
```
Y1 = LReg.intercept_ + LReg.coef_*trainX
```

In [27]:
```
#plotting the graph
sns.set_style('darkgrid')
plt.scatter(trainX,trainY,color='black')
plt.title("Train set",fontsize=20)
plt.plot(trainX,Y1,color='blue')
plt.xlabel("Hours",fontsize=15)
plt.ylabel("Scores",fontsize=15)
plt.show()
```



Testing the model

In [28]:
```
#Test data scores
predictionDOFy = LReg.predict(testX)
prediction = pd.DataFrame({'Hours': [i[0] for i in testX], 'Predicted Marks': [k for k in predictionDOFy]})
prediction
```

Out[28]:

	Hours	Predicted Marks
0	1.5	16.844722
1	3.2	33.745575
2	7.4	75.500624
3	2.5	26.796480
4	5.9	60.588106
5	3.8	39.710582
6	1.9	20.821393

In [29]:
```
#plotting the graph
sns.set_style('darkgrid')
plt.scatter(testX,predictionDOFy,color ='yellow')
plt.scatter(testX,testY,color='black')
plt.title("Test set",fontsize=20)
plt.xlabel("Hours",fontsize=15)
plt.ylabel("Scores",fontsize=15)
plt.show()
```

In [30]:
```
compare_scores = pd.DataFrame({'Actual Marks': testY, 'Predicted Marks': predictionDOFy})
compare_scores
```

Out[30]:

	Actual Marks	Predicted Marks
0	20	16.844722
1	27	33.745575
2	69	75.500624
3	30	26.796480
4	62	60.588106
5	35	39.710582
6	24	20.821393

ACCURACY

In [31]:
```
from sklearn import metrics
```

In [32]:
```
metrics.r2_score(testY,predictionDOFy)
```

Out[32]:
```
0.9367661043365055
```

The Accuracy of the model is 93.67 which is a GOOD MODEL

Error prediction by evaluating the model

In [35]:
```
#error prediction
from sklearn.metrics import mean_squared_error
```

In [36]:
```
meanSquareError = metrics.mean_squared_error(testY,predictionDOFy)
print("Mean Squared Error is= ",meanSquareError)
```

```
Mean Squared Error is=  20.332923674679977
```

The chance of error occuring is stated by Mean Absolute Error

Score Prediction

What will be the predicted score of a student if he/she studies for 9.25 hrs/day?

In [37]:
```
score = LReg.predict([[9.25]])
print("predicted score if a student studies 9.25 hours per day :", score)

predicted score if a student studies 9.25 hours per day : [91.85272888]
```

The regression model predicted the if a student studies for 9.25 hrs/day then he/she is likely to score 93.89 percent marks