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Task 1

Supervised Machine Learning Algorithm

Objective :- To predict the score in exam if student study for 9.25 hours in a day

Simple Liner Regression

In this regression task we will predict the scores of student based on number of hours they study Here predict variable is score and responce variable is hours of study

In [1]:

```
import numpy as np   #import libraries
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

```
path="http://bit.ly/w-data"  # import data
data=pd.read_csv(path)
data.head()
```

Out[2]:

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

Basic Statistic of Dataset

In [3]:

```
print(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
None
```

Interpretation :- Given data set contain 25 data entry and there is no any null value present in data

In [4]:

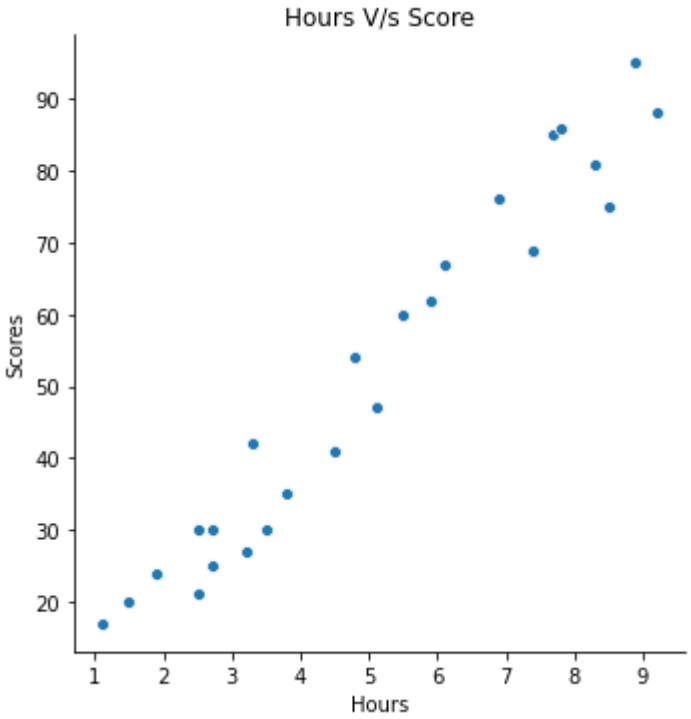
```
print(data.describe())   # description of data
```

```
           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
```

Visualization

In [5]:

```
sns.relplot(x='Hours',y='Scores',data=data)  # Visualisation of data
plt.title("Hours V/s Score")
plt.show()
```



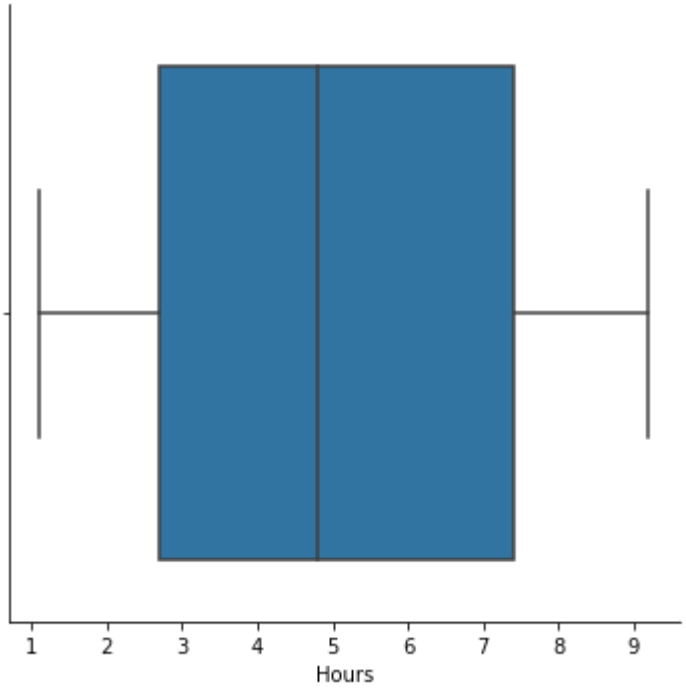
From above scatter plot we see that there is stright line relationship between Hours as Scores

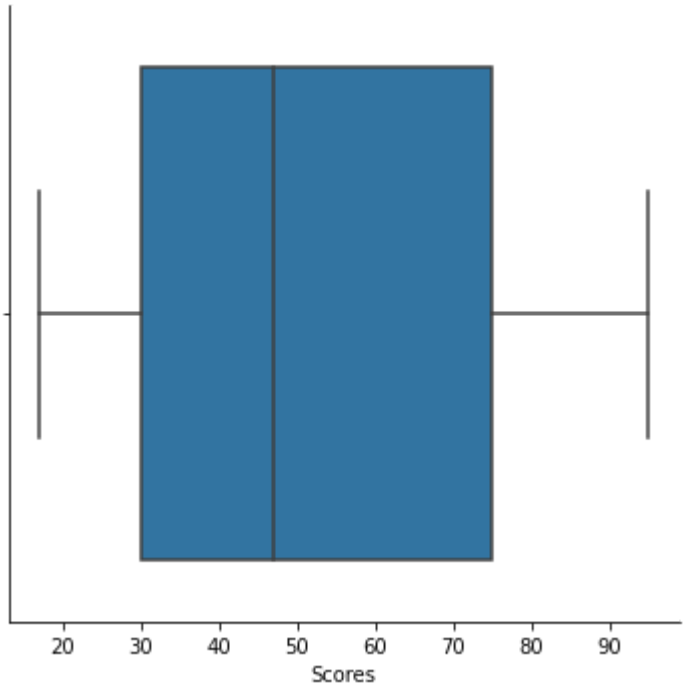
In [6]:

```
sns.catplot("Hours",data=data,kind='box')
sns.catplot("Scores",data=data,kind='box')
```

Out[6]:

```
<seaborn.axisgrid.FacetGrid at 0x54219d0>
```





There is no any outlier present in data set so we can do analysis

In [7]:

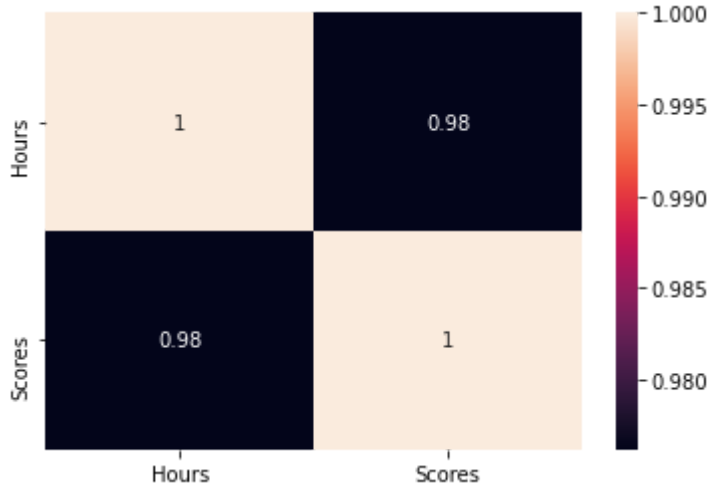
```
cor=data.corr()   #correlation of data
cor
```

Out[7]:

	Hours	Scores
Hours	1.000000	0.976191
Scores	0.976191	1.000000

In [8]:

```
sns.heatmap(cor,annot=True)
plt.show()
```



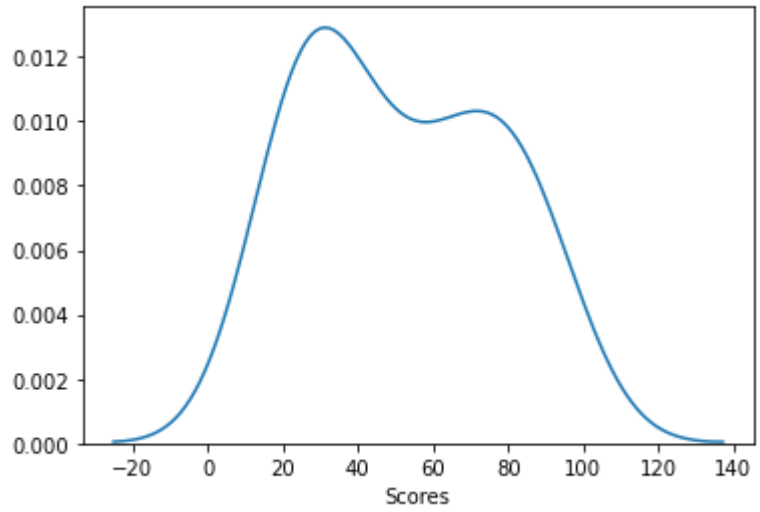
From above heatmap and cor table we clearly see that the is strong positive correlation between Hours as Score

In [9]:

```
sns.distplot(data['Scores'],hist=False)  # plotting the distributin of score of the data
```

Out[9]:

```
<matplotlib.axes._subplots.AxesSubplot at 0xb34f700>
```



From above kde plot we can see that Score distributed normally

Preparing the Data

In [10]:

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

Train Test Split

In [11]:

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=0)
```

In [12]:

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

In [13]:

```
print(model.coef_),print(model.intercept_)
```

```
[9.91065648]
2.018160041434683
```

Out[13]:

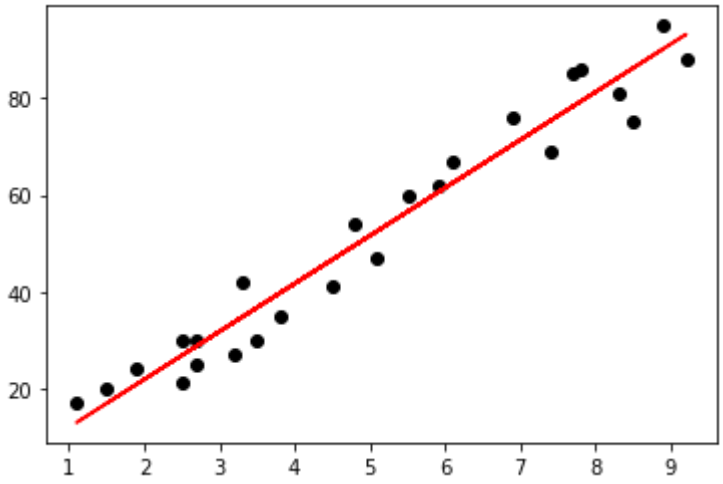
```
(None, None)
```

The best fit of line is

Score = 2.018 + 9.912 * Hours

In [15]:

```
line=model.intercept_+model.coef_*x   #plotting the regression line
plt.scatter(x,y,color='black')
plt.plot(x,line,color='red')
plt.show()
```



Prediction

In [16]:

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

Out[16]:

```
array([16.88414476, 33.73226078, 75.357018  , 26.79480124, 60.49103328])
```

In [17]:

```
pd.DataFrame({'Actual':y_test,'Predict':y_pred})  #comparing actual versus predicted
```

Out[17]:

	Actual	Predict
0	20	16.884145
1	27	33.732261
2	69	75.357018
3	30	26.794801
4	62	60.491033

In [18]:

```
Hours=9.25
Predict_Score=model.predict([[Hours]])
Predict_Score
print('Number of Hours=9.25')
print("Predict Score=",format(Predict_Score[0]))
```

```
Number of Hours=9.25
Predict Score= 93.69173248737538
```

In [19]:

```
from sklearn import metrics   #mean square error
print('Mean Absolute Error:',round(metrics.mean_absolute_error(y_test,y_pred)),3)
print('Mean Squared Error:',round(metrics.mean_squared_error(y_test,y_pred)),3)
print('Root Mean Squared Error:',round(np.sqrt(metrics.mean_squared_error(y_test,y_pred)),3
```

```
Mean Absolute Error: 4.0 3
Mean Squared Error: 22.0 3
Root Mean Squared Error: 4.647
```

The value of root mean Squared error is 4.647 which is less than 10% of the mean of percentage of all the student (51.48)

In [20]:

```
from scipy import stats    # R- squared value
slope,inter,r,p,std=stats.linregress(y_test,y_pred)
print('R-Squared Value:',r)
```

```
R-Squared Value: 0.9806835759589493
```

Here R-Squared = 0.9806 means the model explain 98.06% of variability in the dependent variable (Score) by independent Variable(Hours)

Thank you