GRIP - Task 1

February 3, 2021

0.0.1 Task 1

0.0.2 Author : Manisha Das

0.0.3 Objective :

To estimate the percetage of marks, obtained by a student who studies for 9.25 hours/day, given the data on marks and hours

[1]:
```
import numpy as np
import pandas as pd
from pandas import Series,DataFrame
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
sns.set_style('whitegrid')
from sklearn import metrics
import statsmodels.api as sm
from sklearn.model_selection import train_test_split
```

0.0.4 Import the Dataset

[2]:
```
df = pd.read_csv('https://raw.githubusercontent.com/AdiPersonalWorks/Random/
↪master/student_scores%20-%20student_scores.csv',sep=',')
```

[3]:
```
df.head()
```

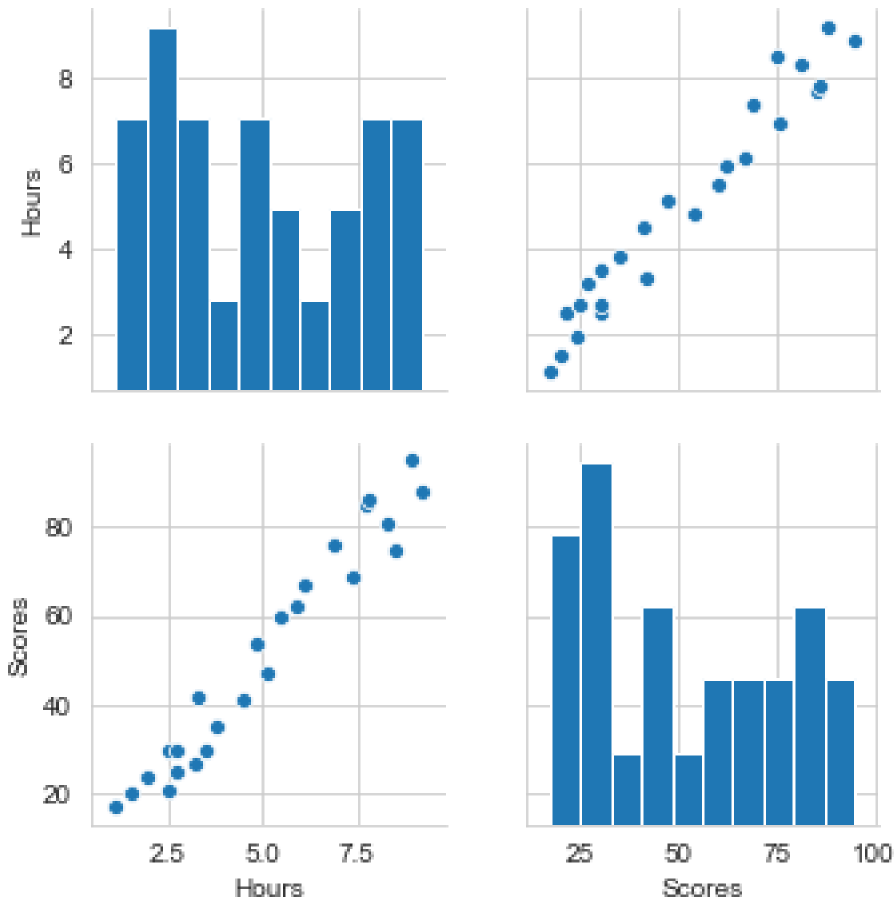
[3]:

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

0.0.5 Visualize the Entire Dataset

[4]:
```
sns.pairplot(df)
```

[4]:
```
<seaborn.axisgrid.PairGrid at 0x1c15730e988>
```



From the scatter plot, we can see that there is a positive relationship between Scores and Hours. This implies that if a student studies for more hours, they will obtain a higher score

0.0.6 Define the Dependent and Independent Variables

[5]:
```
X=df.loc[:,df.columns!="Scores"]
Y=df['Scores']
```

[6]:
```
X.head()
```

[6]:

	Hours
0	2.5
1	5.1
2	3.2
3	8.5
4	3.5

[7]:
```
Y.head()
```

[7]:
```
0    21
1    47
2    27
3    75
4    30
Name: Scores, dtype: int64
```

0.0.7 Test Train Split

20 % of the entire dataset is used for testing purpose

[8]:
```
X_train,X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.
↪2,random_state=0)
```

0.0.8 Estimate the Model Using the Training Dataset

[10]:
```
# Adding constant to estimate the linear model of the form Y = a + bX +␣
↪error_terms

X_train=sm.add_constant(X_train)
```

[11]:
```
model = sm.OLS(Y_train,X_train)
```

[12]:
```
result = model.fit()
```

[13]:
```
print(result.summary())
```

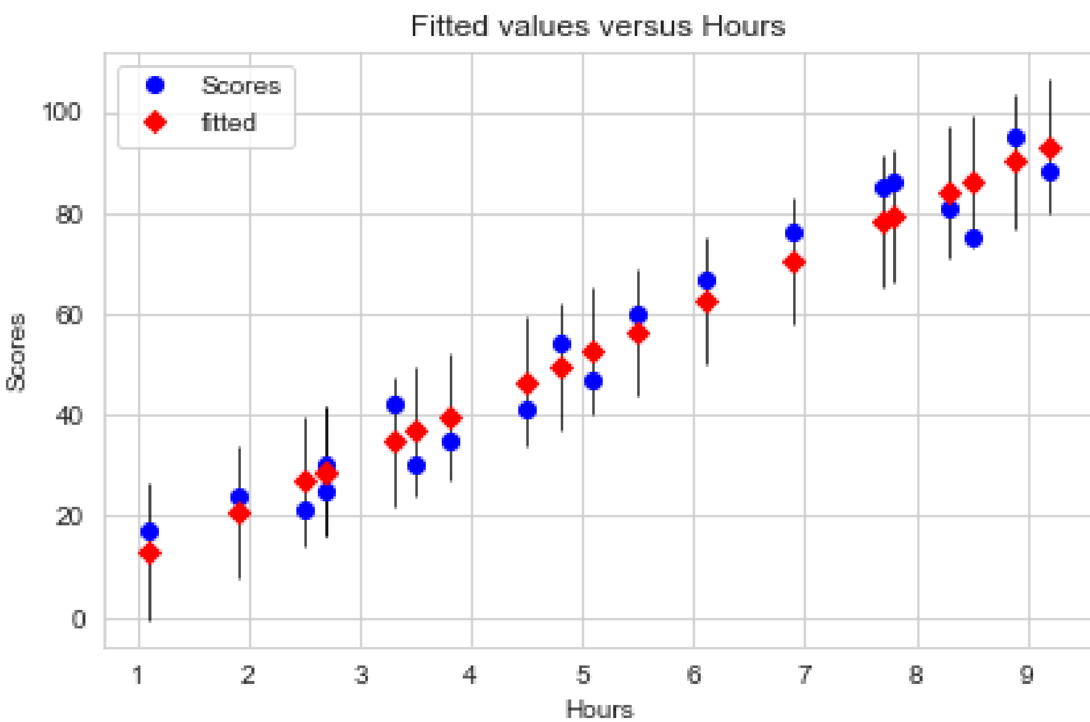
```
                            OLS Regression Results
==============================================================================
Dep. Variable:                 Scores   R-squared:                       0.952
Model:                            OLS   Adj. R-squared:                  0.949
Method:                 Least Squares   F-statistic:                     353.5
Date:                Wed, 03 Feb 2021   Prob (F-statistic):           2.79e-13
Time:                        10:53:00   Log-Likelihood:                -62.686
No. Observations:                  20   AIC:                             129.4
Df Residuals:                      18   BIC:                             131.4
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          2.0182      3.057      0.660      0.517      -4.404       8.441
Hours          9.9107      0.527     18.802      0.000       8.803      11.018
==============================================================================
Omnibus:                        4.659   Durbin-Watson:                   1.813
Prob(Omnibus):                  0.097   Jarque-Bera (JB):                1.720
Skew:                          -0.296   Prob(JB):                        0.423
```

```
Kurtosis:                       1.691   Cond. No.                       13.9
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
```

0.0.9 Visual Representation of the Fitted Model With Respect to the Training Dataset

[16]:
```python
fig = sm.graphics.plot_fit(result, "Hours")
fig.tight_layout(pad=1.0)
```



0.0.10 Prediction using the Test Dataset

[18]:
```python
X_test = sm.add_constant(X_test)
Y_hat = result.predict(X_test)
Y_hat
```

[18]:
```
5     16.884145
2     33.732261
19    75.357018
16    26.794801
```

```
11    60.491033
dtype: float64
```

0.0.11 Checking the Performance of the Model With Respect to the Test Dataset

[19]:
```
from sklearn.metrics import mean_squared_error,r2_score
mean_squared_error(Y_test,Y_hat)
```

[19]:
```
21.59876930721748
```

[20]:
```
r2_score(Y_test,Y_hat)
```

[20]:
```
0.9454906892105354
```

Here we see that the r^2 value is quite high. So we conclude that the model is a good fit.

0.0.12 Estimate the Percentage of Marks Obtained by a Student Who Studies for 9.25 Hours/Day

[21]:
```
# Create a dataframe to estimate the percentage of marks obtained by a student␣
↪who studies for 9.25 hrs/day

X_new = pd.DataFrame({'const':[1],'Hours':[9.25]})
```

[22]:
```
X_new
```

[22]:

	const	Hours
0	1	9.25

[23]:
```
result.predict(X_new)
```

[23]:
```
0    93.691732
dtype: float64
```

The Estimated Percentage of Score, Obtained by the student is 94 (approximately)

[ ]:
```
```