task_2

August 15, 2020

0.0.1 Task # 2 - To Explore Supervise Machine Learning

Predicting the percentage of marks that a student is expected to score based upon the number of hours they studied.

Technique : Linear Regression

Tool : Jupyter Notebook (Python)

Data : http://bit.ly/w-data

[1]:
```
# Importing libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

[2]:
```
# Loading dataset from link
url = "http://bit.ly/w-data"
data = pd.read_csv(url)
```

[3]:
```
# Viewing top 5 row of data
data.head()
```

[3]:

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

[4]:
```
# Knowing the rows and columns of dataset
data.shape
```

[4]:
```
(25, 2)
```

[5]:
```
# information on dataset type
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25 entries, 0 to 24
Data columns (total 2 columns):
Hours     25 non-null float64
Scores    25 non-null int64
dtypes: float64(1), int64(1)
memory usage: 480.0 bytes
```

[6]:
```
# checking for missing or null values
data.isnull().sum()
```

[6]:
```
Hours     0
Scores    0
dtype: int64
```

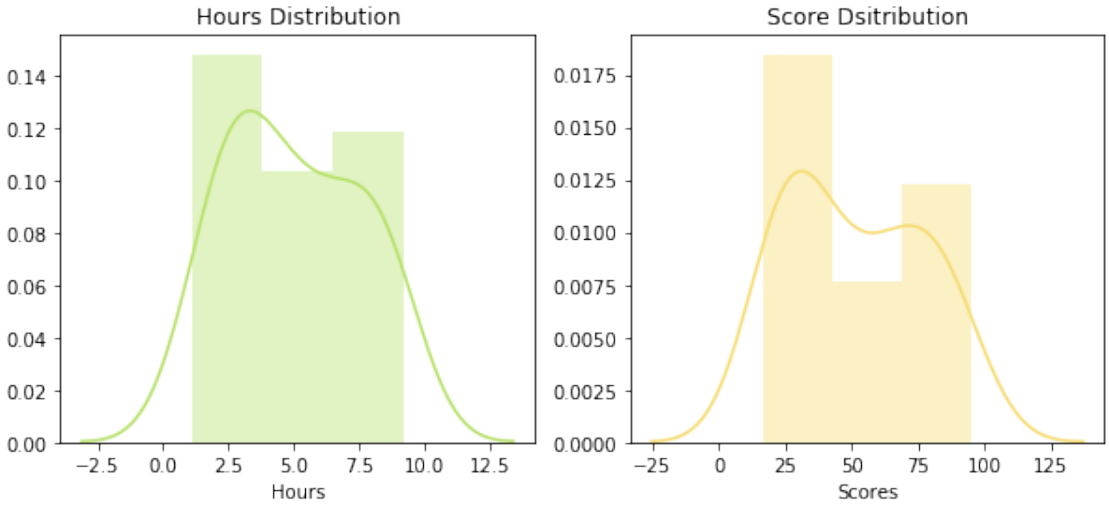
[7]:
```
# descriptive statistics of dataset
data.describe()
```

[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

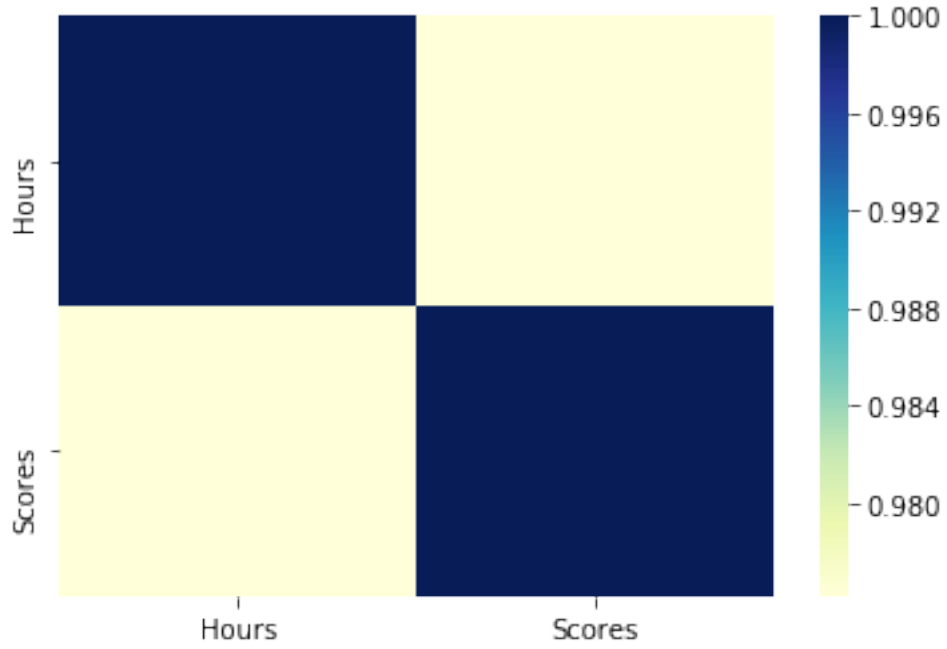
[8]:
```
# knowing the nature of distribution in both variables
plt.figure(figsize=(10,4))
plt.subplot(1,2,1)
p1 = sns.distplot(data['Hours'],label='Hours',color='#B6E167')
plt.title('Hours Distribution')
plt.subplot(1,2,2)
p2 = sns.distplot(data['Scores'],label='Scores',color='#F7DC6F')
plt.title('Score Dsitribution')
```

[8]:
```
Text(0.5, 1.0, 'Score Dsitribution')
```



[9]:
```
# finding the correlation among the variables
sns.heatmap(data.corr(), cmap ="YlGnBu")
```

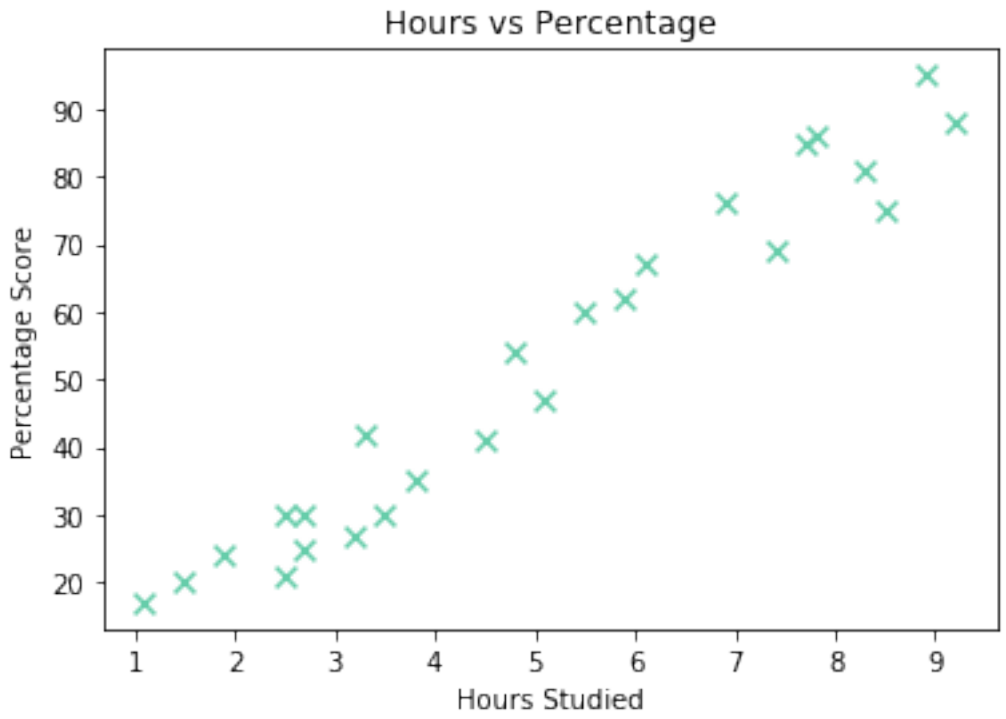
[9]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1e2fa67f9e8>
```



[10]:
```
# plot to finding relation between hours and percentage
plt.figure()
data.plot.scatter(x='Hours', y='Scores', color = '#66CDAA', marker = 'x', s=60)
plt.title('Hours vs Percentage')
```

```
plt.xlabel('Hours Studied')
plt.ylabel('Percentage Score')
plt.show()
```

```
<Figure size 432x288 with 0 Axes>
```



[11]:
```
# assigning dependent and independent variables
x = data.iloc[:, :-1].values
y = data.iloc[:, 1].values
```

[12]:
```
# splitting data set into training and testing data
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)
```

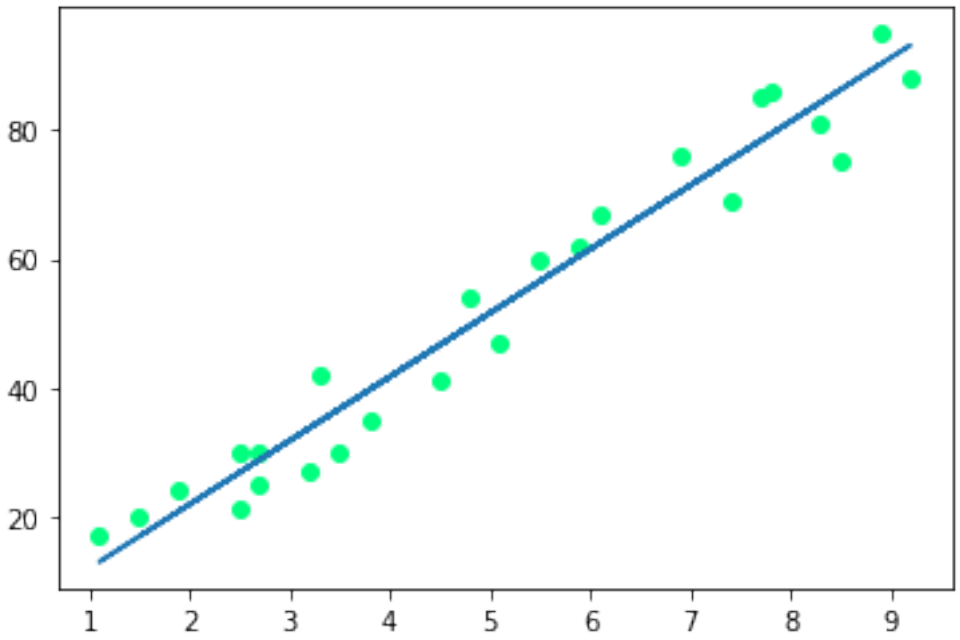
[13]:
```
# fitting the linear regression model in the data
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(x_train, y_train)
line = model.coef_*x+model.intercept_
```

[14]:
```
# obtaining the intercept and coeffient values to for regression equation
print('Intercept of given fiited line is:{}'.format(model.intercept_))
print('Coefficient of x for given fiited line is:{}'.format(model.coef_))
```

```
Intercept of given fiited line is:2.018160041434683
Coefficient of x for given fiited line is:[9.91065648]
```

[15]:
```
# plot to fit the regression line
plt.scatter(x, y, color = '#00FF7F')
plt.plot(x, line)
```

[15]:
```
[<matplotlib.lines.Line2D at 0x1e2fb0e8ba8>]
```



[16]:
```
# predicted values
y_pred = model.predict(x_test)
y_pred
```

[16]:
```
array([16.88414476, 33.73226078, 75.357018  , 26.79480124, 60.49103328])
```

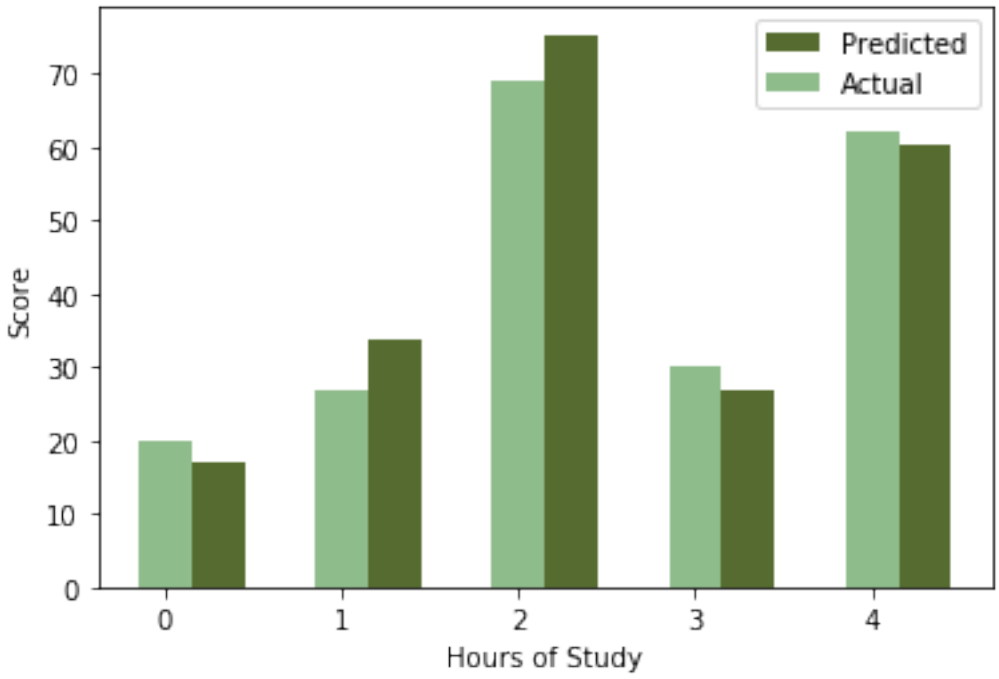
[17]:
```
# comparing the actual and predicted values
compare = pd.DataFrame({'Actual':y_test})
compare.reset_index(drop=True,inplace=True)
compare['Predicted']=y_pred
compare['Deviation']=abs(compare['Actual']-compare['Predicted'])
compare
```

[17]:

	Actual	Predicted	Deviation
0	20	16.884145	3.115855
1	27	33.732261	6.732261
2	69	75.357018	6.357018
3	30	26.794801	3.205199
4	62	60.491033	1.508967

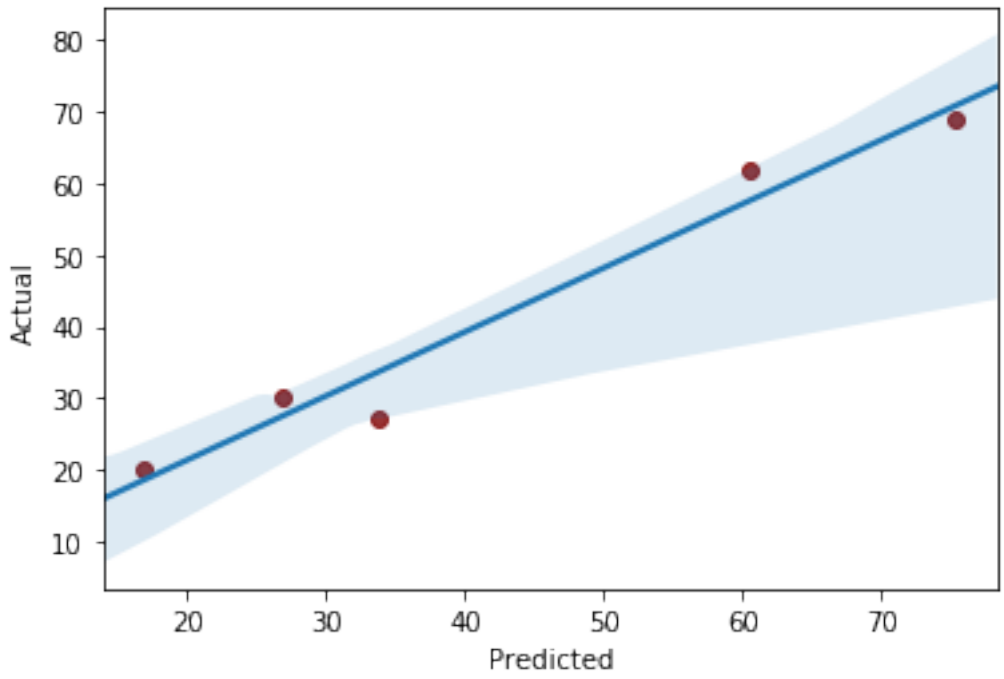
[18]:
```
# visualizing the actual and predicted values
plt.bar(np.arange(5)+0.3,compare.Predicted,width=0.3,label='Predicted', color =␣
↪'#556B2F')
plt.bar(np.arange(5),compare.Actual,width=0.3,label='Actual', color = '#8FBC8B')
plt.xlabel('Hours of Study')
plt.ylabel('Score')
plt.legend()
```

[18]:
```
<matplotlib.legend.Legend at 0x1e2fa8032e8>
```



[19]:
```
sns.regplot('Predicted','Actual',data=compare,scatter_kws={'color':'#800000'})
```

[19]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1e2fafe59e8>
```



[20]:
```
# metrics to measure the performance
from sklearn.metrics import mean_absolute_error,mean_squared_error
MAE1 = mean_absolute_error(y_pred , y_test)
RMSE1 = np.sqrt(mean_squared_error(y_pred , y_test))
print('Mean Absolute Error = ',MAE1.round(3))
print('Root Mean Squared Error = ',RMSE1.round(3))
```

```
Mean Absolute Error =  4.184
Root Mean Squared Error =  4.647
```

[22]:
```
# predicted score if a student study for 9.25 hrs in a day
n = float(input())
hours = np.array([n])
hours = hours.reshape(-1, 1)
pred = model.predict(hours)
print("No of Hours = {}".format(hours))
print("Predicted Score = {}".format(pred[0]))
```

```
9.25
No of Hours = [[9.25]]
Predicted Score = 93.69173248737538
```

[ ]:
```

```