Project Report

on

Evalution of Regression and Classificarion Models

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Scope of project :
After the collection of dataset and performing data cleaning , data processing , and data visualiations , the data sets are trained with machine learning models such as **Linear Regression and Decision Tree Classifier** and model is built .

After building the model we need to evaluate the performance / results of the model . for that we use different metrics for different algorithms.

For Regression model : For Regression algorithm the model evaluation metrics are

1. MSE - mean square error

The average of the square of the difference between the original values and the predicted values.

2. RMSE - root mean square error

Root Mean Square Error (**RMSE**) is the standard deviation of the residuals (prediction errors). Residuals are a measure of how far from the regression line data points are; **RMSE** is a measure of how spread out these residuals are.

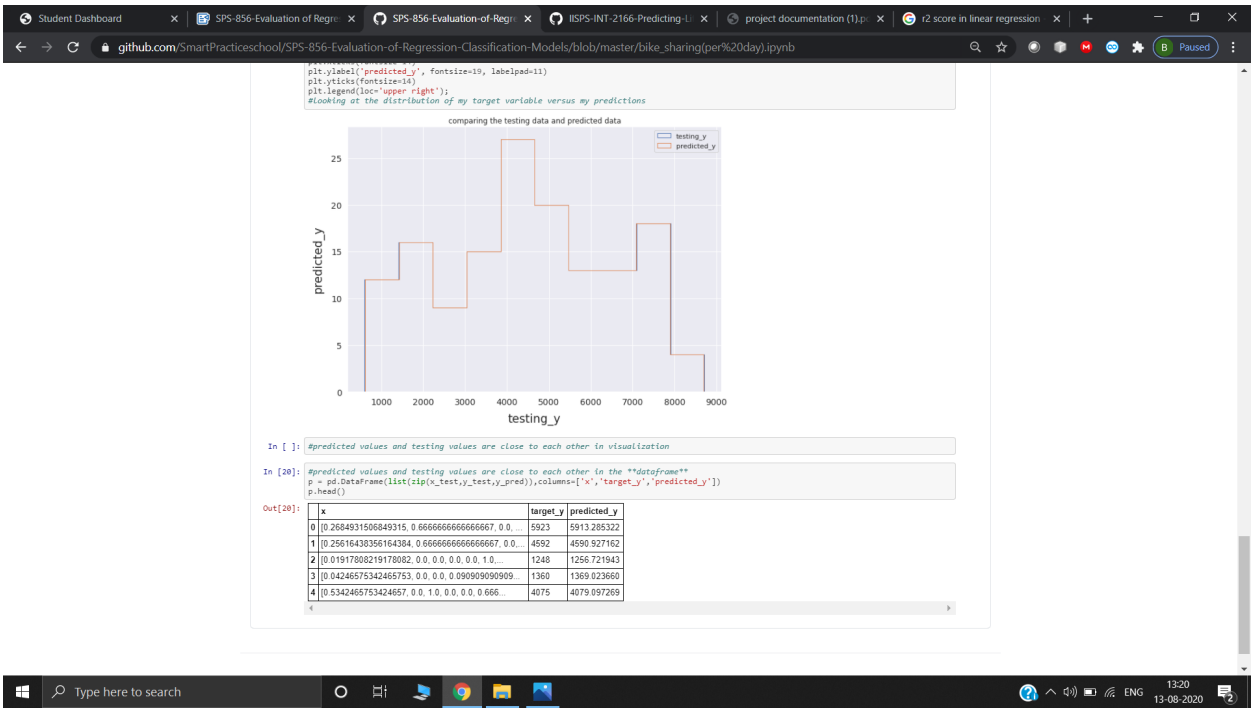
3. R2 score - r square score

R-squared (R^2) is a statistical measure that represents the proportion of the variance for a dependent variable that's explained by an independent variable or variables in a **regression** model.
With this r2 score , we can evaluate the quality of model.
The values range from 0 to 1.

If the r2 score is 1 , the model is highly accurate but sometimes it leads to over fitting.

```
In [12]: #Linear regression using SKLearn Linear Regression method
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import Lasso
#Build linear regression model
model = Lasso()
# Train the model, using training data set
model.fit(x_train, y_train)
y_pred = model.predict(x_test)
print('Intercept =', model.intercept_)
print('Coefficients = ', model.coef_)
mse = mean_squared_error(y_test, y_pred)
rmse = math.sqrt(  mse)
r2score = r2_score(y_test, y_pred)
print("Mean squared error(MSE) = %.2f" %   mse)
print("Root Mean squared error(RMSE) = %.2f" % rmse)
print('R2 score = %.2f' % r2score)

Intercept = 34.394477016900964
Coefficients =  [ 0.00000000e+00  0.00000000e+00  2.25868938e+00  0.00000000e+00
 -0.00000000e+00  0.00000000e+00 -0.00000000e+00 -0.00000000e+00
  0.00000000e+00  0.00000000e+00 -0.00000000e+00 -0.00000000e+00
  3.38865758e+03  6.90931217e+03]
Mean squared error(MSE) = 39.60
Root Mean squared error(RMSE) = 6.29
R2 score = 1.00
```



Here we can see that predicted values are approximately equal to testing values. Finally we can say that the model is good and accurate .

For Classification model : For Regression algorithm the model evaluation metrics are

1. Accuracy Score

Classification **Accuracy** is what we usually mean, when we use the term **accuracy**. It is the ratio of number of correct predictions to the total number of input samples.

2. Confusion Matrix

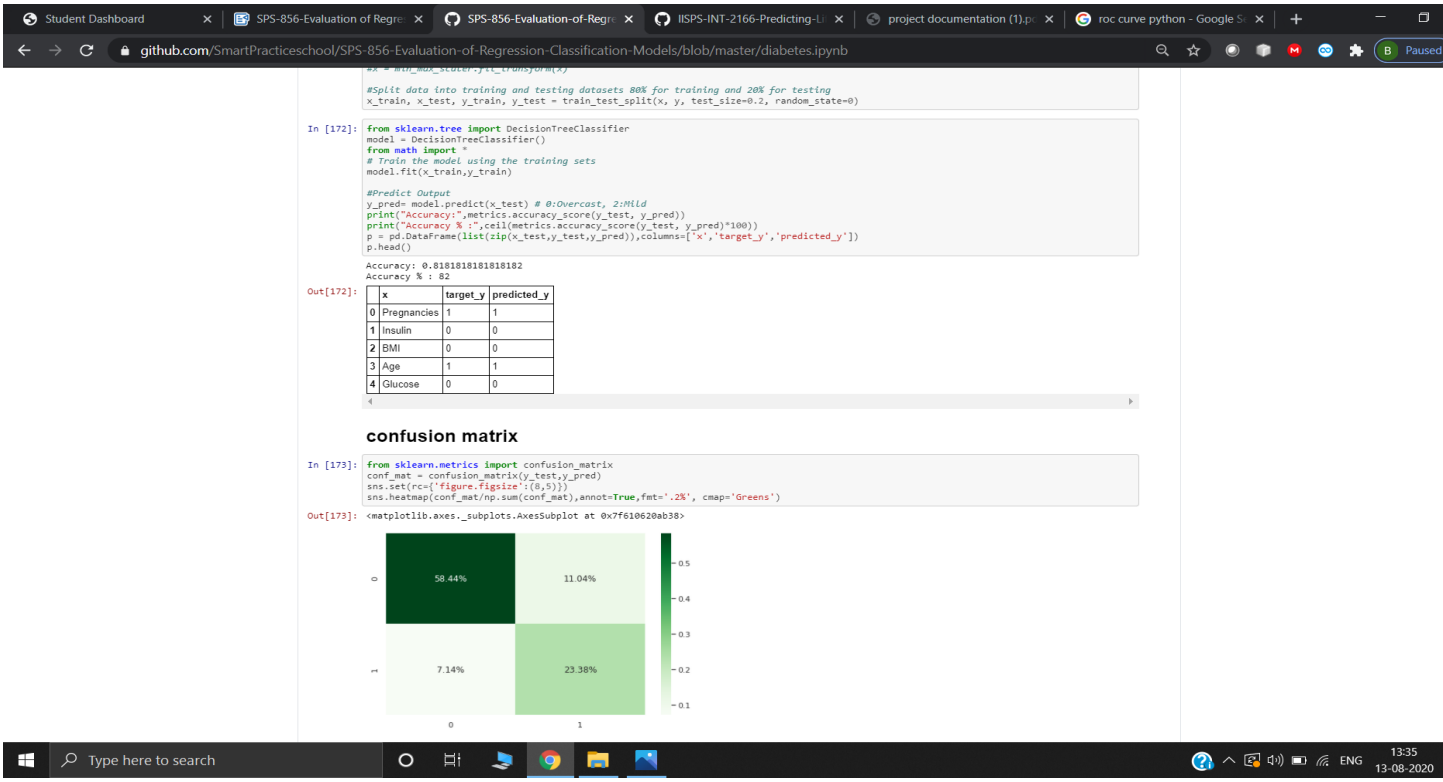
A **confusion matrix** is a table that is often used to describe the performance of a classification model (or "classifier") on a set of test data for which the true values **are** known.

3. ROC curve -

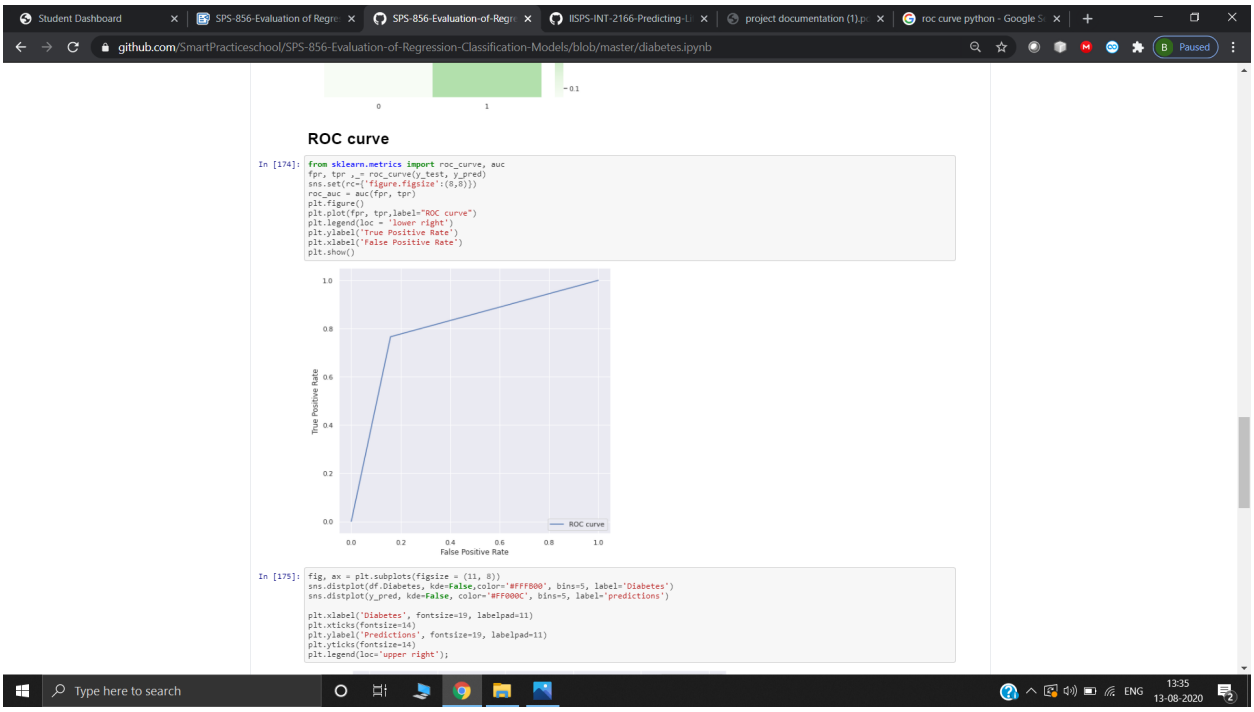
ROC is a plot of signal (True Positive Rate) against noise (False Positive Rate). ... The model performance is determined by looking at the area under the **ROC curve** (or AUC).

Higher the accuracy , more good is the model .

I got the accuracy of 82%



ROC Curve



comparing testing values and predicted values.