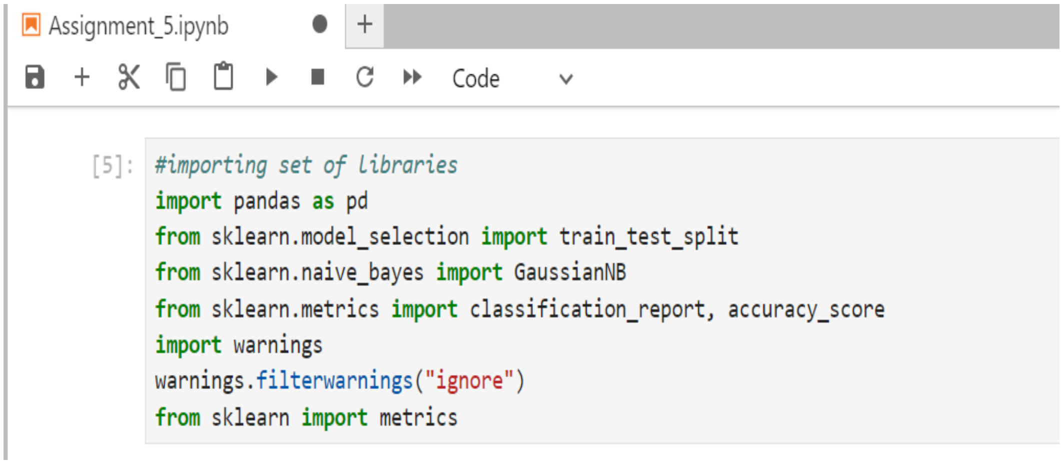
Spring 2024: CS5720 Neural Networks & Deep Learning -ICP5
Assignment-5
NAME: Baddam Sangeetha
STUDENT ID:700757191

Video Link:
https://drive.google.com/file/d/1VgvW_Teia3duZtHfq9XaDIjn5_GYwbvK/view?usp=sharing

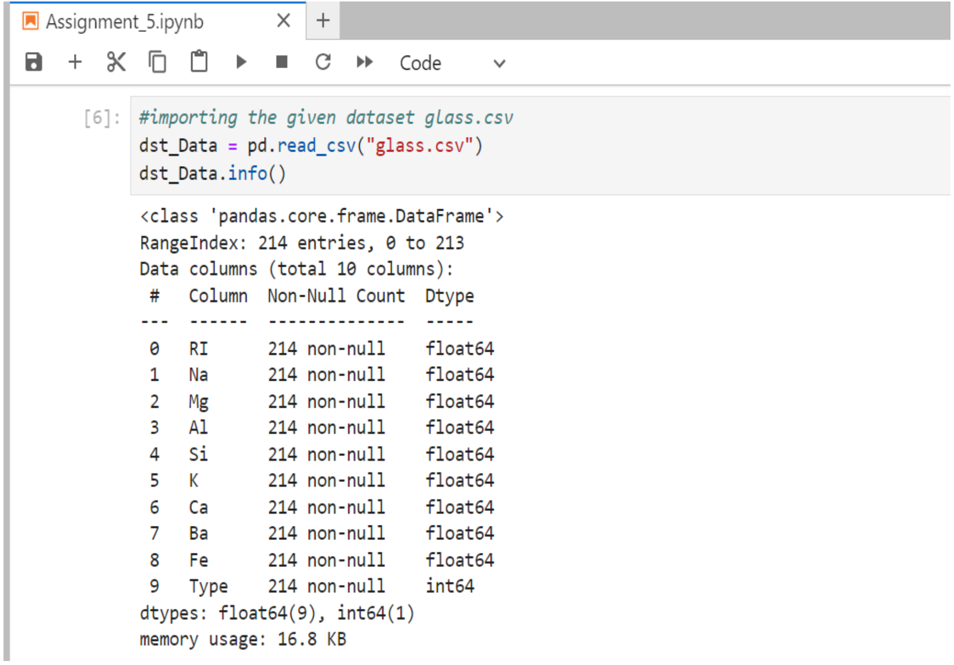
GitHub Link: https://github.com/Sangeetha-Baddam/Asiignment_5

1. Implement Naïve Bayes method using scikit-learn library.



```
[5]: #importing set of libraries
     import pandas as pd
     from sklearn.model_selection import train_test_split
     from sklearn.naive_bayes import GaussianNB
     from sklearn.metrics import classification_report, accuracy_score
     import warnings
     warnings.filterwarnings("ignore")
     from sklearn import metrics
```

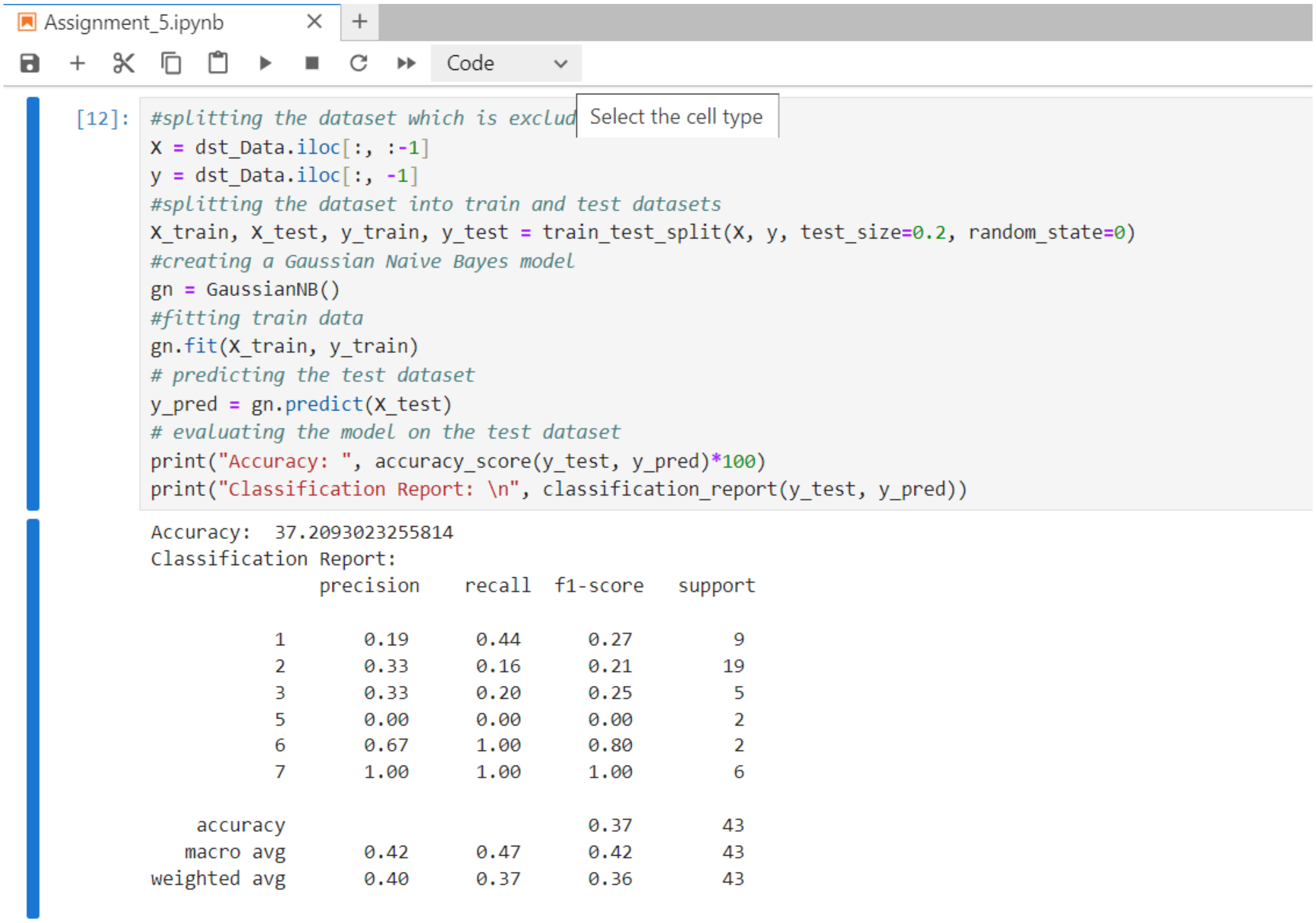
Use dataset available with name glass.



```
[6]: #importing the given dataset glass.csv
     dst_Data = pd.read_csv("glass.csv")
     dst_Data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 214 entries, 0 to 213
Data columns (total 10 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   RI      214 non-null    float64
 1   Na      214 non-null    float64
 2   Mg      214 non-null    float64
 3   Al      214 non-null    float64
 4   Si      214 non-null    float64
 5   K       214 non-null    float64
 6   Ca      214 non-null    float64
 7   Ba      214 non-null    float64
 8   Fe      214 non-null    float64
 9   Type    214 non-null    int64  
dtypes: float64(9), int64(1)
memory usage: 16.8 KB
```

Use train _test _split to create training and testing part
Evaluate the model on test part using score and classification _report(y _true, y _pred)



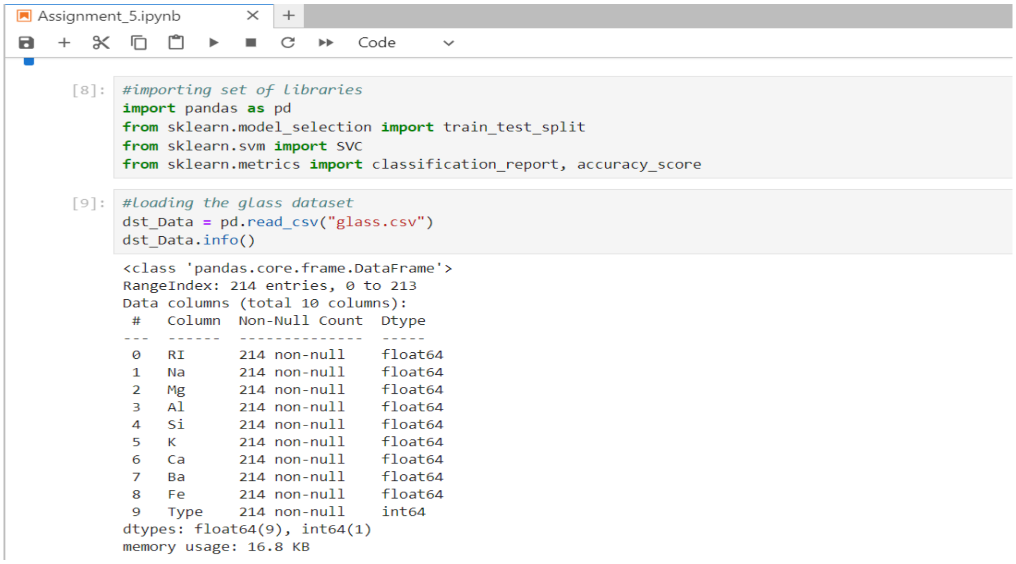
```
[12]: #splitting the dataset which is exclud
      X = dst_Data.iloc[:, :-1]
      y = dst_Data.iloc[:, -1]
      #splitting the dataset into train and test datasets
      X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
      #creating a Gaussian Naive Bayes model
      gn = GaussianNB()
      #fitting train data
      gn.fit(X_train, y_train)
      # predicting the test dataset
      y_pred = gn.predict(X_test)
      # evaluating the model on the test dataset
      print("Accuracy: ", accuracy_score(y_test, y_pred)*100)
      print("Classification Report: \n", classification_report(y_test, y_pred))
```

```
Accuracy:  37.2093023255814
Classification Report:
               precision    recall  f1-score   support

           1       0.19      0.44      0.27         9
           2       0.33      0.16      0.21        19
           3       0.33      0.20      0.25         5
           5       0.00      0.00      0.00         2
           6       0.67      1.00      0.80         2
           7       1.00      1.00      1.00         6

    accuracy                           0.37        43
   macro avg       0.42      0.47      0.42        43
weighted avg       0.40      0.37      0.36        43
```

2. Implement linear SVM method using scikit library Use the same dataset above.

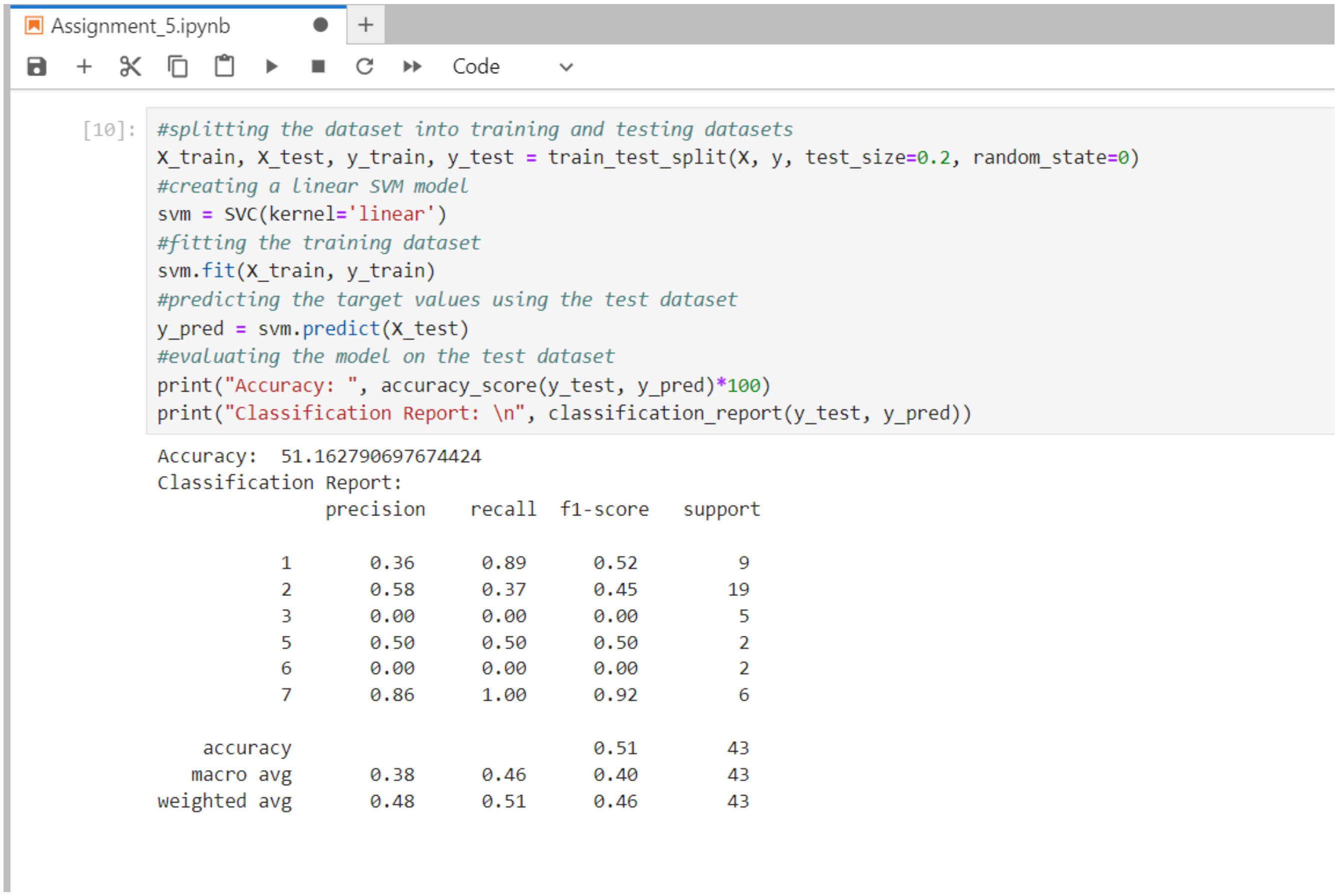


```
[8]: #importing set of libraries
     import pandas as pd
     from sklearn.model_selection import train_test_split
     from sklearn.svm import SVC
     from sklearn.metrics import classification_report, accuracy_score
```

```
[9]: #loading the glass dataset
     dst_Data = pd.read_csv("glass.csv")
     dst_Data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 214 entries, 0 to 213
Data columns (total 10 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   RI      214 non-null    float64
 1   Na      214 non-null    float64
 2   Mg      214 non-null    float64
 3   Al      214 non-null    float64
 4   Si      214 non-null    float64
 5   K       214 non-null    float64
 6   Ca      214 non-null    float64
 7   Ba      214 non-null    float64
 8   Fe      214 non-null    float64
 9   Type    214 non-null    int64  
dtypes: float64(9), int64(1)
memory usage: 16.8 KB
```

Use train _test _split to create training and testing part.
Evaluate the model on test part using score and classification _report (y _true, y _pred)



```
#splitting the dataset into training and testing datasets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
#creating a linear SVM model
svm = SVC(kernel='linear')
#fitting the training dataset
svm.fit(X_train, y_train)
#predicting the target values using the test dataset
y_pred = svm.predict(X_test)
#evaluating the model on the test dataset
print("Accuracy: ", accuracy_score(y_test, y_pred)*100)
print("Classification Report: \n", classification_report(y_test, y_pred))
```

```
Accuracy:  51.162790697674424
Classification Report: 
              precision    recall  f1-score   support

           1       0.36      0.89      0.52         9
           2       0.58      0.37      0.45        19
           3       0.00      0.00      0.00         5
           5       0.50      0.50      0.50         2
           6       0.00      0.00      0.00         2
           7       0.86      1.00      0.92         6

    accuracy                           0.51        43
   macro avg       0.38      0.46      0.40        43
weighted avg       0.48      0.51      0.46        43
```

Which algorithm you got better accuracy? Can you justify why?

The biggest difference between the models you're building from a "features" point of view is that Naive Bayes treats them as independent, whereas SVM looks at the interactions between them to a certain degree, as long as you're using a non-linear kernel. So, if you have interactions, and, given your problem, you most likely do, an SVM will be better at capturing those, hence better at the classification task you want.