Spring 2024:CS5720 Neural Networks & Deep Learning

ICP-5 Assignment-5

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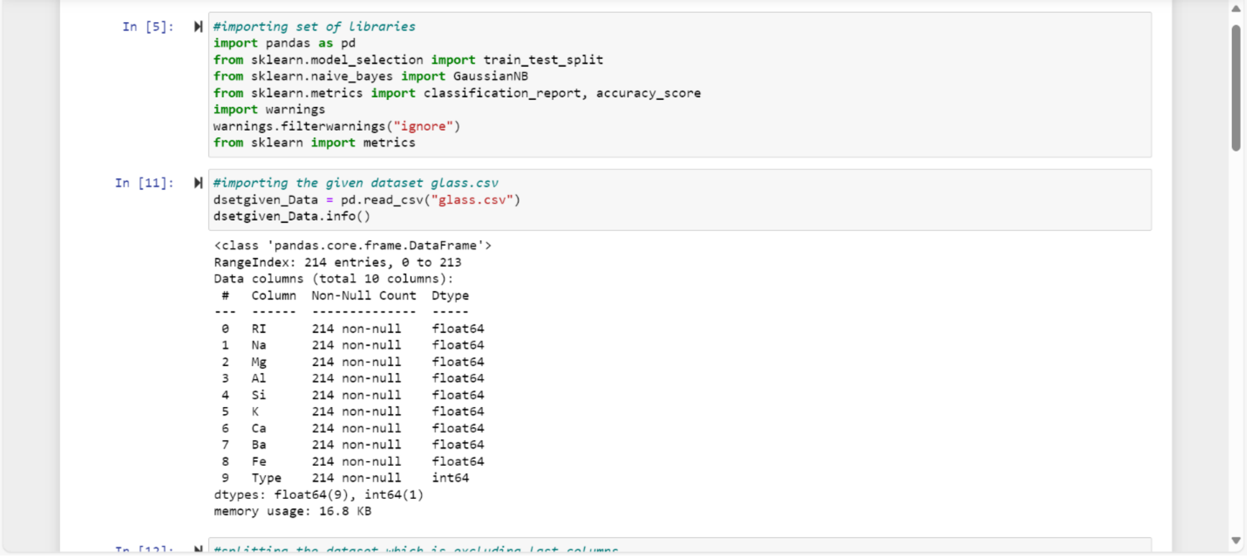
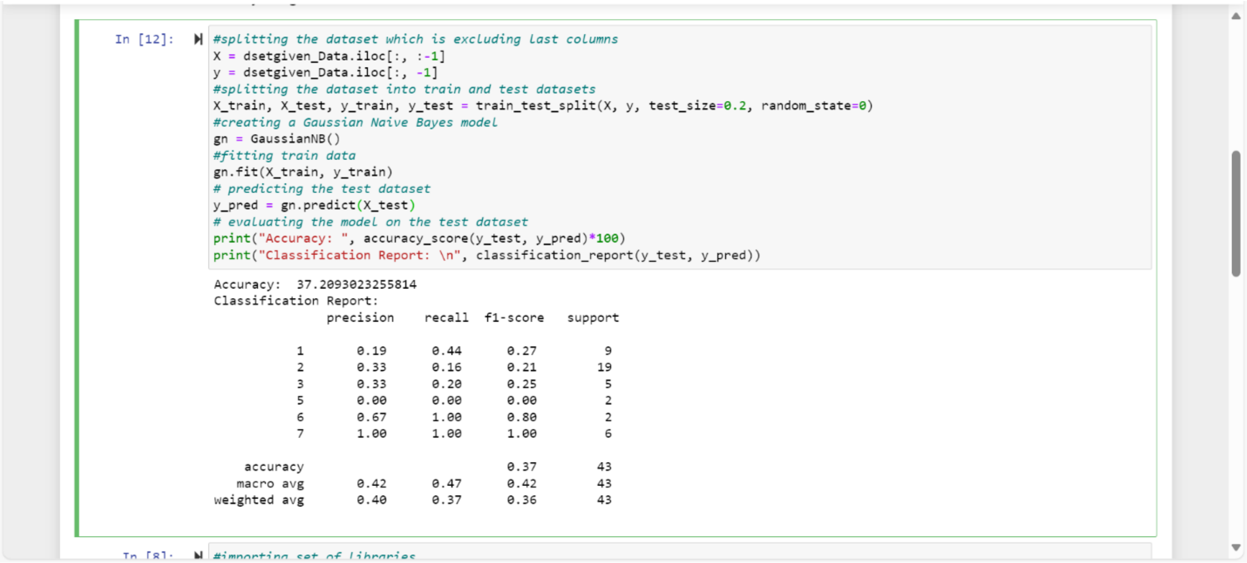
GitHub Link: https://github.com/SaiSushmaSriBireddy/Assignment5

Video Link: https://drive.google.com/file/d/14_SXR6yuodh51C87V3sv2Vj02_Ekgnli/view?usp=sharing

1. Implement Naïve Bayes method using scikit-learn library
   Use dataset available with name glass
   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)

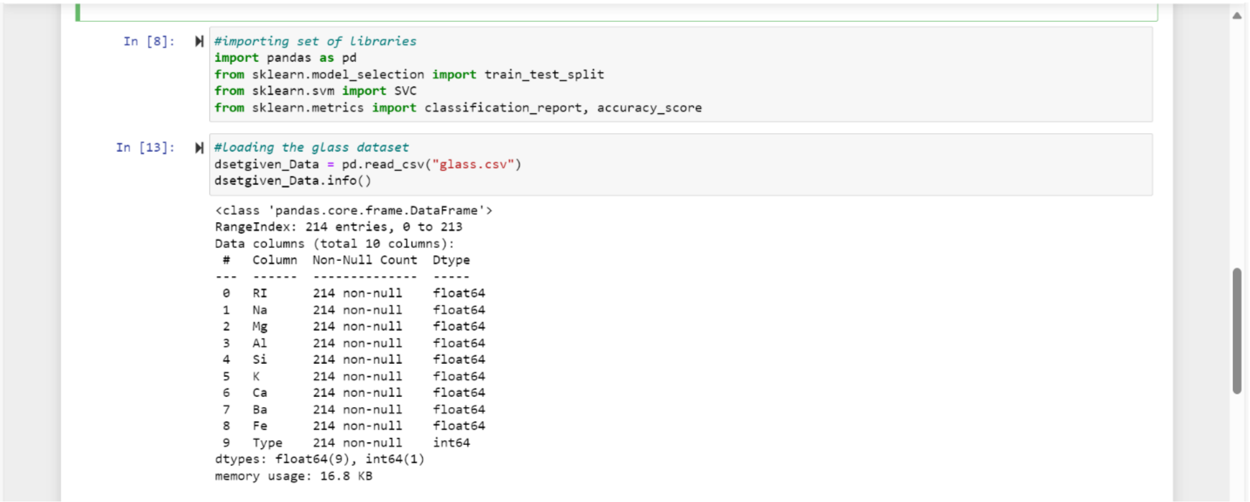


```
In [5]:  #importing set of libraries
          import pandas as pd
          from sklearn.model_selection import train_test_split
          from sklearn.naive_bayes import GaussianNB
          from sklearn.metrics import classification_report, accuracy_score
          import warnings
          warnings.filterwarnings("ignore")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

In [11]: #importing the given dataset glass.csv
          dsetgiven_Data = pd.read_csv("glass.csv")
          dsetgiven_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

In [12]: #splitting the dataset which is excluding last columns
```



```
In [12]: #splitting the dataset which is excluding last columns
          X = dsetgiven_Data.iloc[:, :-1]
          y = dsetgiven_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

In [8]:  #importing set of libraries
```

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



```
In [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
```

```
In [13]: #loading the glass dataset
         dsetgiven_Data = pd.read_csv("glass.csv")
         dsetgiven_Data.info()
```

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

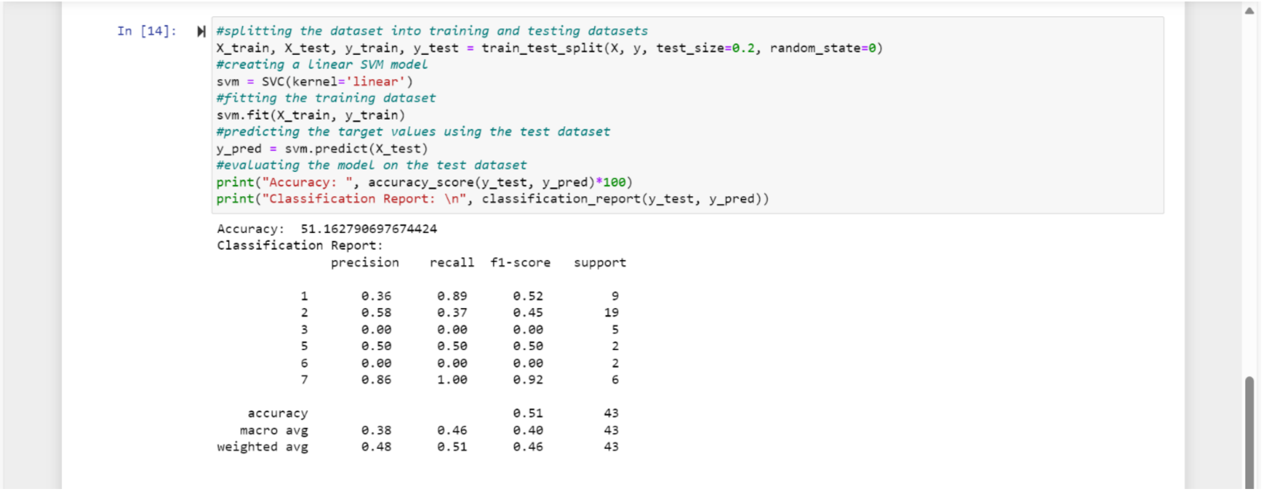

```
In [14]: #splitting the dataset into training and testing datasets
         X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
         #creating a linear SVM model
         svm = SVC(kernel='linear')
         #fitting the training dataset
         svm.fit(X_train, 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?

Naive Bayes Classification (NBC) and Support Vector Machine (SVM) are the techniques in data mining used to classify data or users opinion. According to me the accuracy depends on precision , recall of the both cases ,In the given both algorithms SVM is having the better accuracy because the NBC deals independently whereas the SVM deals with the interactions. So, the SVM is having better accuracy in this condition.