Classification Assignment Report

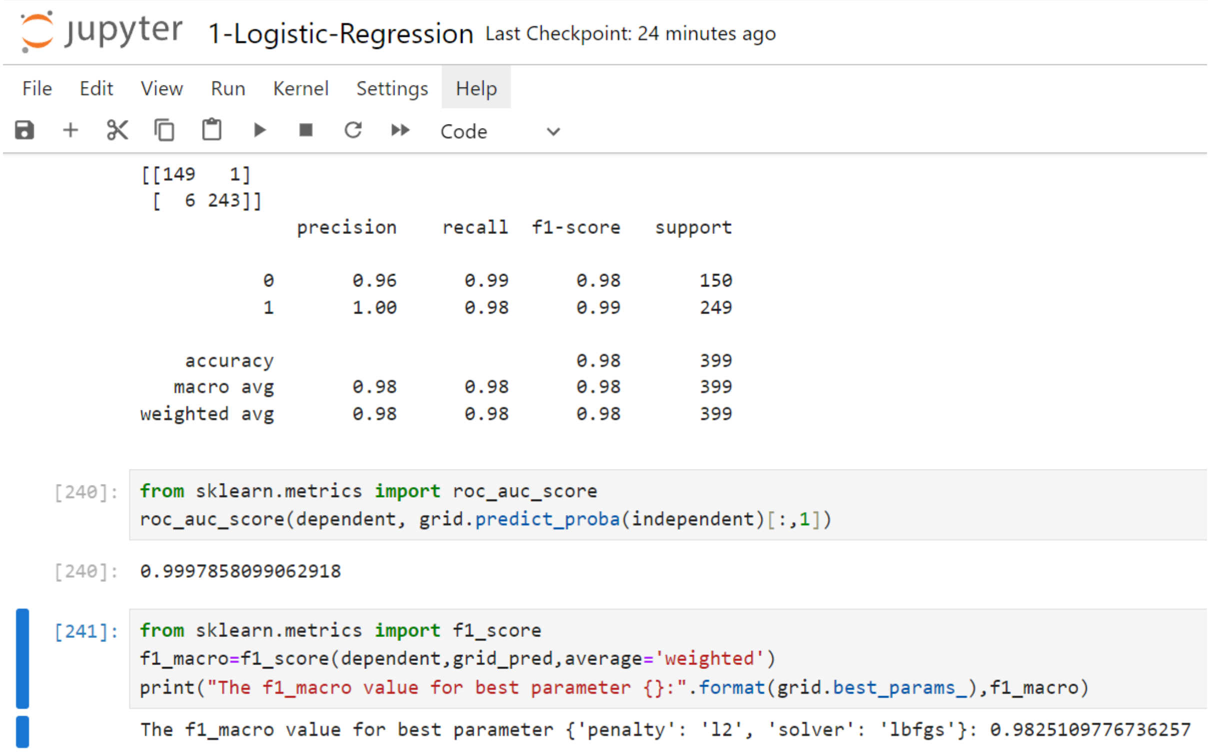
- **Identify your problem statement:**

  Classification assignment report.

- **Tell basic info about the dataset**
  Rows: 399
  Columns:28
  Output variable: Classification

- **Mention the pre-processing method if you're doing any (like converting string to number – nominal data)**
  Pre-processing method is Nominal data (one hot encoding) because input contains text, we are using get_dummies method and the parameters we are passing dataset, dtype=int, drop_first=true

- **All the research values of each algorithm should be documented. (You can make tabulation or screenshot of the results.)**

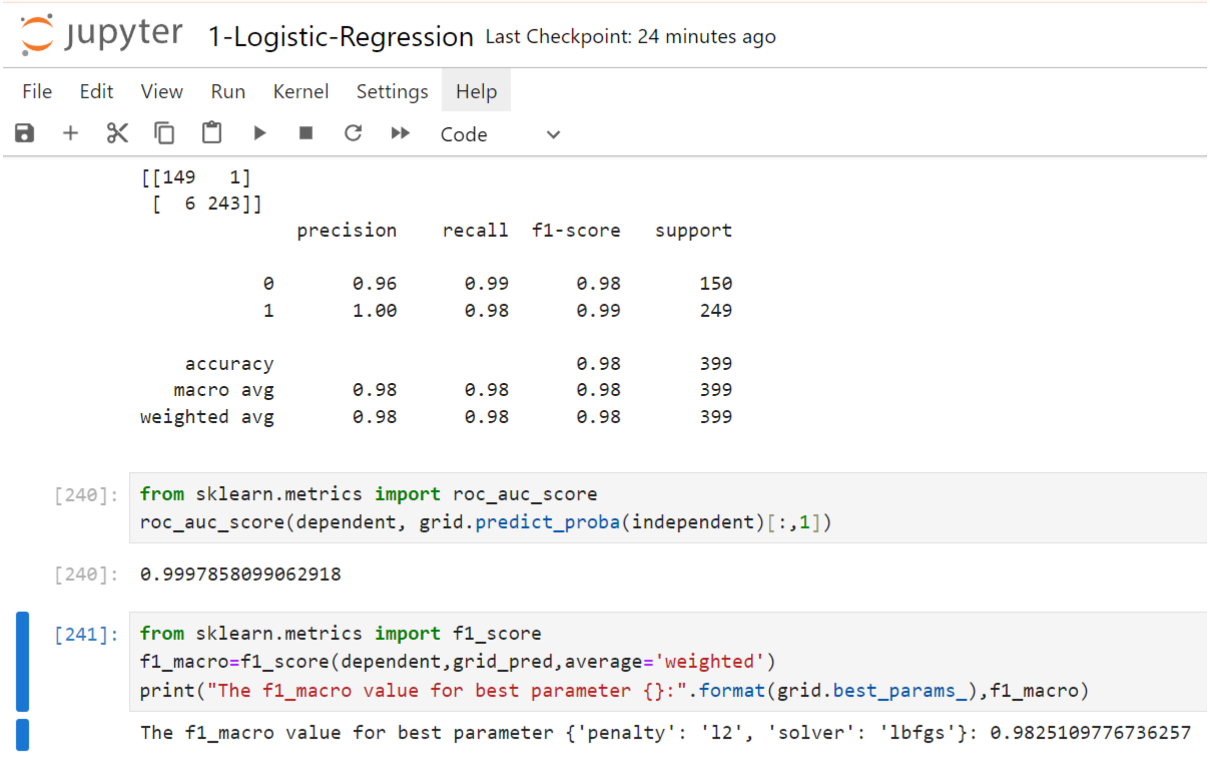


```
[[149   1]
 [  6 243]]
              precision    recall  f1-score   support

           0       0.96      0.99      0.98       150
           1       1.00      0.98      0.99       249

    accuracy                           0.98       399
   macro avg       0.98      0.98      0.98       399
weighted avg       0.98      0.98      0.98       399
```

```
[240]: from sklearn.metrics import roc_auc_score
       roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[240]: 0.9997858099062918

[241]: from sklearn.metrics import f1_score
       f1_macro=f1_score(dependent,grid_pred,average='weighted')
       print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)

       The f1_macro value for best parameter {'penalty': 'l2', 'solver': 'lbfgs'}: 0.9825109776736257
```

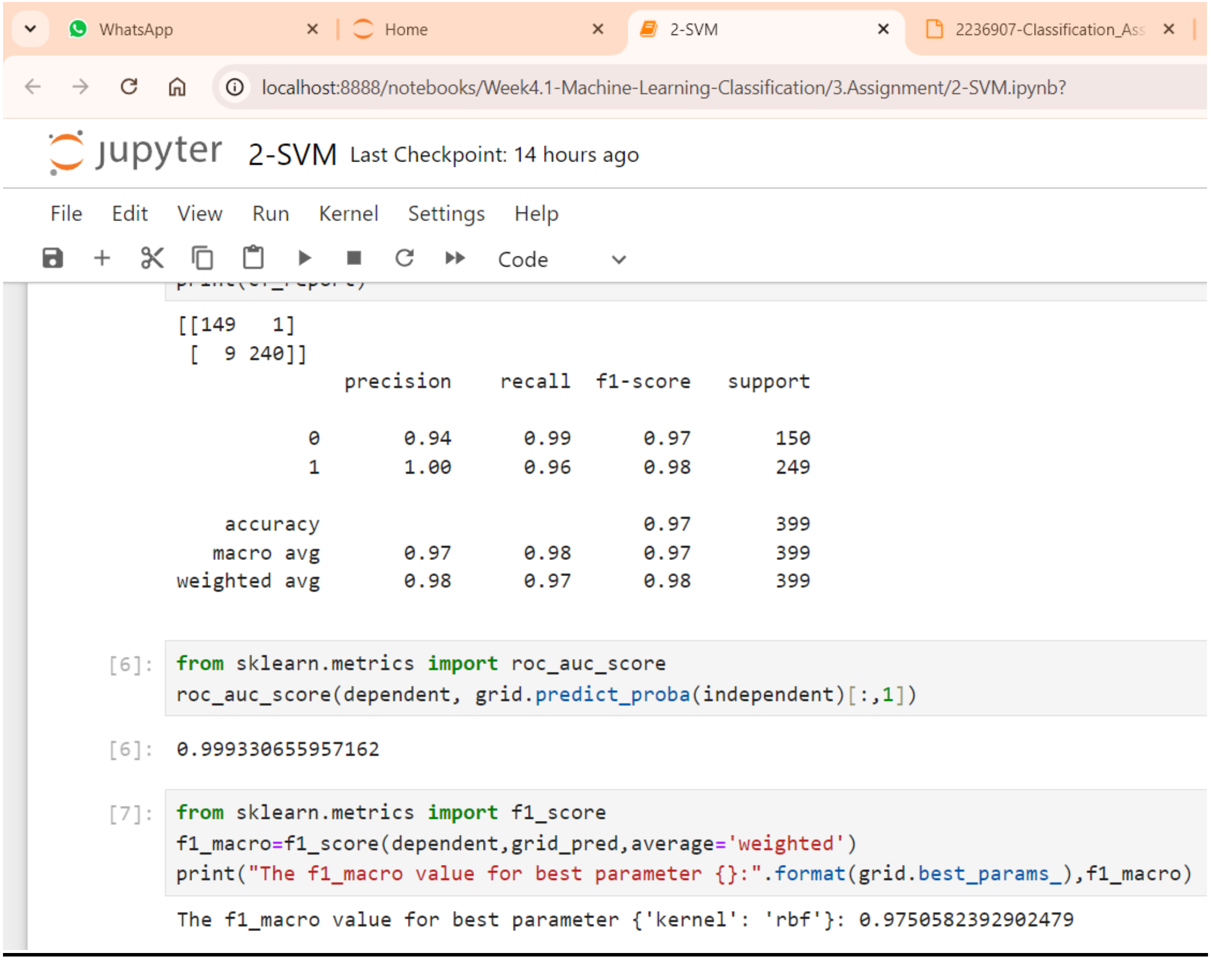
- **Mention your final model, justify why u have chosen the same**
  Final model is logistic-regression because the "roc_auc_score" 0.99978580999062918, and accuracy is 98%

Complete report for all algorithms:



```
[[149   1]
 [  6 243]]
              precision    recall  f1-score   support

           0       0.96      0.99      0.98       150
           1       1.00      0.98      0.99       249

    accuracy                           0.98       399
   macro avg       0.98      0.98      0.98       399
weighted avg       0.98      0.98      0.98       399
```

```
[240]: from sklearn.metrics import roc_auc_score
       roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[240]: 0.9997858099062918

[241]: from sklearn.metrics import f1_score
       f1_macro=f1_score(dependent,grid_pred,average='weighted')
       print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)

       The f1_macro value for best parameter {'penalty': 'l2', 'solver': 'lbfgs'}: 0.9825109776736257
```


WhatsApp
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2-SVM
2236907-Classification_Ass
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jupyter
2-SVM
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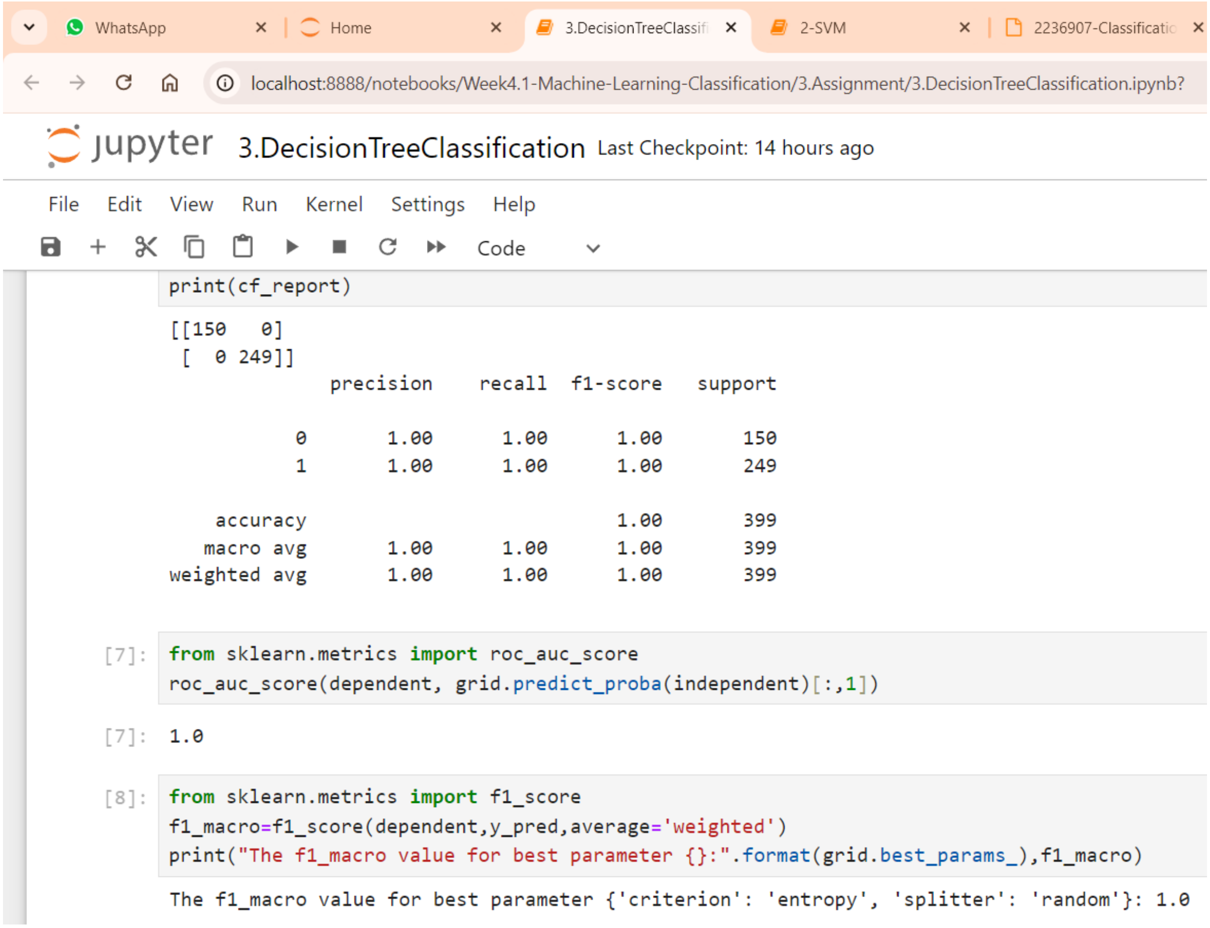
```
[[149   1]
 [  9 240]]
              precision    recall  f1-score   support

           0       0.94      0.99      0.97       150
           1       1.00      0.96      0.98       249

    accuracy                           0.97       399
   macro avg       0.97      0.98      0.97       399
weighted avg       0.98      0.97      0.98       399
```

```
[6]: from sklearn.metrics import roc_auc_score
     roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[6]: 0.999330655957162

[7]: from sklearn.metrics import f1_score
     f1_macro=f1_score(dependent,grid_pred,average='weighted')
     print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)

     The f1_macro value for best parameter {'kernel': 'rbf'}: 0.9750582392902479
```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jupyter
3.DecisionTreeClassification Last Checkpoint: 14 hours ago
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Code

```
print(cf_report)
```

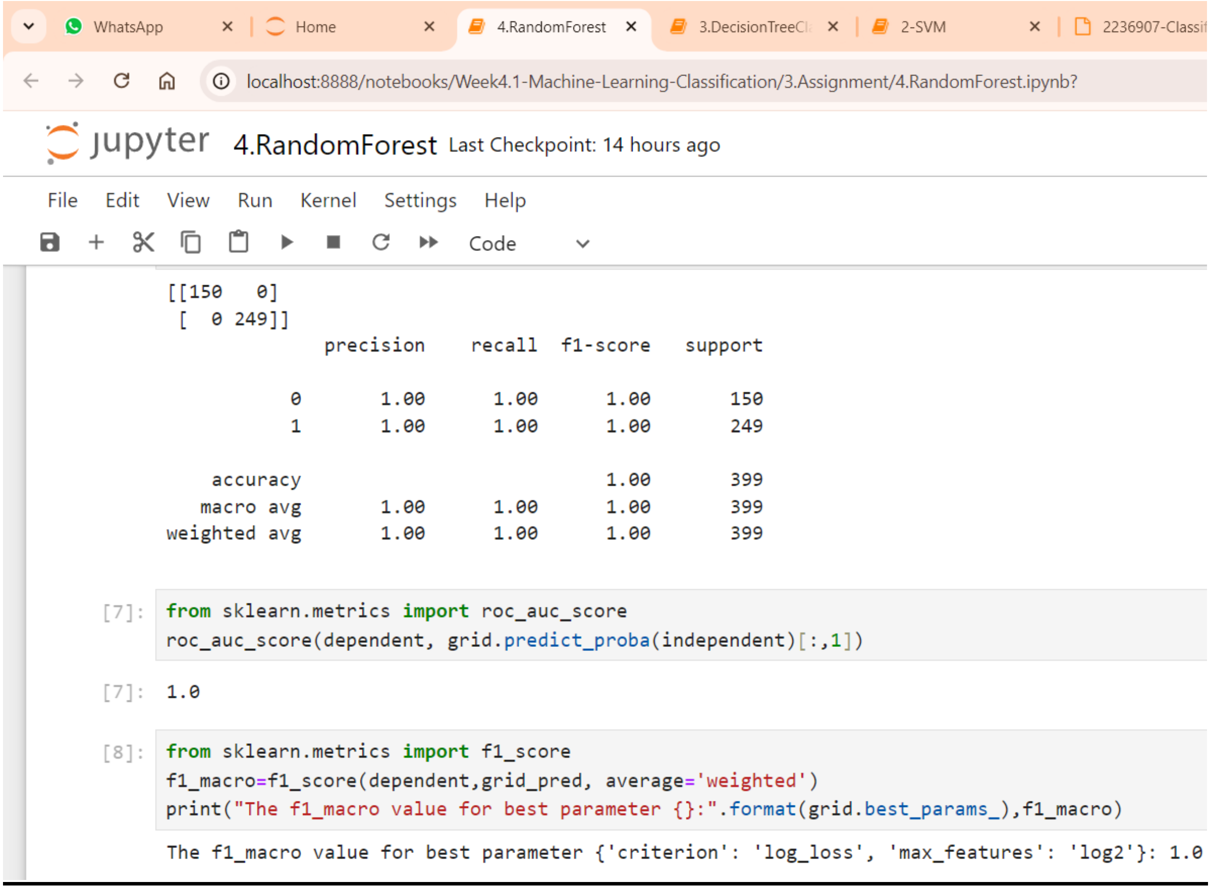
```
[[150   0]
 [  0 249]]
              precision    recall  f1-score   support

           0       1.00      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

```
[7]: from sklearn.metrics import roc_auc_score
     roc_auc_score(dependent, grid.predict_proba(independent)[:,1])
```

```
[7]: 1.0
```

```
[8]: from sklearn.metrics import f1_score
     f1_macro=f1_score(dependent,y_pred,average='weighted')
     print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)
```

```
The f1_macro value for best parameter {'criterion': 'entropy', 'splitter': 'random'}: 1.0
```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jupyter
4.RandomForest Last Checkpoint: 14 hours ago
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Code

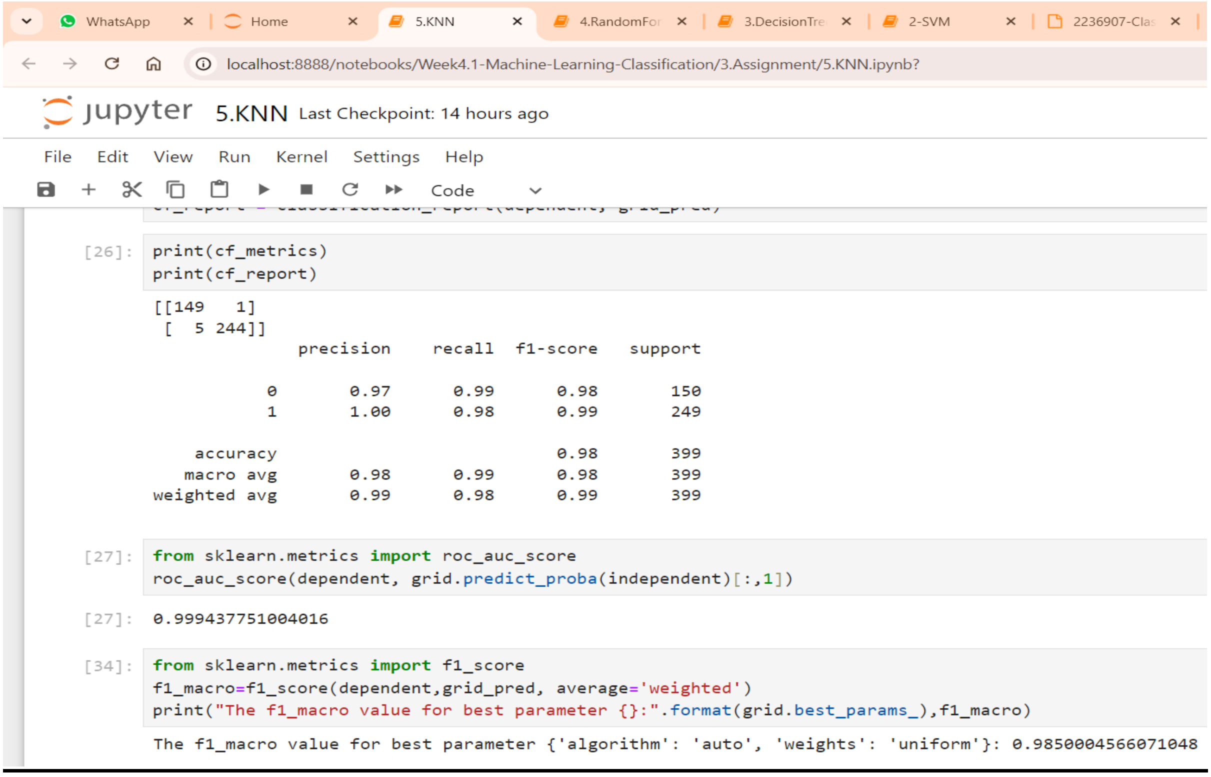
```
[[150   0]
 [  0 249]]
              precision    recall  f1-score   support

           0       1.00      1.00      1.00       150
           1       1.00      1.00      1.00       249

    accuracy                           1.00       399
   macro avg       1.00      1.00      1.00       399
weighted avg       1.00      1.00      1.00       399
```

```
[7]: from sklearn.metrics import roc_auc_score
     roc_auc_score(dependent, grid.predict_proba(independent)[:,1])
```

```
[7]: 1.0
```

```
[8]: from sklearn.metrics import f1_score
     f1_macro=f1_score(dependent,grid_pred, average='weighted')
     print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)
```

```
The f1_macro value for best parameter {'criterion': 'log_loss', 'max_features': 'log2'}: 1.0
```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jupyter
5.KNN Last Checkpoint: 14 hours ago
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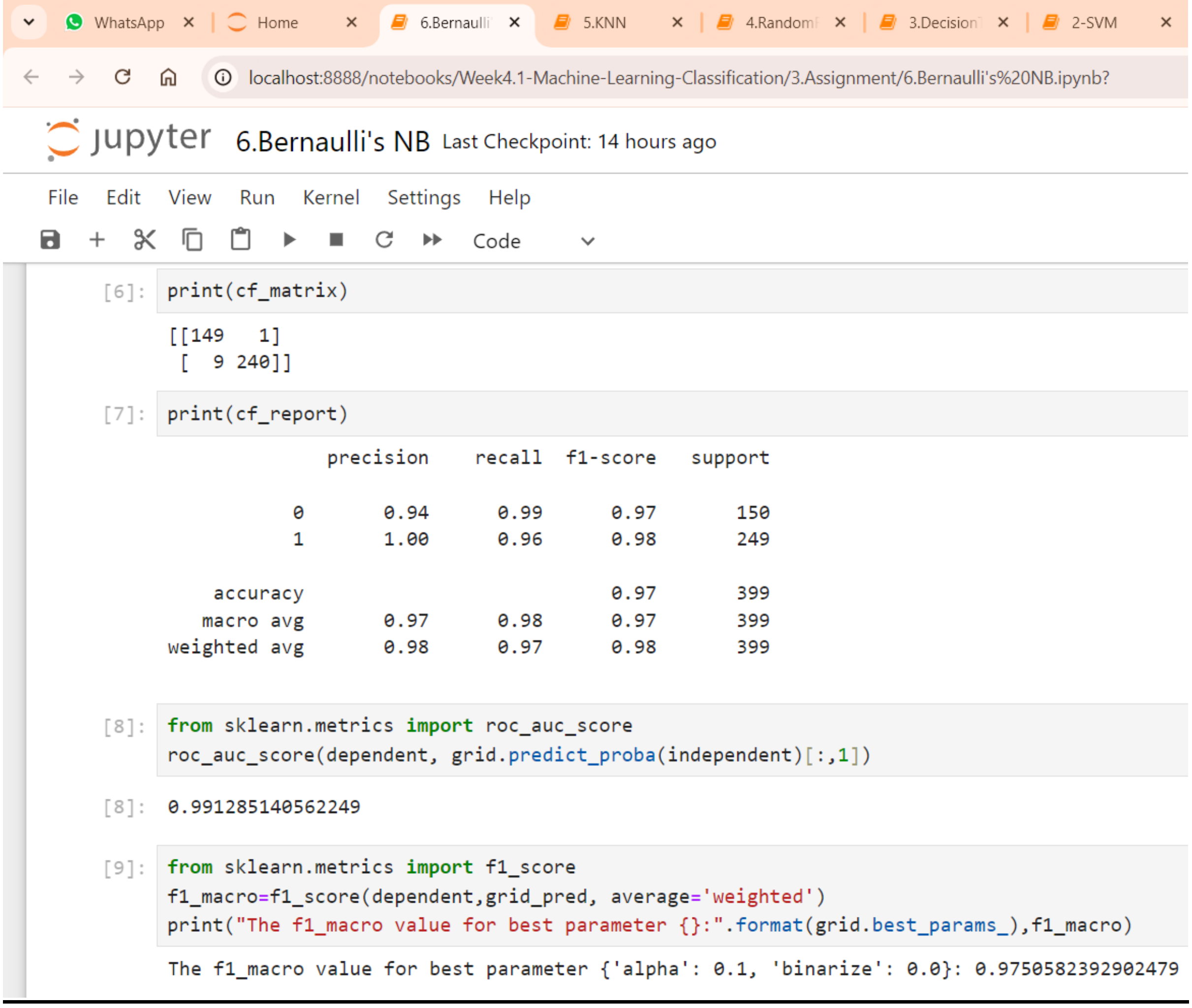
Code

```
cf_report = classification_report(dependent, grid_pred)
```

```
[26]: print(cf_metrics)
      print(cf_report)

      [[149   1]
       [  5 244]]
                    precision    recall  f1-score   support

                 0       0.97      0.99      0.98       150
                 1       1.00      0.98      0.99       249

          accuracy                           0.98       399
         macro avg       0.98      0.99      0.98       399
      weighted avg       0.99      0.98      0.99       399
```

```
[27]: from sklearn.metrics import roc_auc_score
      roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[27]: 0.999437751004016
```

```
[34]: from sklearn.metrics import f1_score
      f1_macro=f1_score(dependent,grid_pred, average='weighted')
      print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)

      The f1_macro value for best parameter {'algorithm': 'auto', 'weights': 'uniform'}: 0.9850004566071048
```


WhatsApp
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6.Bernaulli
5.KNN
4.Random
3.Decision
2-SVM
localhost:8888/notebooks/Week4.1-Machine-Learning-Classification/3.Assignment/6.Bernaulli's%20NB.ipynb?
jupyter
6.Bernaulli's NB Last Checkpoint: 14 hours ago
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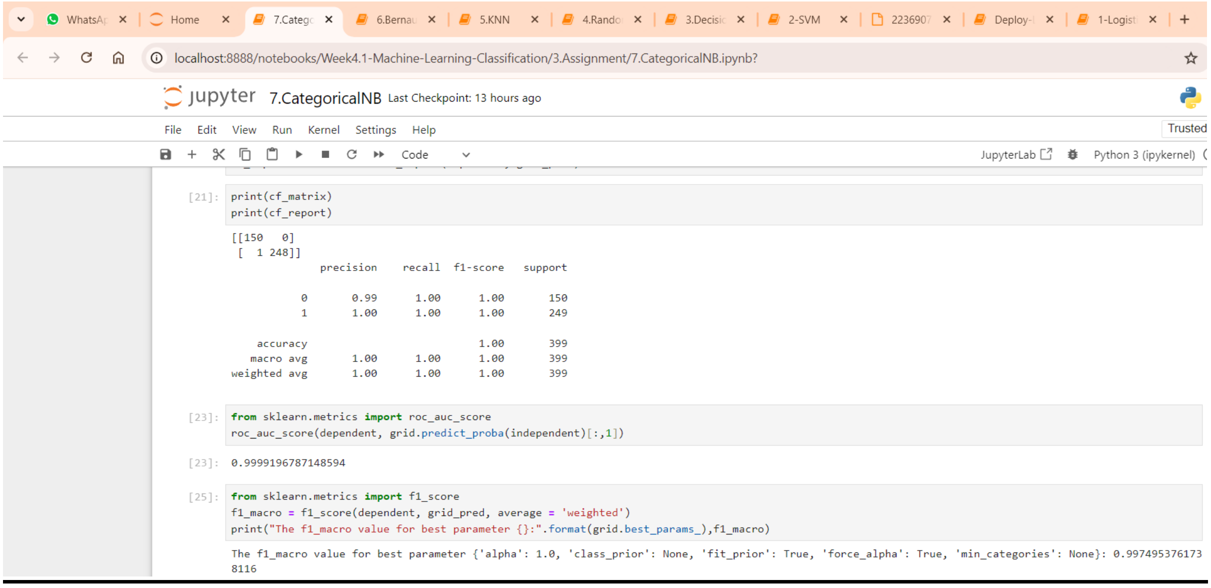
```
[6]: print(cf_matrix)

     [[149   1]
      [  9 240]]
```

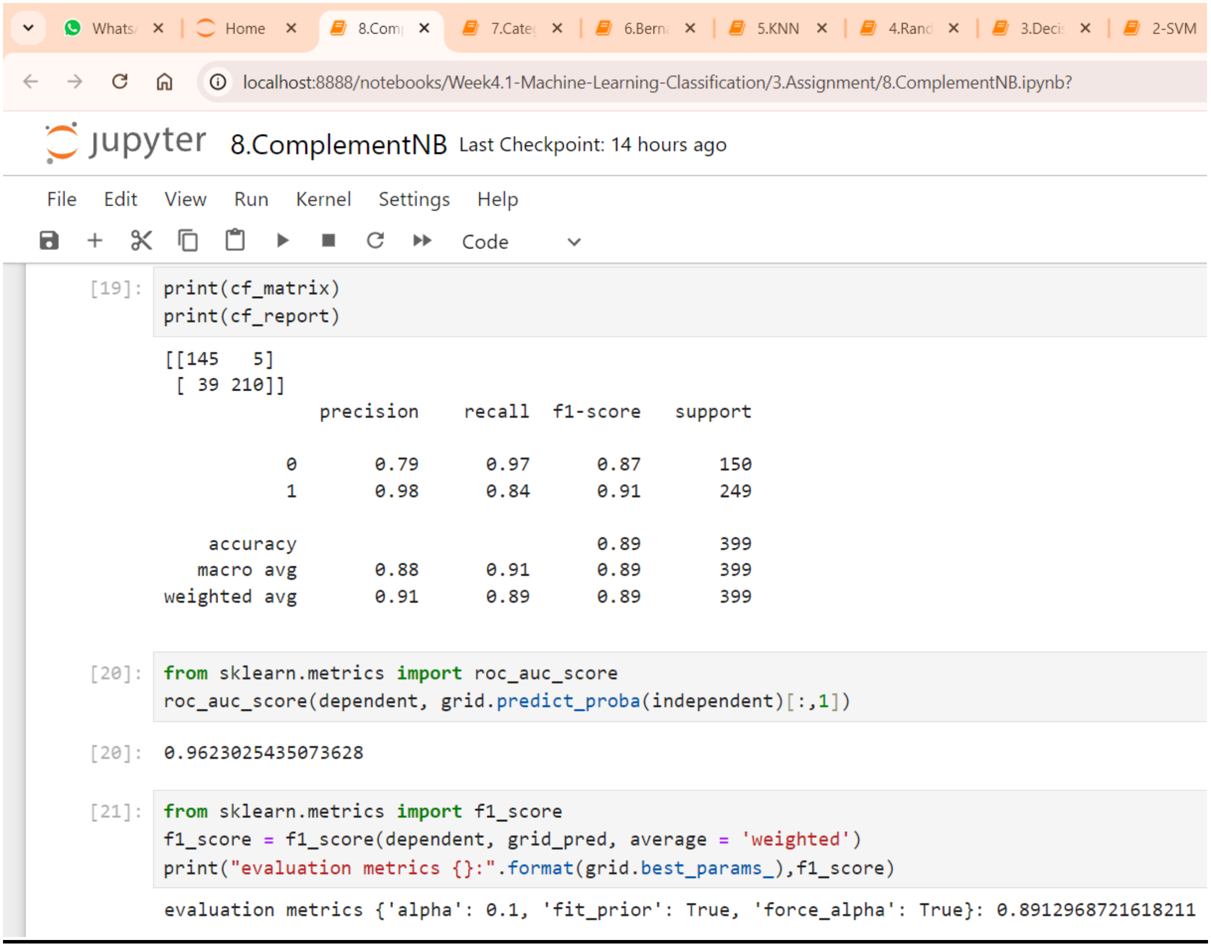
```
[7]: print(cf_report)

                   precision    recall  f1-score   support

                0       0.94      0.99      0.97       150
                1       1.00      0.96      0.98       249

         accuracy                           0.97       399
        macro avg       0.97      0.98      0.97       399
     weighted avg       0.98      0.97      0.98       399
```

```
[8]: from sklearn.metrics import roc_auc_score
     roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[8]: 0.991285140562249
```

```
[9]: from sklearn.metrics import f1_score
     f1_macro=f1_score(dependent,grid_pred, average='weighted')
     print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)

     The f1_macro value for best parameter {'alpha': 0.1, 'binarize': 0.0}: 0.9750582392902479
```



```
[21]: print(cf_matrix)
      print(cf_report)

      [[150   0]
       [  1 248]]
                    precision    recall  f1-score   support

                 0       0.99      1.00      1.00       150
                 1       1.00      1.00      1.00       249

          accuracy                           1.00       399
         macro avg       1.00      1.00      1.00       399
      weighted avg       1.00      1.00      1.00       399

[23]: from sklearn.metrics import roc_auc_score
      roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[23]: 0.9999196787148594

[25]: from sklearn.metrics import f1_score
      f1_macro = f1_score(dependent, grid_pred, average = 'weighted')
      print("The f1_macro value for best parameter {}:".format(grid.best_params_),f1_macro)

      The f1_macro value for best parameter {'alpha': 1.0, 'class_prior': None, 'fit_prior': True, 'force_alpha': True, 'min_categories': None}: 0.997495376173
      8116
```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8.Com
7.Cate
6.Bern
5.KNN
4.Rand
3.Deci
2-SVM
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jupyter
8.ComplementNB
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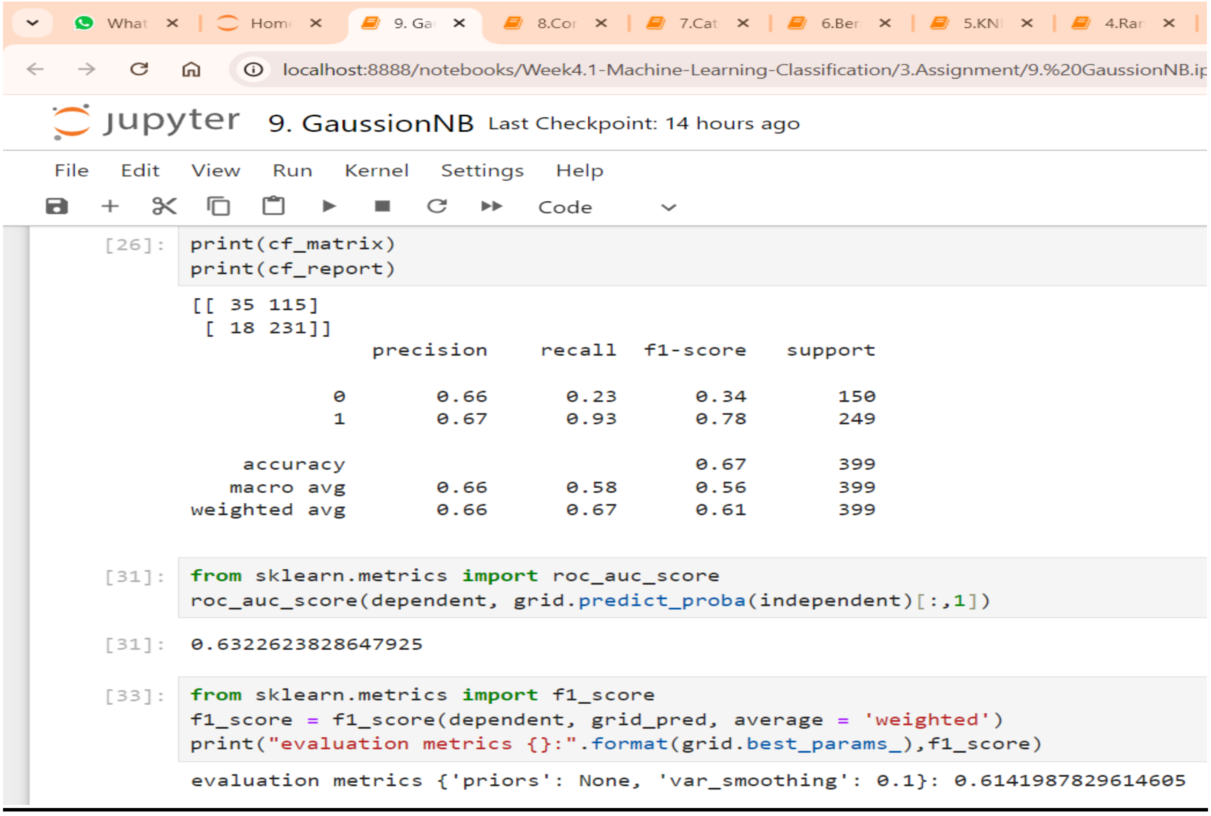
```
[19]: print(cf_matrix)
      print(cf_report)

      [[145   5]
       [ 39 210]]
                    precision    recall  f1-score   support

                 0       0.79      0.97      0.87       150
                 1       0.98      0.84      0.91       249

          accuracy                           0.89       399
         macro avg       0.88      0.91      0.89       399
      weighted avg       0.91      0.89      0.89       399

[20]: from sklearn.metrics import roc_auc_score
      roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[20]: 0.9623025435073628

[21]: from sklearn.metrics import f1_score
      f1_score = f1_score(dependent, grid_pred, average = 'weighted')
      print("evaluation metrics {}:".format(grid.best_params_),f1_score)

      evaluation metrics {'alpha': 0.1, 'fit_prior': True, 'force_alpha': True}: 0.8912968721618211
```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jupyter
9. GaussionNB
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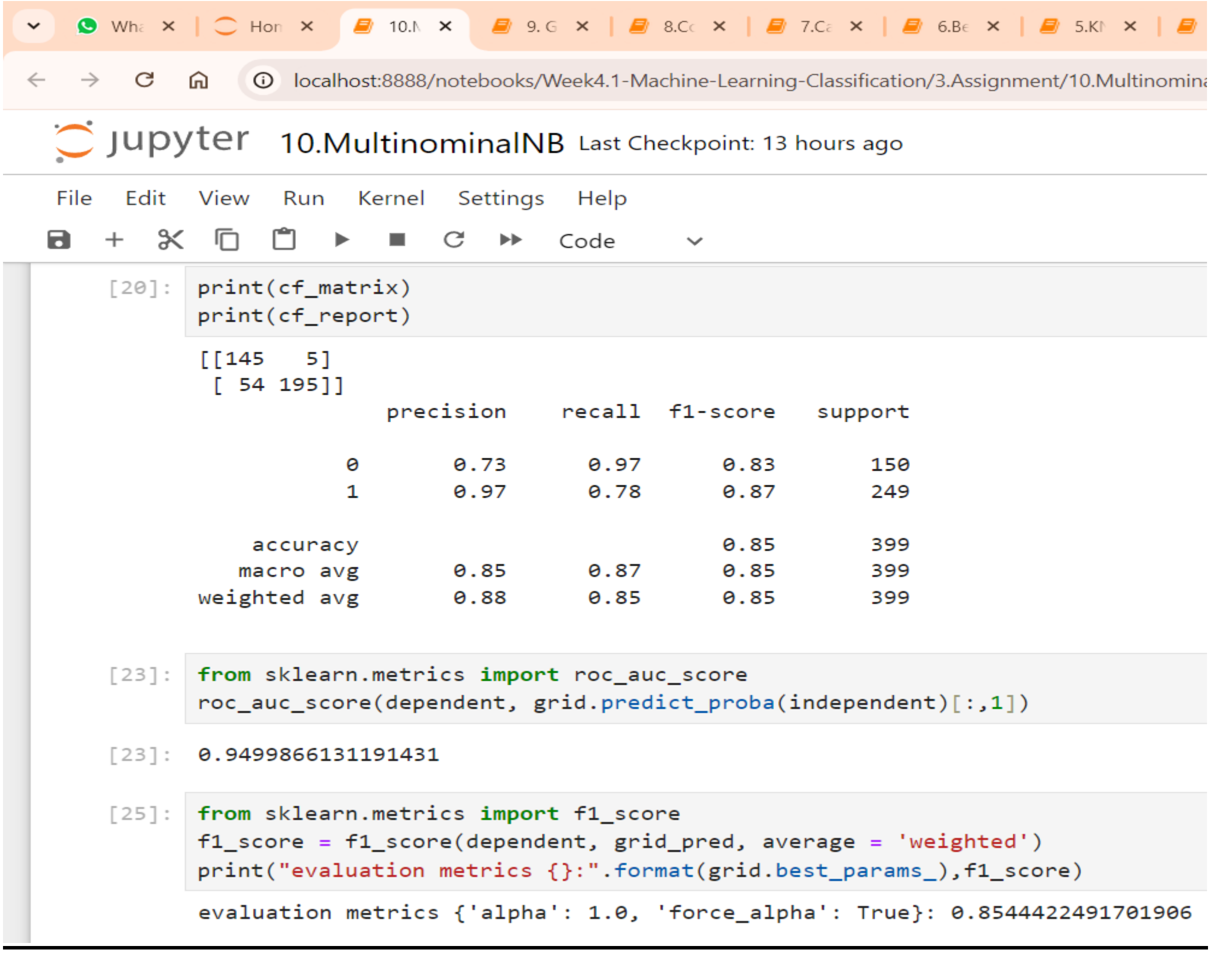
```
[26]: print(cf_matrix)
      print(cf_report)

      [[ 35 115]
       [ 18 231]]
                    precision    recall  f1-score   support

                 0       0.66      0.23      0.34       150
                 1       0.67      0.93      0.78       249

          accuracy                           0.67       399
         macro avg       0.66      0.58      0.56       399
      weighted avg       0.66      0.67      0.61       399

[31]: from sklearn.metrics import roc_auc_score
      roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[31]: 0.6322623828647925

[33]: from sklearn.metrics import f1_score
      f1_score = f1_score(dependent, grid_pred, average = 'weighted')
      print("evaluation metrics {}:".format(grid.best_params_),f1_score)

      evaluation metrics {'priors': None, 'var_smoothing': 0.1}: 0.6141987829614605
```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10.MultinominalNB
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Code

```
[20]: print(cf_matrix)
      print(cf_report)

      [[145   5]
       [ 54 195]]
                    precision    recall  f1-score   support

                 0       0.73      0.97      0.83       150
                 1       0.97      0.78      0.87       249

          accuracy                           0.85       399
         macro avg       0.85      0.87      0.85       399
      weighted avg       0.88      0.85      0.85       399

[23]: from sklearn.metrics import roc_auc_score
      roc_auc_score(dependent, grid.predict_proba(independent)[:,1])

[23]: 0.9499866131191431

[25]: from sklearn.metrics import f1_score
      f1_score = f1_score(dependent, grid_pred, average = 'weighted')
      print("evaluation metrics {}:".format(grid.best_params_),f1_score)

      evaluation metrics {'alpha': 1.0, 'force_alpha': True}: 0.8544422491701906
```