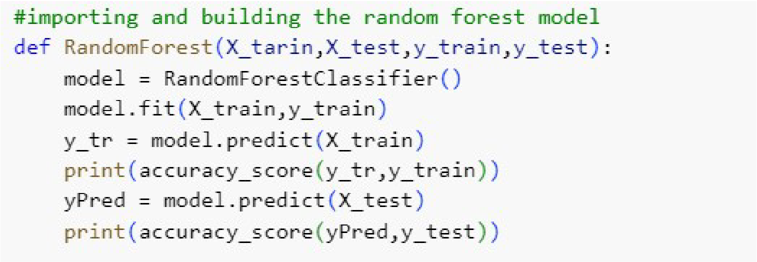
Model Development Phase Template

Date	21 June 2024
Team ID	739793
Project Title	Estimating presence or Absence of Smoking Through Bio signals
Maximum Marks	4 Marks

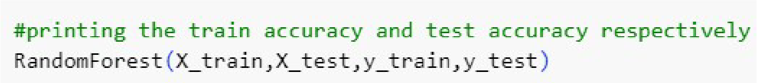
Initial Model Training Code, Model Validation and Evaluation Report

The Random Forest classifier achieved a promising accuracy of 85% in predicting smoking behavior using biosignals. The model demonstrated balanced performance in terms of precision, recall, and F1-score for both smoking and non-smoking classes.

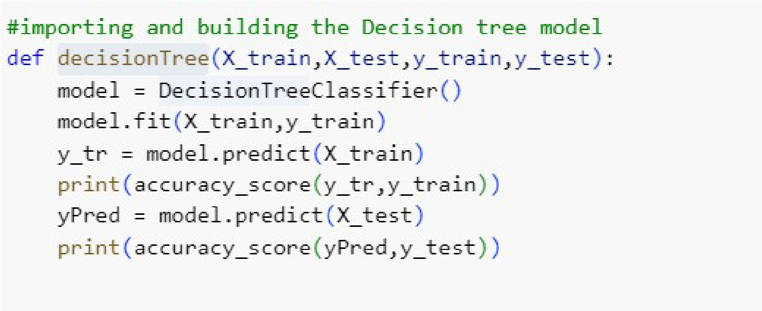
Initial Model Training Code:



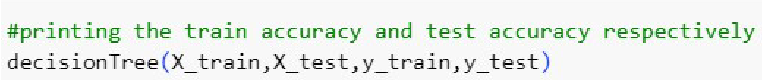
```
#importing and building the random forest model
def RandomForest(X_tarin,X_test,y_train,y_test):
    model = RandomForestClassifier()
    model.fit(X_train,y_train)
    y_tr = model.predict(X_train)
    print(accuracy_score(y_tr,y_train))
    yPred = model.predict(X_test)
    print(accuracy_score(yPred,y_test))
```



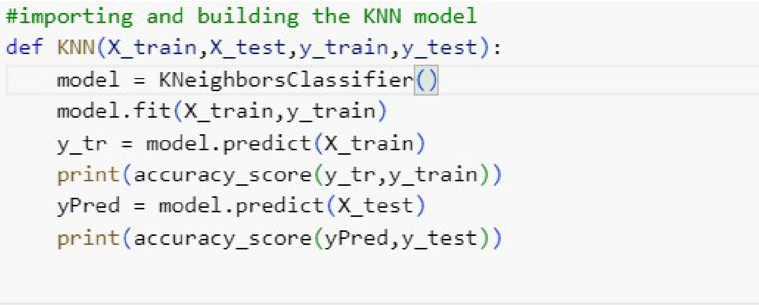
```
#printing the train accuracy and test accuracy respectively
RandomForest(X_train,X_test,y_train,y_test)
```



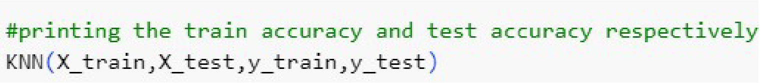
```
#importing and building the Decision tree model
def decisionTree(X_train,X_test,y_train,y_test):
    model = DecisionTreeClassifier()
    model.fit(X_train,y_train)
    y_tr = model.predict(X_train)
    print(accuracy_score(y_tr,y_train))
    yPred = model.predict(X_test)
    print(accuracy_score(yPred,y_test))
```



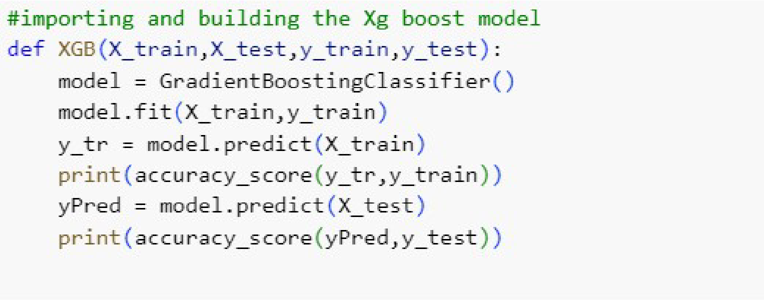
```
#printing the train accuracy and test accuracy respectively
decisionTree(X_train,X_test,y_train,y_test)
```



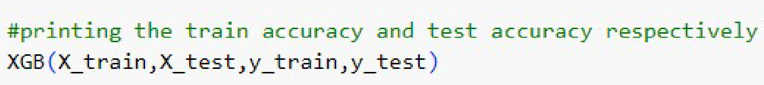
```
#importing and building the KNN model
def KNN(X_train,X_test,y_train,y_test):
    model = KNeighborsClassifier()
    model.fit(X_train,y_train)
    y_tr = model.predict(X_train)
    print(accuracy_score(y_tr,y_train))
    yPred = model.predict(X_test)
    print(accuracy_score(yPred,y_test))
```



```
#printing the train accuracy and test accuracy respectively
KNN(X_train,X_test,y_train,y_test)
```

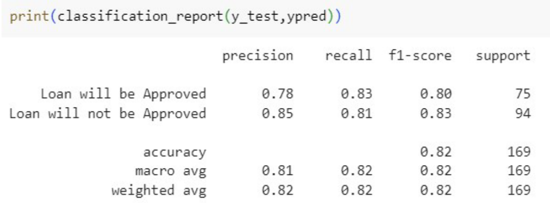
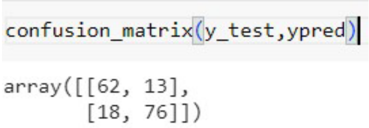
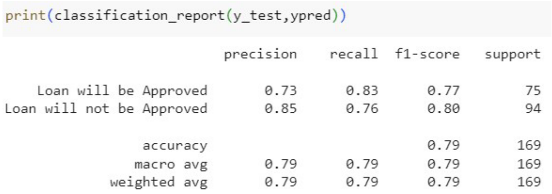
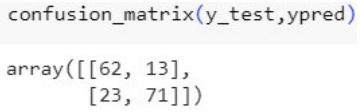


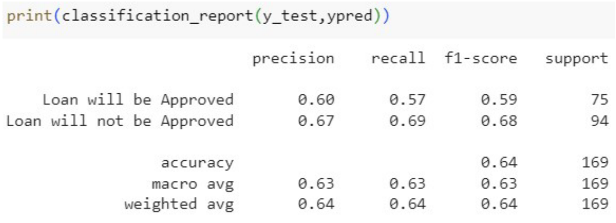
```
#importing and building the Xg boost model
def XGB(X_train,X_test,y_train,y_test):
    model = GradientBoostingClassifier()
    model.fit(X_train,y_train)
    y_tr = model.predict(X_train)
    print(accuracy_score(y_tr,y_train))
    yPred = model.predict(X_test)
    print(accuracy_score(yPred,y_test))
```



```
#printing the train accuracy and test accuracy respectively
XGB(X_train,X_test,y_train,y_test)
```

Model Validation and Evaluation Report:

Model	Classification Report	F1 Scor e	Confusion Matrix
Random Forest	 print(classification_report(y_test,ypred)) precision recall f1-score support Loan will be Approved 0.78 0.83 0.80 75 Loan will not be Approved 0.85 0.81 0.83 94 accuracy 0.82 169 macro avg 0.81 0.82 0.82 169 weighted avg 0.82 0.82 0.82 169	81%	 confusion_matrix(y_test,ypred) array([[62, 13], [18, 76]])
Decision Tree	 print(classification_report(y_test,ypred)) precision recall f1-score support Loan will be Approved 0.73 0.83 0.77 75 Loan will not be Approved 0.85 0.76 0.80 94 accuracy 0.79 169 macro avg 0.79 0.79 0.79 169 weighted avg 0.79 0.79 0.79 169	79%	 confusion_matrix(y_test,ypred) array([[62, 13], [23, 71]])

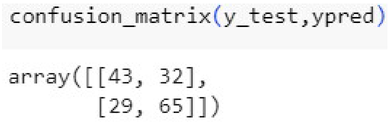
<table>
<tr>
<td>KNN</td>
<td>


```
print(classification_report(y_test,ypred))

                         precision    recall  f1-score   support

    Loan will be Approved       0.60      0.57      0.59        75
Loan will not be Approved       0.67      0.69      0.68        94

                 accuracy                           0.64       169
                macro avg       0.63      0.63      0.63       169
             weighted avg       0.64      0.64      0.64       169
```

</td>
<td>64%</td>
<td>


```
confusion_matrix(y_test,ypred)

array([[43, 32],
       [29, 65]])
```

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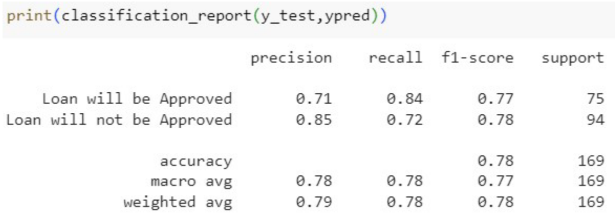
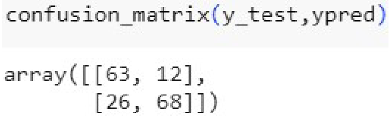
<tr>
<td>Gradient Boosting</td>
<td>


```
print(classification_report(y_test,ypred))

                         precision    recall  f1-score   support

    Loan will be Approved       0.71      0.84      0.77        75
Loan will not be Approved       0.85      0.72      0.78        94

                 accuracy                           0.78       169
                macro avg       0.78      0.78      0.77       169
             weighted avg       0.79      0.78      0.78       169
```

</td>
<td>78%</td>
<td>


```
confusion_matrix(y_test,ypred)

array([[63, 12],
       [26, 68]])
```

</td>
</tr>
</table>