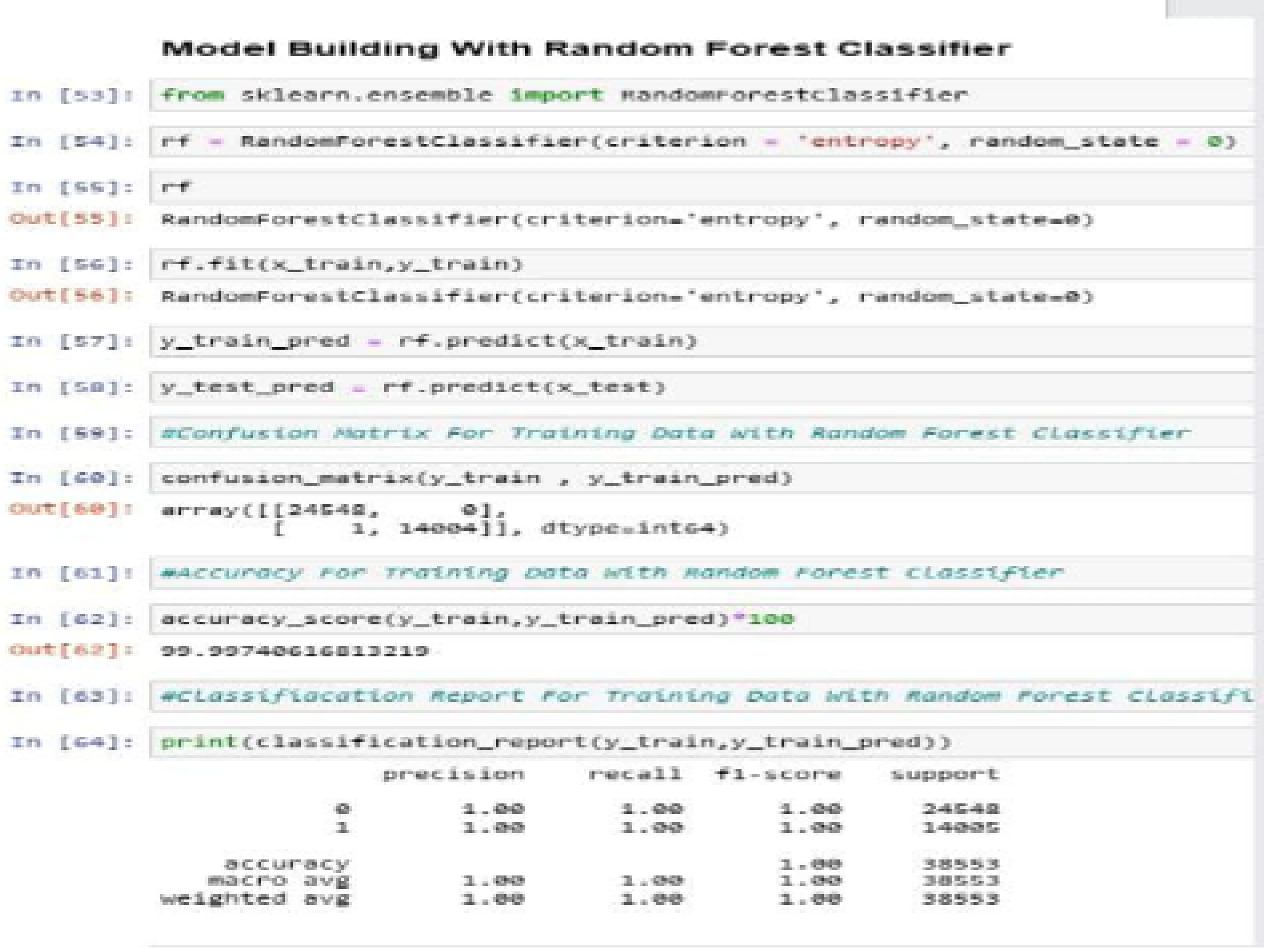
Model Development Phase Template

Date	21 June 2024
Team ID	740005
Project Title	Estimating Presence or Absence of Smoking through bio signals
Maximum Marks	4 Marks

Initial Model Training Code, Model Validation and Evaluation Report

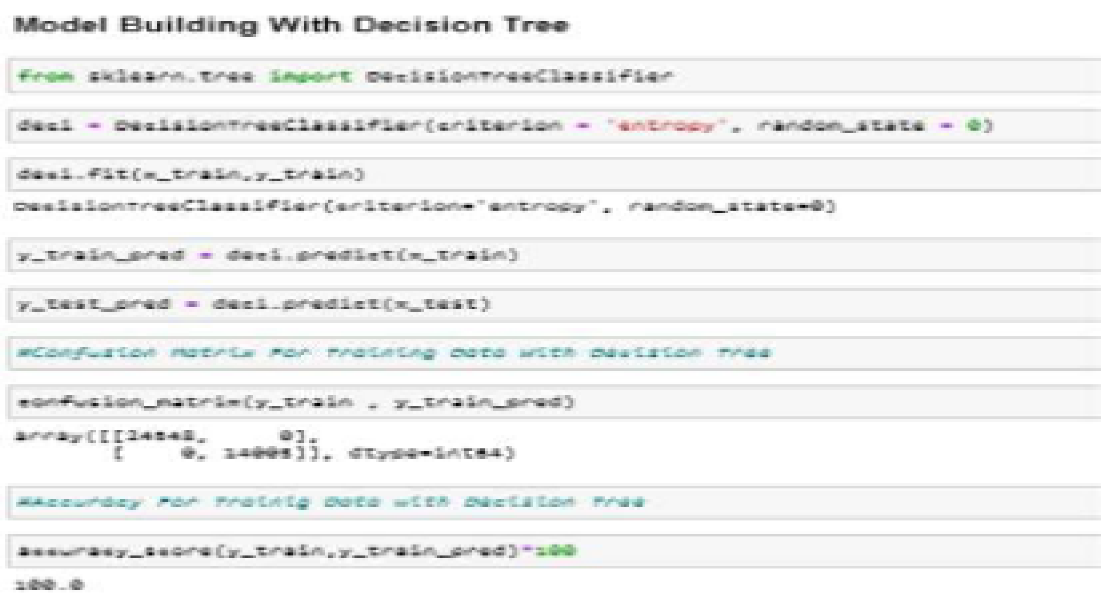
The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include classification reports, accuracy, and confusion matrices for multiple models, presented through respective screenshots.

Initial Model Training Code:



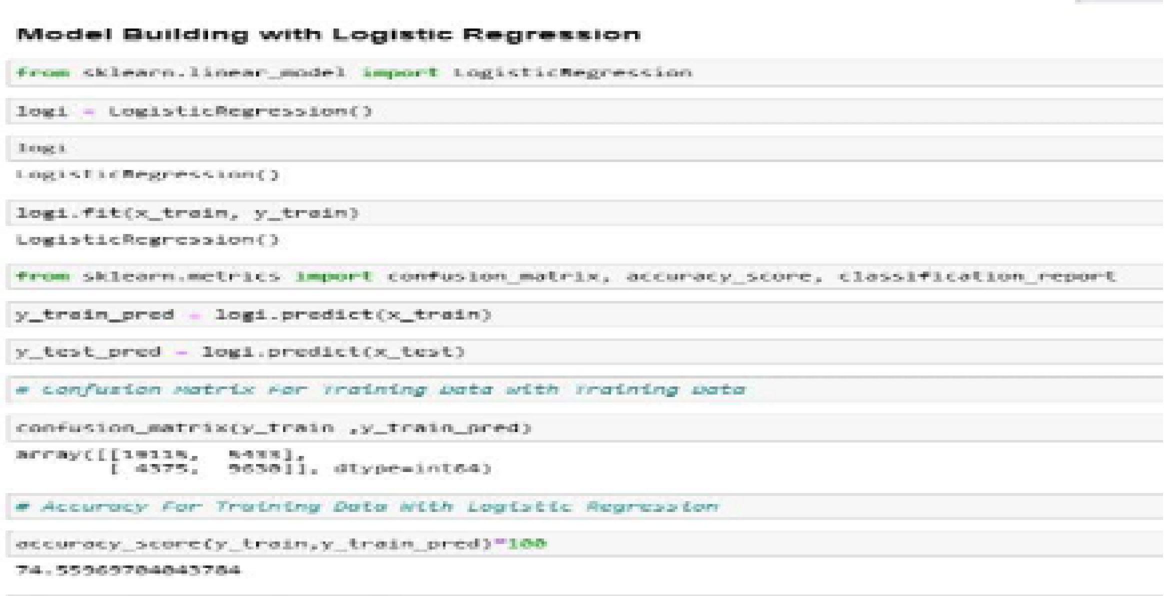
Model Building With Random Forest Classifier

```
In [53]: from sklearn.ensemble import RandomForestClassifier

In [54]: rf = RandomForestClassifier(criterion = 'entropy', random_state = 0)

In [55]: rf
Out[55]: RandomForestClassifier(criterion='entropy', random_state=0)

In [56]: rf.fit(x_train,y_train)
Out[56]: RandomForestClassifier(criterion='entropy', random_state=0)

In [57]: y_train_pred = rf.predict(x_train)

In [58]: y_test_pred = rf.predict(x_test)

In [59]: #Confusion Matrix For Training Data With Random Forest Classifier

In [60]: confusion_matrix(y_train , y_train_pred)
Out[60]: array([[24548,     0],
                [    1, 14004]], dtype=int64)

In [61]: #Accuracy For Training Data With Random Forest Classifier

In [62]: accuracy_score(y_train,y_train_pred)*100
Out[62]: 99.99740616813219

In [63]: #Classifiacation Report For Training Data With Random Forest Classifi

In [64]: print(classification_report(y_train,y_train_pred))
              precision    recall  f1-score   support

           0       1.00      1.00      1.00     24548
           1       1.00      1.00      1.00     14005

    accuracy                           1.00     38553
   macro avg       1.00      1.00      1.00     38553
weighted avg       1.00      1.00      1.00     38553
```



Model Building With Decision Tree

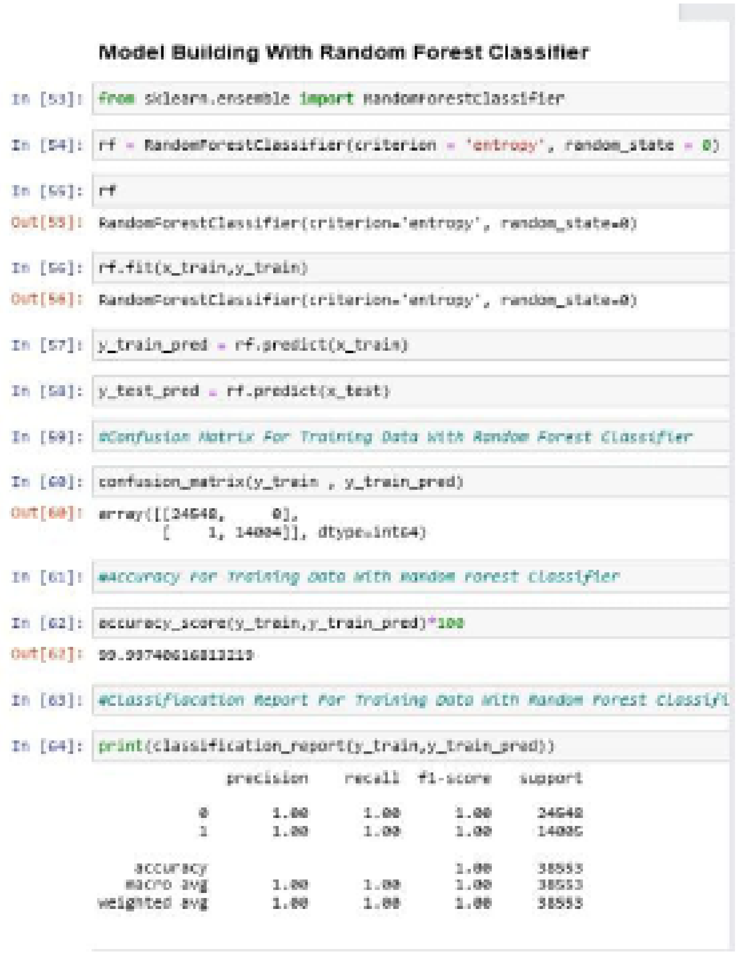
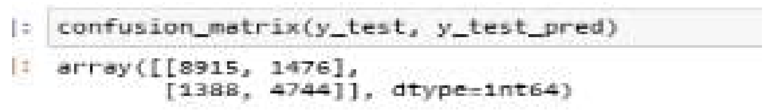
```
from sklearn.tree import DecisionTreeClassifier

deci = DecisionTreeClassifier(criterion = 'entropy', random_state = 0)

deci.fit(x_train,y_train)
DecisionTreeClassifier(criterion='entropy', random_state=0)

y_train_pred = deci.predict(x_train)

y_test_pred = deci.predict(x_test)

#Confusion matrix for Training data with Decision Tree

confusion_matrix(y_train , y_train_pred)
array([[24548,     0],
       [    0, 14005]], dtype=int64)

#Accuracy for Trainig data with Decision Tree

accuracy_score(y_train,y_train_pred)*100
100.0
```

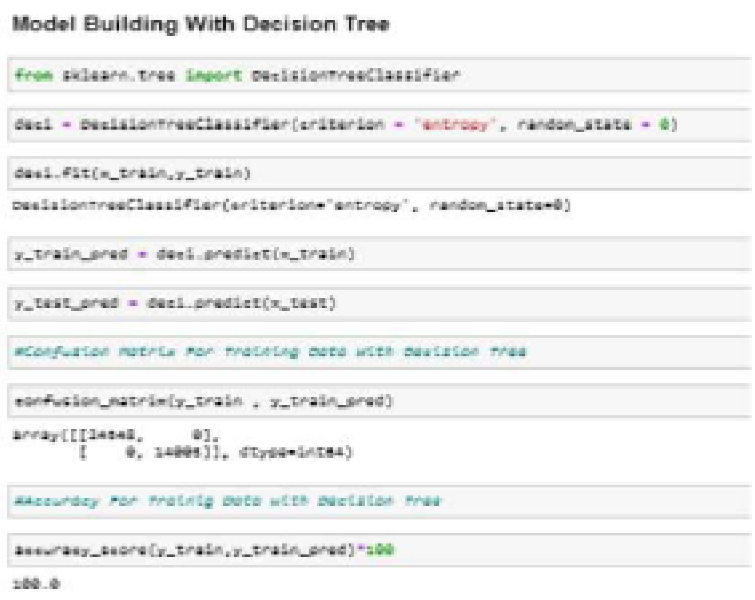
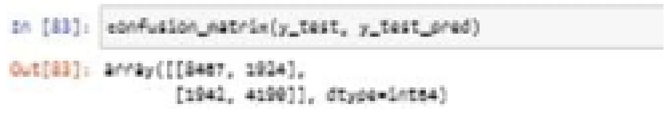
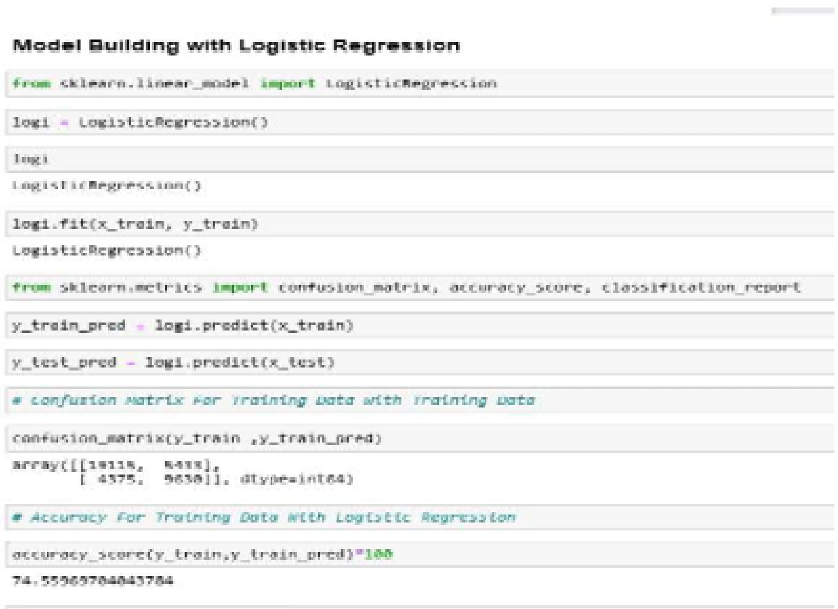
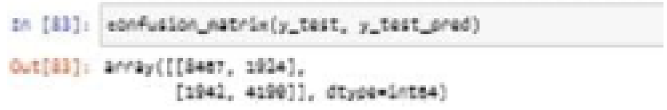


Model Building with Logistic Regression

```
from sklearn.linear_model import LogisticRegression

logi = LogisticRegression()

logi
LogisticRegression()

logi.fit(x_train, y_train)
LogisticRegression()

from sklearn.metrics import confusion_matrix, accuracy_score, classification_report

y_train_pred = logi.predict(x_train)

y_test_pred = logi.predict(x_test)

# confusion matrix for Training Data with Training Data

confusion_matrix(y_train ,y_train_pred)
array([[19115,  5433],
       [ 4375,  9630]], dtype=int64)

# Accuracy For Training Data With Logistic Regression

accuracy_score(y_train,y_train_pred)*100
74.55969704043784
```

Model Validation and Evaluation Report:

Model	Classification Report	Accuracy	Confusion Matrix
Random forest classifier	 Model Building With Random Forest Classifier In [53]: from sklearn.ensemble import RandomForestClassifier In [54]: rf = RandomForestClassifier(criterion = 'entropy', random_state = 0) In [55]: rf Out[55]: RandomForestClassifier(criterion='entropy', random_state=0) In [56]: rf.fit(x_train,y_train) Out[56]: RandomForestClassifier(criterion='entropy', random_state=0) In [57]: y_train_pred = rf.predict(x_train) In [58]: y_test_pred = rf.predict(x_test) In [59]: #Confusion Matrix For Training Data With Random Forest Classifier In [60]: confusion_matrix(y_train , y_train_pred) Out[60]: array([[24548, 0], [1, 14004]], dtype=int64) In [61]: #Accuracy For Training Data With Random Forest Classifier In [62]: accuracy_score(y_train,y_train_pred)*100 Out[62]: 99.99740616813219 In [63]: #Classification Report For Training Data With Random Forest Classifi In [64]: print(classification_report(y_train,y_train_pred)) precision recall f1-score support 0 1.00 1.00 1.00 24548 1 1.00 1.00 1.00 14005 accuracy 1.00 38553 macro avg 1.00 1.00 1.00 38553 weighted avg 1.00 1.00 1.00 38553	69%	]: confusion_matrix(y_test, y_test_pred)]: array([[8915, 1476], [1388, 4744]], dtype=int64)

Decision tree		64%	
Logistic Regression Gradient Boosting		76.4% 75%	

Model Building With Decision Tree

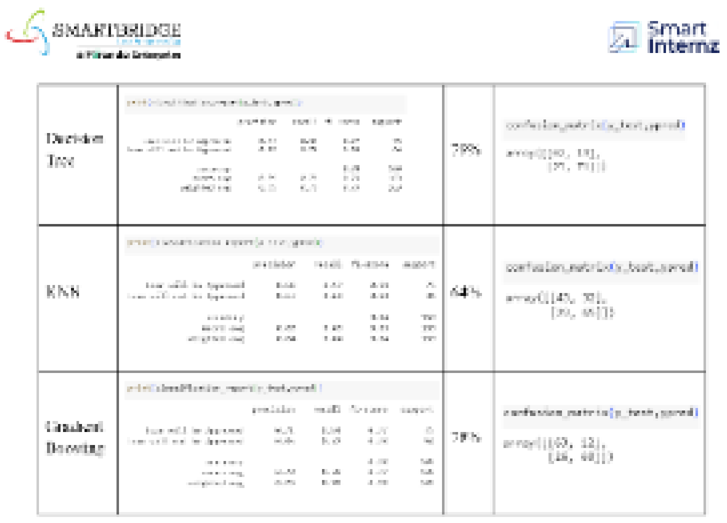
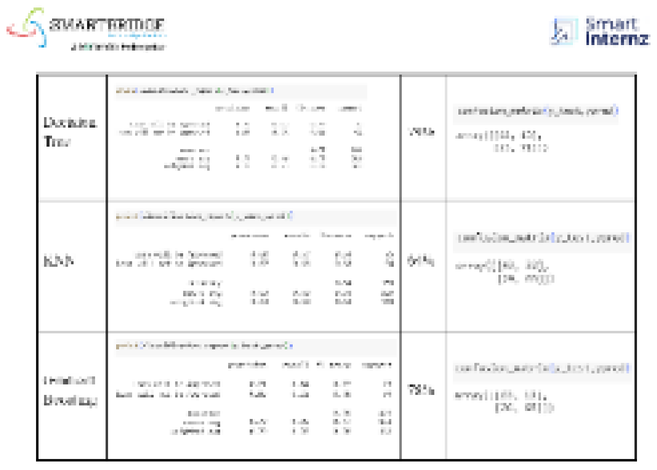
```
from sklearn.tree import DecisionTreeClassifier
```
```
deci = DecisionTreeClassifier(criterion = 'entropy', random_state = 0)
```
```
deci.fit(x_train,y_train)
```
```
DecisionTreeClassifier(criterion='entropy', random_state=0)
```
```
y_train_pred = deci.predict(x_train)
```
```
y_test_pred = deci.predict(x_test)
```
```
#Confusion matrix for Training data with decision tree
```
```
confusion_matrix(y_train , y_train_pred)
```
```
array([[24550,     0],
       [    0, 14005]], dtype=int64)
```
```
#Accuracy for Trainig data with decision tree
```
```
accuracy_score(y_train,y_train_pred)*100
```
```
100.0
```

```
In [83]: confusion_matrix(y_test, y_test_pred)
Out[83]: array([[8487, 1024],
                [1942, 4190]], dtype=int64)
```

Model Building with Logistic Regression

```
from sklearn.linear_model import LogisticRegression
```
```
logi = LogisticRegression()
```
```
logi
```
```
LogisticRegression()
```
```
logi.fit(x_train, y_train)
```
```
LogisticRegression()
```
```
from sklearn.metrics import confusion_matrix, accuracy_score, classification_report
```
```
y_train_pred = logi.predict(x_train)
```
```
y_test_pred = logi.predict(x_test)
```
```
# Confusion Matrix For Training Data with Training Data
```
```
confusion_matrix(y_train ,y_train_pred)
```
```
array([[19115,  5435],
       [ 4375,  9630]], dtype=int64)
```
```
# Accuracy For Training Data With Logistic Regression
```
```
accuracy_score(y_train,y_train_pred)*100
```
```
74.55969704043784
```

```
In [83]: confusion_matrix(y_test, y_test_pred)
Out[83]: array([[8487, 1024],
                [1942, 4190]], dtype=int64)
```

	SMARTBRIDGE a Veranda Enterprise Smart Internz Decision Tree [illegible] 79% confusion_matrix(y_test,ypred) array([[[illegible]]]) KNN [illegible] 64% confusion_matrix(y_test,ypred) array([[[illegible]]]) Gradient Boosting print(classification_report(y_test,ypred)) [illegible] 78% confusion_matrix(y_test,ypred) array([[[illegible]]])		SMARTBRIDGE a Veranda Enterprise Smart Internz Decision Tree [illegible] confusion_matrix(y_test,ypred) array([[[illegible]]]) KNN [illegible] confusion_matrix(y_test,ypred) array([[[illegible]]]) Gradient Boosting [illegible] confusion_matrix(y_test,ypred) array([[[illegible]]])