Model Development Phase Template

Date	15 July 2024
Team ID	739699
Project Title	Telecom Customer Churn Prediction
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:

[50]:
```
#Model Building
```

[51]:
```
#support Vector Machine
from sklearn.svm import SVC
svm=SVC(kernel="linear")
```

[52]:
```
svm.fit(x_train,y_train)
```

[52]:
```
SVC(kernel='linear')
```

[53]:
```
svm_pred = svm.predict(x_test)
svm_acc = accuracy_score(svm_pred,y_test)
svm_acc
```

[53]:
```
0.7975
```

```
       [   0,    0]], dtype=int64)
```

[54]:
```
#Logistic Regression
from sklearn.linear_model import LogisticRegression

model=LogisticRegression()
model.fit(x_train,y_train)
accuracy_score(model.predict(x_test),y_test)
```

[54]: 0.807

56]:
```
#Decision Tree classifier]
from sklearn.tree import DecisionTreeClassifier
classifier= DecisionTreeClassifier(criterion='entropy', random_state=42)
classifier.fit(x_train, y_train)
pred=classifier.predict(x_test)
dtc_acc=accuracy_score(pred,y_test)
dtc_acc
```

56]: 0.7835

3]:
```
#random forest classifier
from sklearn.ensemble import RandomForestClassifier
rc=RandomForestClassifier(random_state=42)
rc.fit(x_train,y_train)
pred=rc.predict(x_test)
rfc_acc=accuracy_score(y_test,pred)
rfc_acc
```

3]: 0.864

```
[67]: #kNeighborsClassifier
      from sklearn.neighbors import KNeighborsClassifier
      knn=KNeighborsClassifier()

[68]: knn.fit(x_train,y_train)

[68]: ▾ KNeighborsClassifier
      KNeighborsClassifier()

[69]: knn_acc=accuracy_score(knn.predict(x_test),y_test)
      knn_acc

[69]: 0.8345

[71]: #naive bayes classifier
      from sklearn.naive_bayes import GaussianNB
      gnb = GaussianNB()
      gnb.fit(x_train, y_train)
      nb_acc=accuracy_score(gnb.predict(x_test),y_test)
      nb_acc

[71]: 0.8275
```

Model Validation and Evaluation Report:

Model	Classification Report	Accuracy	Confusion Matrix
svm	[82]: `print(classification_report(svm_pred,y_test))` precision recall f1-score support 0 1.00 0.80 0.89 2000 1 0.00 0.00 0.00 0 accuracy 0.80 2000 macro avg 0.50 0.40 0.44 2000 weighted avg 1.00 0.80 0.89 2000	79	[83]: `confusion_matrix(svm_pred,y_test)` [83]: array([[1595, 405], [0, 0]], dtype=int64)

Logistic regression	[84]: `print(classification_report(model.predict(x_test),y_test))` precision recall f1-score support 0 0.96 0.88 0.92 1733 1 0.49 0.75 0.60 267 accuracy 0.86 2000 macro avg 0.73 0.82 0.76 2000 weighted avg 0.90 0.86 0.88 2000	80	[85]: `confusion_matrix(model.predict(x_test),y_test)` [85]: array([[1528, 205], [67, 200]], dtype=int64)
Decision Tree	[86]: `print(classification_report(pred,y_test))` precision recall f1-score support 0 0.96 0.88 0.92 1733 1 0.49 0.75 0.60 267 accuracy 0.86 2000 macro avg 0.73 0.82 0.76 2000 weighted avg 0.90 0.86 0.88 2000	78	[87]: `confusion_matrix(pred,y_test)` [87]: array([[1528, 205], [67, 200]], dtype=int64)
Random Forest	[88]: `print(classification_report(pred,y_test))` precision recall f1-score support 0 0.96 0.88 0.92 1733 1 0.49 0.75 0.60 267 accuracy 0.86 2000 macro avg 0.73 0.82 0.76 2000 weighted avg 0.90 0.86 0.88 2000	86	[61]: `rfc_con=confusion_matrix(pred,y_test)` `rfc_con` [61]: array([[1528, 205], [67, 200]], dtype=int64)
knn	[89]: `print(classification_report(knn.predict(x_test),y_test))` precision recall f1-score support 0 0.94 0.87 0.90 1728 1 0.43 0.64 0.51 272 accuracy 0.83 2000 macro avg 0.68 0.75 0.71 2000 weighted avg 0.87 0.83 0.85 2000	83	[70]: `knn_con=confusion_matrix(knn.predict(x_test),y_test)` `knn_con` [70]: array([[1496, 232], [99, 173]], dtype=int64)
Naïve bayes	90]: `print(classification_report(gnb.predict(x_test),y_test))` precision recall f1-score support 0 0.97 0.84 0.90 1846 1 0.26 0.69 0.38 154 accuracy 0.83 2000 macro avg 0.62 0.77 0.64 2000 weighted avg 0.92 0.83 0.86 2000	82	[72]: `nb_con=confusion_matrix(gnb.predict(x_test),y_test)` `nb_con` [72]: array([[1548, 298], [47, 107]], dtype=int64)