

## Model Development Phase Template

Date	27 January 2025
Team ID	SWUID20240011509
Project Title	Restaurant Recommendation System
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:

```
#importing and building the random forest model
def RandomForest(X_train,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 Score	Confusion Matrix
Random Forest	<pre>print(classification_report(y_test,ypred))</pre> <pre>               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         169  weighted avg                   0.82         169 </pre>	81%	<pre>confusion_matrix(y_test,ypred)</pre> <pre>array([[62, 13],        [18, 76]])</pre>

Decision Tree	<pre>print(classification_report(y_test,ypred))</pre> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>Loan will be Approved</td><td>0.73</td><td>0.83</td><td>0.77</td><td>75</td></tr><tr><td>Loan will not be Approved</td><td>0.85</td><td>0.76</td><td>0.80</td><td>94</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.79</td><td>169</td></tr><tr><td>macro avg</td><td>0.79</td><td>0.79</td><td>0.79</td><td>169</td></tr><tr><td>weighted avg</td><td>0.79</td><td>0.79</td><td>0.79</td><td>169</td></tr></tbody></table>		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%	<pre>confusion_matrix(y_test,ypred)</pre> <pre>array([[62, 13],        [23, 71]])</pre>
	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																													
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KNN	<pre>print(classification_report(y_test,ypred))</pre> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>Loan will be Approved</td><td>0.60</td><td>0.57</td><td>0.59</td><td>75</td></tr><tr><td>Loan will not be Approved</td><td>0.67</td><td>0.69</td><td>0.68</td><td>94</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.64</td><td>169</td></tr><tr><td>macro avg</td><td>0.63</td><td>0.63</td><td>0.63</td><td>169</td></tr><tr><td>weighted avg</td><td>0.64</td><td>0.64</td><td>0.64</td><td>169</td></tr></tbody></table>		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	64%	<pre>confusion_matrix(y_test,ypred)</pre> <pre>array([[43, 32],        [29, 65]])</pre>
	precision	recall	f1-score	support																													
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weighted avg	0.64	0.64	0.64	169																													
Gradient Boosting	<pre>print(classification_report(y_test,ypred))</pre> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>Loan will be Approved</td><td>0.71</td><td>0.84</td><td>0.77</td><td>75</td></tr><tr><td>Loan will not be Approved</td><td>0.85</td><td>0.72</td><td>0.78</td><td>94</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.78</td><td>169</td></tr><tr><td>macro avg</td><td>0.78</td><td>0.78</td><td>0.77</td><td>169</td></tr><tr><td>weighted avg</td><td>0.79</td><td>0.78</td><td>0.78</td><td>169</td></tr></tbody></table>		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	78%	<pre>confusion_matrix(y_test,ypred)</pre> <pre>array([[63, 12],        [26, 68]])</pre>
	precision	recall	f1-score	support																													
Loan will be Approved	0.71	0.84	0.77	75																													
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