

Model Development Phase Template

Date	15 July 2024
Team ID	739791
Project Title	Flight Delay Prediction using Machine Learning.
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:

1.RandomForestClassifier

```
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report, confusion_matrix
rfc = RandomForestClassifier()
rfc.fit(x_train,y_train)

y_test_predict1 = rfc.predict(x_test)
test_accuracy = accuracy_score(y_test,y_test_predict1)
test_accuracy
```

```
y_train_predict1 = rfc.predict(x_train)
train_accuracy = accuracy_score(y_train,y_train_predict1)
```

2. Logistic Regression

```
lr = LogisticRegression()
lr.fit(x_train,y_train)

y_test_predict2 = lr.predict(x_test)
test_accuracy = accuracy_score(y_test,y_test_predict2)
test_accuracy
```

```
y_train_predict2 = rfc.predict(x_train)
train_accuracy = accuracy_score(y_train,y_train_predict2)
train_accuracy
```

3. DecisionTreeClassifier

```
dtc = DecisionTreeClassifier()
dtc.fit(x_train,y_train)

y_test_predict3 = dtc.predict(x_test)
test_accuracy = accuracy_score(y_test,y_test_predict3)
test_accuracy
```

```
y_train_predict3 = dtc.predict(x_train)
train_accuracy = accuracy_score(y_train,y_train_predict3)
train_accuracy
```

4. ExtraTreeClassifier

```
etc = ExtraTreesClassifier()
etc.fit(x_train,y_train)

y_test_predict4 = etc.predict(x_test)
test_accuracy = accuracy_score(y_test,y_test_predict4)
test_accuracy
```

```
y_train_predict4 = etc.predict(x_train)
train_accuracy = accuracy_score(y_train,y_train_predict4)
train_accuracy
```

Model Validation and Evaluation Report:

Model	Classification Report	Accuracy	Confusion Matrix
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Random Forest Classifier	<pre>print(classification_report(y_test,y_test_predict1))</pre> <pre>✓ 0.1s</pre> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0.0</td><td>0.94</td><td>0.96</td><td>0.95</td><td>1932</td></tr><tr><td>1.0</td><td>0.71</td><td>0.59</td><td>0.65</td><td>293</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.92</td><td>2225</td></tr><tr><td>macro avg</td><td>0.83</td><td>0.78</td><td>0.80</td><td>2225</td></tr><tr><td>weighted avg</td><td>0.81</td><td>0.73</td><td>0.77</td><td>2225</td></tr></tbody></table>		precision	recall	f1-score	support	0.0	0.94	0.96	0.95	1932	1.0	0.71	0.59	0.65	293	accuracy			0.92	2225	macro avg	0.83	0.78	0.80	2225	weighted avg	0.81	0.73	0.77	2225	Accuracy Value	<pre>confusion_matrix(y_test, y_test_predict1)</pre> <pre>✓ 0.0s</pre> <pre>array([[1865, 67], [122, 171]])</pre>
	precision	recall	f1-score	support																													
0.0	0.94	0.96	0.95	1932																													
1.0	0.71	0.59	0.65	293																													
accuracy			0.92	2225																													
macro avg	0.83	0.78	0.80	2225																													
weighted avg	0.81	0.73	0.77	2225																													
Logistic Regression	<pre>print(classification_report(y_test,y_test_predict2))</pre> <pre>✓ 0.1s</pre> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0.0</td><td>0.95</td><td>0.96</td><td>0.95</td><td>1932</td></tr><tr><td>1.0</td><td>0.70</td><td>0.65</td><td>0.68</td><td>293</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.92</td><td>2225</td></tr><tr><td>macro avg</td><td>0.83</td><td>0.81</td><td>0.82</td><td>2225</td></tr><tr><td>weighted avg</td><td>0.92</td><td>0.92</td><td>0.92</td><td>2225</td></tr></tbody></table>		precision	recall	f1-score	support	0.0	0.95	0.96	0.95	1932	1.0	0.70	0.65	0.68	293	accuracy			0.92	2225	macro avg	0.83	0.81	0.82	2225	weighted avg	0.92	0.92	0.92	2225	Accuracy Value	<pre>confusion_matrix(y_test, y_test_predict2)</pre> <pre>✓ 0.0s</pre> <pre>array([[1852, 80], [102, 191]])</pre>
	precision	recall	f1-score	support																													
0.0	0.95	0.96	0.95	1932																													
1.0	0.70	0.65	0.68	293																													
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weighted avg	0.92	0.92	0.92	2225																													
Decision Tree Classifier	<pre>print(classification_report(y_test,y_test_predict3))</pre> <pre>✓ 0.0s</pre> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0.0</td><td>0.92</td><td>0.92</td><td>0.92</td><td>1932</td></tr><tr><td>1.0</td><td>0.47</td><td>0.48</td><td>0.48</td><td>293</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.86</td><td>2225</td></tr><tr><td>macro avg</td><td>0.70</td><td>0.70</td><td>0.70</td><td>2225</td></tr><tr><td>weighted avg</td><td>0.86</td><td>0.86</td><td>0.86</td><td>2225</td></tr></tbody></table>		precision	recall	f1-score	support	0.0	0.92	0.92	0.92	1932	1.0	0.47	0.48	0.48	293	accuracy			0.86	2225	macro avg	0.70	0.70	0.70	2225	weighted avg	0.86	0.86	0.86	2225	Accuracy Value	<pre>confusion_matrix(y_test, y_test_predict3)</pre> <pre>✓ 0.0s</pre> <pre>array([[1773, 159], [151, 142]])</pre>
	precision	recall	f1-score	support																													
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Extra Tree Classifier	<pre>print(classification_report(y_test,y_test_predict4))</pre> <pre>✓ 0.1s</pre> <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0.0</td><td>0.94</td><td>0.96</td><td>0.95</td><td>1932</td></tr><tr><td>1.0</td><td>0.69</td><td>0.56</td><td>0.62</td><td>293</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.91</td><td>2225</td></tr><tr><td>macro avg</td><td>0.81</td><td>0.76</td><td>0.78</td><td>2225</td></tr><tr><td>weighted avg</td><td>0.90</td><td>0.91</td><td>0.90</td><td>2225</td></tr></tbody></table>		precision	recall	f1-score	support	0.0	0.94	0.96	0.95	1932	1.0	0.69	0.56	0.62	293	accuracy			0.91	2225	macro avg	0.81	0.76	0.78	2225	weighted avg	0.90	0.91	0.90	2225	Accuracy Value	<pre>confusion_matrix(y_test, y_test_predict4)</pre> <pre>✓ 0.0s</pre> <pre>array([[1857, 75], [128, 165]])</pre>
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