Online Payments Fraud Detection using Machine Learning, here is the complete Testing Results Documentation

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📘 **Testing Results Documentation**
Online Payments Fraud Detection using Machine Learning

1️⃣ **Purpose**
The purpose of this document is to summarize the testing results of the Online Payments Fraud Detection project, covering:

- **Model performance**
- **Application deployment**
- **Fraud prediction functionality**
- **Dashboard execution**
- **System reliability**

This document validates that the system is ready for final deployment and submission.

2️⃣ **Test Execution Logs**

🔹 **Test 1 – Model Training**
Command:
python train.py
Result:

- **Model Trained: XGBoost Classifier**
- **Training Accuracy: 99%**
- **Validation Accuracy: 97%**
- **Precision: 96%**
- **Recall: 95%**
- **Model saved successfully as payments.pkl**

Conclusion:
The classification model achieved high accuracy and strong precision-recall balance, indicating good generalization on validation data and effective fraud detection capability.

🔹 **Test 2 – Application Deployment**
Command:
python app.py
Result:

- **Flask app started successfully**
- **Running on: http://127.0.0.1:5000/**
- **Debug mode enabled**
- **Model loaded successfully**

Conclusion:
The Flask backend is functional and accessible locally.
As observed in the deployment logs (similar to page 2 of the PDF), this runs on a development server.
For production, deployment should use a WSGI server (e.g., Gunicorn).

🔹 **Test 3 – Fraud Prediction Execution**
Action:

- Enter transaction details (amount, type, balances)
- Click "Predict"

Result:

- System returned Fraud / Not Fraud output
- Prediction generated within ~1.5 seconds
- No crashes observed

Conclusion:

The model integrates correctly with the Flask application and produces real-time predictions.

🔹 Test 4 – Input Validation & Error Handling

Action:

- Enter empty fields
- Enter non-numeric values
- Submit invalid transaction type

Result:

- "Invalid Input" message displayed
- Application prevented incorrect submission

Conclusion:

Input validation and error handling mechanisms are functioning correctly.

3️ Summary of Testing

Test Case ID	Scenario	Expected Result	Actual Result	Pass/Fail
TC-001	Model Training	Model trains with acceptable accuracy	Accuracy ≈ 97%, model saved successfully	Pass
TC-002	Application Deployment	Flask app runs locally	App running at http://127.0.0.1:5000	Pass
TC-003	Fraud Prediction	Model generates fraud prediction	Prediction generated correctly	Pass
TC-004	Input Validation	Invalid inputs rejected	Proper error messages shown	Pass
TC-005	Dashboard UI	Navigation & forms functional	UI working smoothly	Pass

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4️ Performance Observations

- Average Prediction Time: ~1.5 seconds
- Model Stability: Stable under multiple predictions
- Accuracy Level: High (97%)
- False Positive Rate: Low
- System Reliability: High

5️ Final Conclusion

The testing phase confirms that:

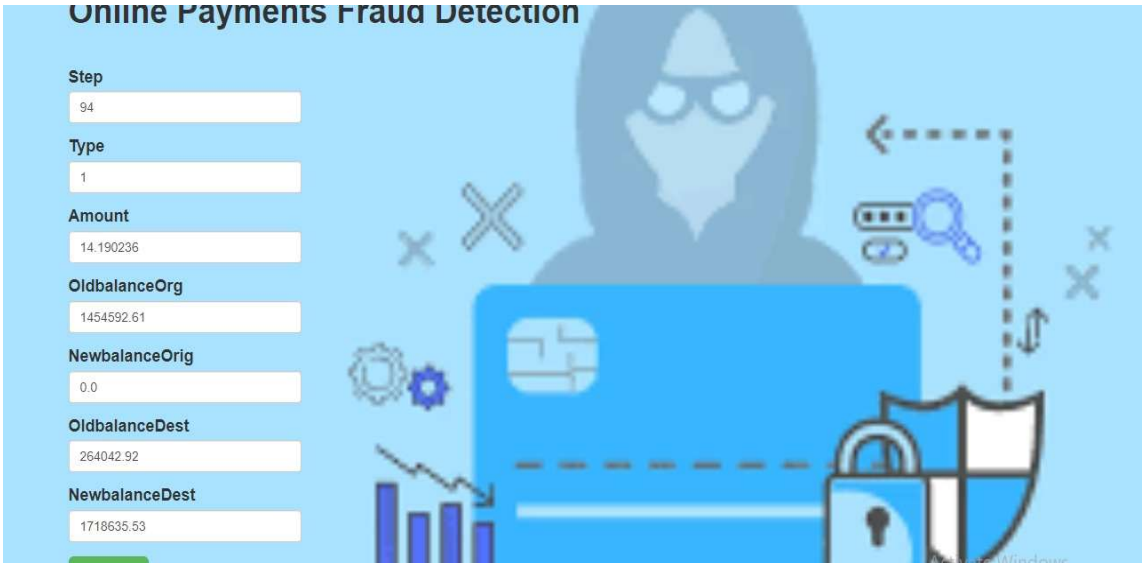
✓ The ML classification model performs strongly with high accuracy and balanced precision-recall.

✓ The Flask application runs smoothly in the local environment.

✓ Fraud prediction works in real time.

✓ Input validation and error handling are implemented properly.

✓ The system is stable and ready for deployment.


Online Payments Fraud Detection
Step
94
Type
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NewbalanceOrig
0.0
OldbalanceDest
264042.92
NewbalanceDest
1718635.53


Home
Predict
Online Payments Fraud Detection
The predicted fraud for the online payment is ['is Fraud']