AI-Based Anomaly Detection in Banking Reconciliation Test Report

# 1. Introduction

This document provides the test cases and test results for the AI-based Anomaly Detection system developed for banking reconciliation. The system uses Isolation Forest models to detect anomalies in reconciliation data and supports email notifications and a Streamlit-based web interface.

# 2. Test Summary

|  |  |  |
| --- | --- | --- |
| **Total Test Cases** | **Total Passed** | **Total Failed** |
| 12 | 12 | 0 |

# 3. Test Cases and Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test Case ID** | **Test Scenario** | **Test Steps** | **Expected Result** | **Result** |
| TC01 | Load Valid Reconciliation Dataset | Upload a valid sample Excel dataset | Dataset loads successfully with correct column mapping | Pass |
| TC02 | Run Anomaly Detection | Execute Isolation Forest model | Model runs, detects anomalies, adds Anomaly column | Pass |
| TC03 | Detect Injected Amount Outliers | Run model on dataset with 5x Amount injection anomalies | Amount-based anomalies correctly flagged (Anomaly = -1) | Pass |
| TC04 | Detect Date Mismatch Anomalies | Inject historical date differences and run the model | Date-based anomalies detected | Pass |
| TC05 | Email Alert Trigger - Anomalies Present | Trigger email alert function when anomalies exist | Email successfully sent with anomaly summary | Pass |
| TC06 | Email Alert Trigger - No Anomalies | Run email alert when no anomalies detected | No email sent / Proper notification displayed | Pass |
| TC07 | Download Anomaly CSV | Download the anomaly report from Streamlit web app | CSV downloaded with correct anomalous transactions | Pass |
| TC08 | Data Validation - Missing Mandatory Columns | Upload a file with missing Amount\_bank or Amount\_ledger | System throws a validation error or warning | Pass |
| TC09 | Handle Empty Data Upload | Upload an empty Excel file | App gracefully handles with user-friendly message | Pass |
| TC10 | Check Web UI Upload & Run Button | Upload file ➔ Click Run Anomaly Detection ➔ Click Download | Results displayed, download button works | Pass |
| TC11 | Deployment on Streamlit Cloud | Deploy on Streamlit Cloud | Accessible via public URL, runs anomaly detection end-to-end | Pass |
| TC12 | Email SMTP Failure Handling | Use wrong SMTP credentials and trigger email | Proper error message displayed, no crash | Pass |

# 4. Conclusion

All test cases executed successfully. The AI-based anomaly detection system meets the functional requirements and is ready for deployment. The system handles both normal and edge scenarios effectively.