



Fraud Detection Analysis

Analyzing transaction data to detect fraud patterns using Python, SQL, and Power BI

Project Objectives



Identify Fraud

Distinguish legitimate vs fraudulent transactions



High-Risk Detection

Detect high-risk customers and patterns



Pattern Analysis

Analyze fraud by location, type, and time



Visual Insights

Interactive dashboards for decision-makers



A screenshot of a dataset visualization interface. At the top, there's a navigation bar with tabs: 'Carding Finance' (highlighted in orange), 'Performers', 'Transaction', 'Saucation', and 'Finance'. Below the tabs, the word 'Data' is centered above a large 'X' button. On the left, a sidebar titled 'Records' shows a total of '\$2830 (.80000)' with a progress bar at '56% in'. The main area displays a table of transaction records with columns: 'ID', 'Timestamp', 'Amount', 'Type', and 'Fraud'. The table contains 13 rows of data. The background features a decorative pattern of yellow leaves.

ID	Timestamp	Amount	Type	Fraud
\$6/50//1140	\$2 ses	\$0,000	\$2.87k	\$17,000
\$62577/2010	\$5 ses	\$0,000	\$1.55k	\$12,000
\$50072/1200	\$1 ses	\$0,000	\$9.34k	\$15,000
160007/2015	\$1 ses	£0,000	\$3.54k	\$12,000
\$606021/20110	\$1 ses	\$1,000	\$5.54k	\$25,000
60002/5911	\$1 ses	\$5,600	\$3.54k	\$15,000
\$60000/1751	\$2 ses	\$0,000	\$5.54k	\$15,000
2011	\$2 ses	\$2,600	\$1.55k	\$12,000
805/1111	\$1 ses	\$2,500	\$3.54k	\$15,000

Dataset Overview

500

Total Rows

13

Columns

Transactional data
including customer IDs,
amounts, timestamps,
locations, device types,
and fraud indicators

Key Fields

- Transaction ID & Customer ID
- Amount & Transaction Time
- Transaction Type (ATM, Payment, Transfer, Online)
- Location & Device Type
- International Flag & Fraud Indicator

Data Preparation Process



Data Cleaning

Removed duplicates, handled missing values

Type Conversion

Converted data types for analysis

Feature Engineering

Created high_amount_flag, risk score, international_flag

```
df['hour'] = df['transaction_time'].dt.hour  
df['day_of_week'] = df['transaction_time'].dt.day_name()  
df['high_amount_flag'] = (df['amount'] > 50000).astype(int)  
df['international_flag'] = (df['is_international'] == 'Yes').astype(int)
```

SQL Analysis Highlights

Top 5 Fraud Transactions

Transaction ID	Amount
147	₹99,297
62	₹99,051
377	₹98,997
190	₹98,729
333	₹98,653

Fraud by Day of Week

Day	Count
Saturday	25
Thursday	25
Sunday	23
Friday	20

Total Fraud Loss: ₹10.42M

Dashboard Overview



Three-page interactive Power BI dashboard providing comprehensive fraud insights

01

Fraud Overview

KPIs, charts, and filters for transaction analysis

02

Fraud Insights Table

Detailed transaction data with multiple filters

03

Deep Insights

Risk scores, heatmaps, and high-risk accounts

Page 1: Key Performance Indicators



500

Total
Transactions

147

Fraud Count

10.4...

Fraud Amount

29%

Fraud Rate

Dynamic Filters

Quarter, Transaction Type, Location, Device Type

Visual Charts

Monthly trends, day-of-week patterns, amount flags, fraud rates



Key Insights & Findings



Transaction Patterns

High fraud in Online & Payment channels. International transactions show significantly higher fraud amounts.



Location Risk

Bangalore, Chennai, Hyderabad show elevated fraud. Metro cities at higher risk.



Time Trends

Fraud peaks on weekends. Evening hours show more suspicious activity.



Customer Risk

Top 5 high-risk customers contribute majority of fraud. High amounts correlate with fraud probability.

Business Recommendations

Strengthen Authentication

Add 2-factor authentication, device binding, behavioral analysis for Online and Payment channels

Monitor High-Risk Locations

Set up real-time alerts for suspicious activity in metro cities

Weekend Monitoring

Add rules for weekend-based fraud pattern detection

Flag High Amounts

Set dynamic thresholds based on customer history

Risk Scoring

Use risk score model to prioritize investigations

Project Deliverables

- Clean Dataset

Preprocessed transaction data

- Python Code

Data preprocessing scripts

- SQL Queries

Fraud analysis queries

- Power BI Dashboard

Interactive .pbix file

- Documentation

Full project report



Project Success

Successfully demonstrated fraud detection using data analytics. Enables financial institutions to identify fraud faster and take preventive actions.