Credit Card Fraud Analysis– Project Report

1. Introduction

The rapid growth of digital payments has increased the risk of credit card fraud, making fraud detection a critical concern for financial institutions. This project focuses on analysing credit card transaction data to identify fraud patterns across merchants, customer demographics, transaction categories, time periods, and geographies. The outcome is an interactive Power BI dashboard that enables stakeholders to monitor fraud trends, identify high-risk segments, and support data-driven decision-making.

2. Objectives

The key objectives of this project are:

- To analyze overall transaction volume and fraudulent activity.
- To identify high-risk merchants, categories, and transaction amounts.
- To understand fraud distribution across age groups, job categories, and time periods.
- To detect temporal patterns such as peak fraud hours and days.
- To visualize fraud hotspots geographically.
- To provide actionable insights for fraud prevention and risk management.

3. Dataset Overview

The dataset consists of credit card transaction records with attributes such as:

- Transaction details: transaction amount, date, time, and category.
- Customer demographics: age group, gender, job category.
- Merchant information: merchant name and category.
- Location data: city and geographic coordinates.
- Fraud indicator: flag identifying fraudulent transactions.

The analysis period covers transactions from June 2020 to December 2020.

4. Dashboard Overview

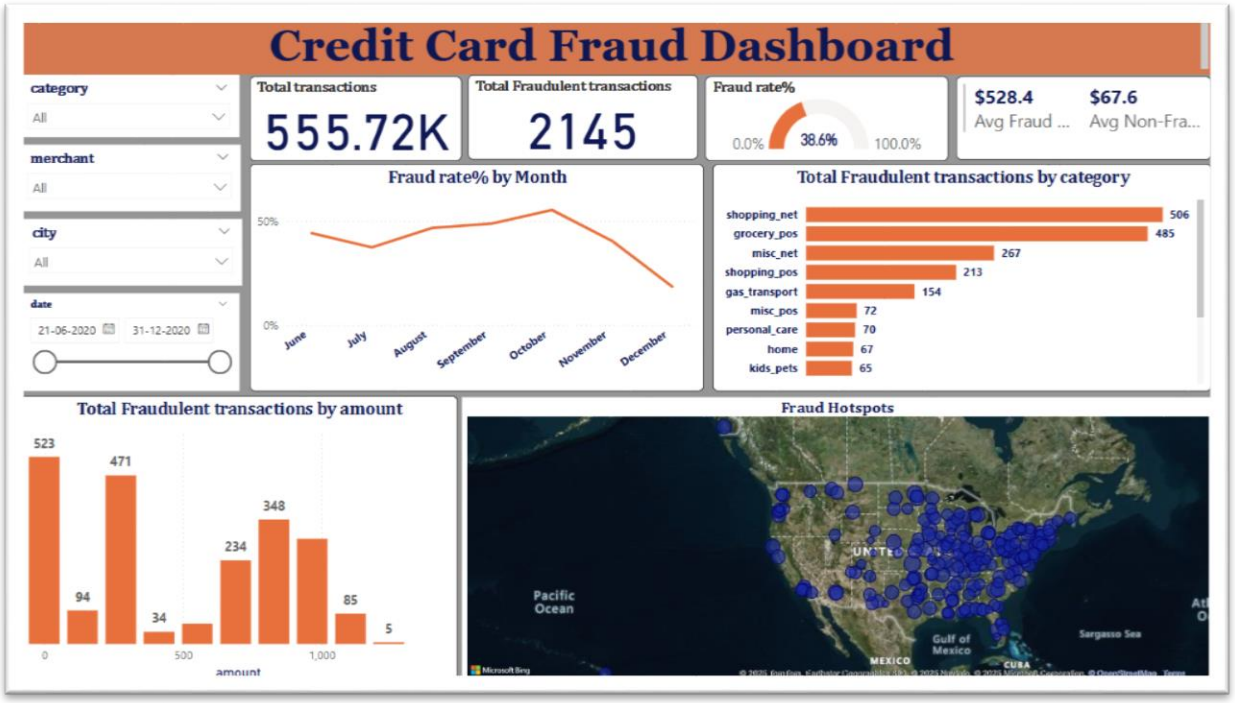
The project delivers two integrated dashboards:

4.1 Fraud Overview Dashboard

This dashboard provides a high-level summary of fraud metrics:

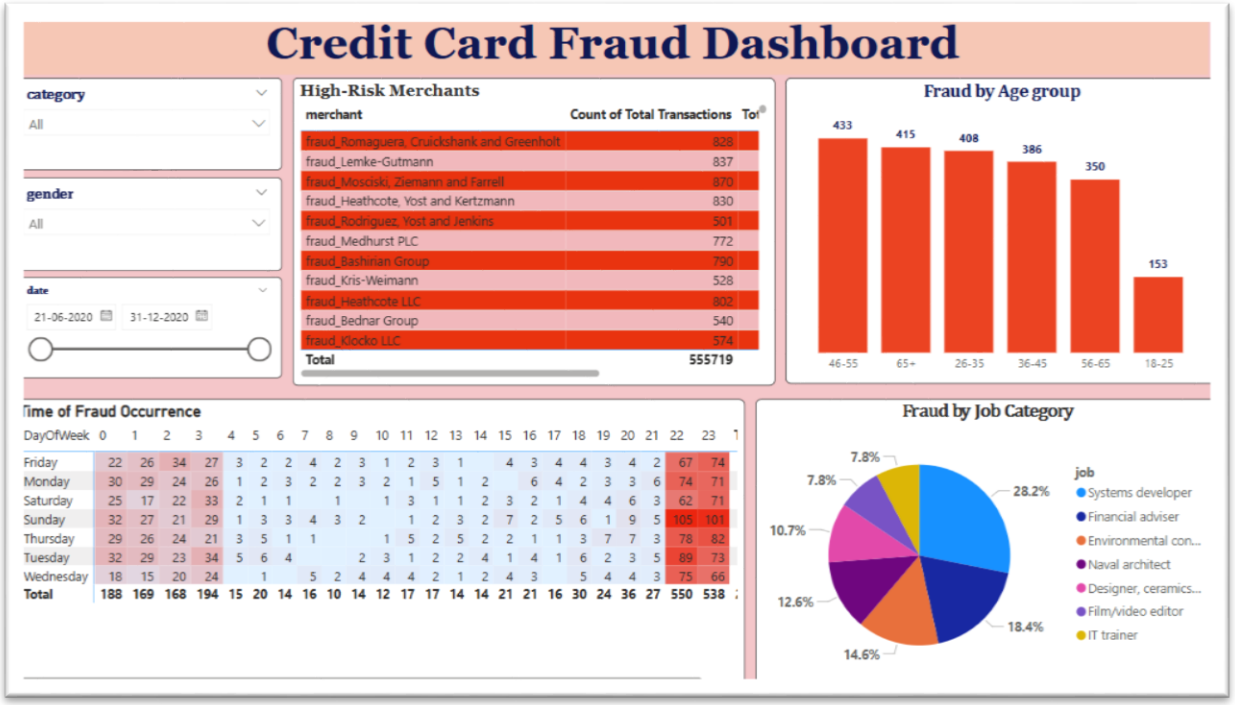
- **Total Transactions:** 555.72K
- **Total Fraudulent Transactions:** 2,145
- **Overall Fraud Rate:** 38.6%
- **Average Fraud Transaction Amount:** $528.4
- **Average Non-Fraud Transaction Amount:** $67.6

Interactive slicers allow filtering by category, merchant, city, gender, and date range.



4.2 Fraud Analysis Dashboard

This dashboard dives deeper into fraud patterns across different dimensions such as merchants, age groups, job categories, time, and geography.



5. Key Insights

- Fraud rates peak between August and November.
- Age groups 46-55 and 65+ are the most targeted.
- Shopping and grocery-related transactions exhibit the highest fraud cases.
- Fraud incidents are concentrated in specific geographical regions.
- Systems developers and financial advisers experience the highest fraud cases, accounting for 28.2% and 18.4% respectively.
- Fraud occurrences peak between 7 PM and 11 PM, with Friday and Monday showing the highest fraudulent activities.

6. Business Impact

- High fraud rates lead to direct financial losses and increased chargeback costs.
- Identifying risky merchants and categories enables targeted audits and policy enforcement.
- Time-based insights help optimize real-time monitoring and alert systems.
- Geographic insights support region-specific fraud prevention strategies.

7. Conclusion

- This project demonstrates how interactive dashboards can be used to effectively monitor and analyze credit card fraud. By uncovering patterns across merchants, demographics, time, and geography, the solution provides actionable insights that can significantly reduce fraud risk and financial losses. The dashboard can be further enhanced by integrating real-time data and predictive fraud detection models.

8. Tools & Technologies Used

- **Data Processing:** CSV dataset
- **Visualization & Reporting:** Power BI