# Fraud Detection & Risk Analysis

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## Objective

The objective of this project is to analyze customer transactions and risk patterns across different regions to identify potential fraudulent activity and optimize business decisions using an interactive Power BI dashboard.

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## Tools Used

- **Power BI Desktop**
- **MySQL / Excel** (for data storage and transformation)
- **DAX** (Data Analysis Expressions)

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## Dataset Overview

This project uses four key datasets:

1. **Customers Table**
    - Contains customer details including customer ID and region.
2. **Transactions Table**
    - Holds all transaction records with amounts and transaction types.
3. **Risk_Scores Table**
    - Includes risk scores assigned to customers based on historical behavior.
4. **Master_Data Table**
    - A unified view combining customers, transactions, and risk metrics.

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## SQL Analysis Queries

1. Fraudulent vs Non-Fraudulent Transactions Count
2. Top 5 High-Risk Transactions (By Score)
3. Fraud Cases by Region
4. Fraud Percentage by Transaction Type
5. Daily Fraud Trends
6. Average Risk Score for Fraud vs Non-Fraud
7. Age-wise Fraudulent Transaction Count
8. Gender-based Fraud Distribution
9. Top 5 Locations with Most Fraud
10. Customers with the Highest Fraud Transactions

## Key Performance Indicators (KPIs)

Displayed as KPI Cards in the top row of the dashboard:

- **Total Customers**
- **Total Transactions**
- **Total Transaction Amount**
- **Average Risk Score**
- **Fraud Transactions**
- **Non-Fraud Transactions**
- **Average Transaction per Customer**
- **Maximum Transaction Amount**

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## Visuals in the Dashboard

1. **Average Risk Score by Region**
    - Bar chart showing the average risk score per region (e.g., North, West, South, East).
    - Helps identify regions with high-risk customers.
2. **Maximum Transaction Amount by Region**
    - Highlights the highest transaction amounts in each region.
    - Useful for flagging unusually high transactions.
3. **Total Number of Transactions by Region**
    - Horizontal bar chart to visualize transaction volume across regions.
    - Indicates active regions with high transaction traffic.

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## Insights Derived

- **North** has the highest average risk score and transaction volume.
- **East** shows the lowest transaction volume and risk score.
- Regions with high maximum transaction amounts may require further investigation for fraud.
- A noticeable concentration of fraud-related transactions in specific regions.

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## Conclusion

This dashboard provides an effective visual tool to monitor regional patterns in customer behavior, risk scoring, and fraudulent activities. It can help fraud analysts and risk teams take preventive measures proactively.