

## **Project Title:** Financial Transaction Analysis

### **Objective:**

This project is a Financial Transactions Analysis Dashboard built using Power BI. The main objective was to analyze customer behavior, card usage, and transaction trends across various cities in the U.S. The dashboard brings together data from multiple sources and presents it in a simple, interactive way to help businesses gain valuable insights and make informed financial decisions.

### **Problem Statement:**

Organizations often struggle to efficiently analyze large volumes of financial transaction data due to scattered sources and lack of visual insights. This leads to poor understanding of card usage patterns, credit limits, customer behavior, and overall financial health.

### **Data Source:**

**Financial Transaction Analysis Dashboard** is developed using **publicly available Kaggle datasets**. Link:

[https://www.kaggle.com/datasets/computingvictor/transactions-fraud-datasets?select=cards\\_data.csv](https://www.kaggle.com/datasets/computingvictor/transactions-fraud-datasets?select=cards_data.csv)

### **Data Volume:**

**Users Dataset:**Total Records: **2,000 users**

**Transactions Dataset:**Total Transactions: **Over 92,000**

Covered: **3,668 cities, 73 states, and 9,289 merchants****Cards Dataset:**Total Cards Issued: **Approximately 3,000**

### **Data Fields:**

card\_type,merchant\_city,merchant\_state,card\_type,card\_id,card\_brand,client\_id,gender,age,credit\_score,address etc.

### **Data Cleaning :**

#### **1. Handled Missing Values:**

- Filled missing values in fields like `retirement_age` and `credit_score` using averages or appropriate defaults.
- Removed rows with critical missing data (e.g., `card_id`, `transaction_amount`).

## Target Audience

The target audience for the Financial Transactions Analysis Dashboard includes banking and financial institutions looking to gain insights into customer behavior, credit usage, and product performance. Credit risk analysts can use the dashboard to assess client creditworthiness by examining credit scores, debt levels, and spending patterns. Marketing teams benefit from customer segmentation based on demographics, card types, and usage trends, enabling more targeted campaigns. Business intelligence professionals and product managers can leverage the data to support strategic decisions and improve financial offerings. Finally, executives and stakeholders can use the dashboard for a clear, high-level view of overall financial activity and customer engagement.

## Aim:

To design an interactive Power BI dashboard that analyzes financial transactions and customer data to uncover trends in card usage, spending behavior, and geographic patterns, helping businesses make informed financial and marketing decision

## Research:











This project aimed to understand customer behavior and spending patterns using Power BI. The analysis focused on card usage (Credit, Debit, Prepaid), transaction volume by city, and customer demographics like age, income, and credit score.

Key findings include:

- **Credit cards** are most used (57%).
- Customers aged **30–60** hold the highest credit limits.
- Cities like **Houston and Miami** have high transaction activity.
- **Visa** is the most popular card brand.

The research helps financial institutions with credit planning, marketing, and identifying key customer segments. Sure! Here are the **Key Features** in bullet points:

## Key Features of the Dashboard

-  Interactive visualizations of financial and customer data
-  Analysis of card types (Credit, Debit, Prepaid) and brands (Visa, Mastercard, etc.)
-  Real-time tracking of credit limits, card counts, and issuance trends
-  Detailed breakdown of transactions by amount, date, and merchant location
-  Geographical mapping of card usage and transaction density
-  Demographic analysis of users by age, gender, and income
-  Timeline analysis of account openings and transaction activity
-  Filters and slicers for dynamic data exploration (by city, state, credit score, etc.)
-  Visualization of debt and income distribution across users
-  Identification of top-performing cities and regions based on usage and revenue

## Tools and Techniques

- **Power BI** – To visualize and analyze financial data through interactive dashboards
- **MySQL** – To store, query, and manage large volumes of raw financial data before loading into Power BI
- **Microsoft Excel** – For quick data checks and minor preprocessing
- **Kaggle** – Data source for user, card, and transaction datasets
- **Power Query Editor** – For transforming and cleaning data inside Power BI
- **DAX (Data Analysis Expressions)** – For creating custom calculations and metrics

## Project Scope and Limitations:

### Project Scope

- Integrates and visualizes data from **Kaggle** (Users, Cards, Transactions)
- Analyzes key metrics: **credit score**, **card usage**, **transaction volume**, and **income/debt**
- Provides demographic insights based on **age**, **gender**, and **location**
- Enables geographic and temporal analysis of financial activity
- Supports **decision-making** for finance teams, analysts, and stakeholders
- Uses tools like **MySQL**, **Power BI**, and **Excel** for full data pipeline

### Project Limitations

- Based on **sample Kaggle data**, not real-time or enterprise-grade datasets
- May **lack real-world complexity** like fraud detection or multi-currency support
- Limited to **basic financial metrics**; no advanced predictive modeling used
- **Data accuracy** depends on the source quality from Kaggle
- No real-time data updates or live database connections in current setup
- Doesn't include **customer feedback** or satisfaction analysis

## Outcome

- Developed an interactive dashboard that provides clear insights into **financial transactions**, **user demographics**, and **card usage patterns**.
- Enabled stakeholders to **monitor credit limits**, **track card issuance trends**, and **analyze client behavior** across age, gender, and location.
- Helped identify **top-performing cities and states**, and provided a geographic view of transaction volumes.
- Simplified complex datasets using **Power BI visualizations**, making financial data easier to understand and act upon.
- Improved the **decision-making process** for financial planning, product targeting, and risk assessment.
- Demonstrated the ability to use **Power BI**, **MySQL**, and **Excel** together for end-to-end data analysis.

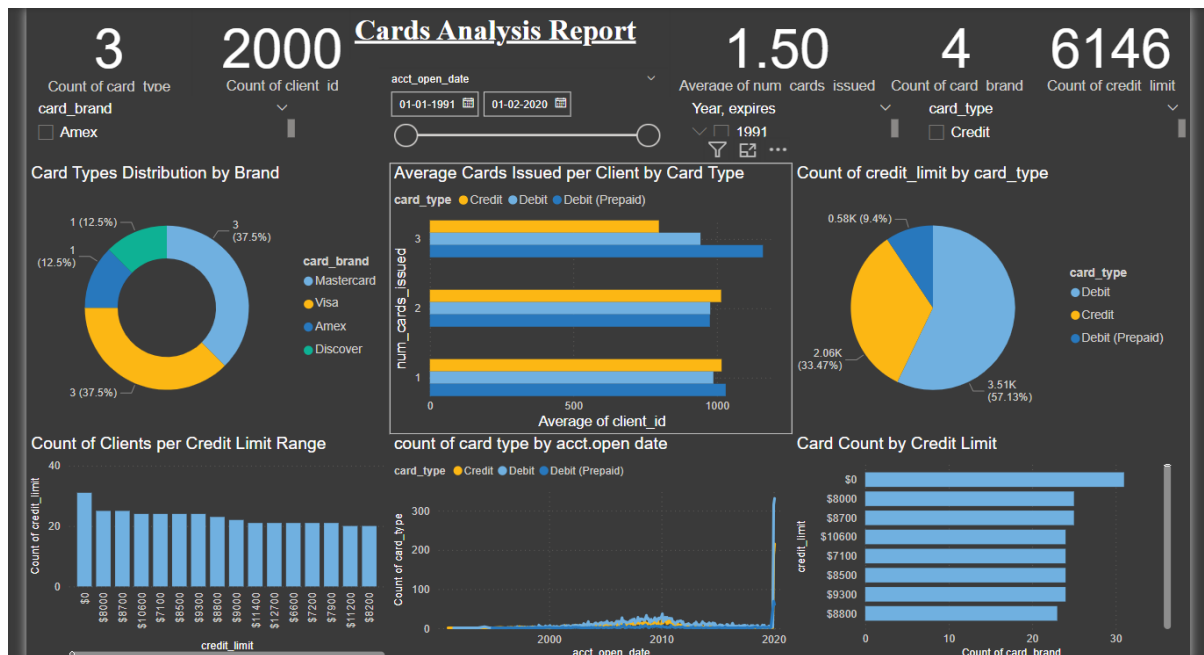
## Future Enhancements

- **Real-time Data Integration** using live database connections (e.g., MySQL or APIs)
- **Mobile-friendly dashboard** version for on-the-go access
- **Predictive analytics** to forecast customer spending or credit risk using machine learning
- **Fraud detection insights** by analyzing unusual transaction patterns
- **User feedback integration** to measure satisfaction and improve services
- **More financial KPIs**, such as ROI, savings trends, or interest rates
- **Drill-down capabilities** for deeper transaction-level insights
- **Multi-currency and international support** for global analysis
- **Automated data refresh and email alerts** for key metric changes
- **Documentation and user guide** for easier dashboard use and understanding

## End-to-End Data Pipeline

1. **Data Collection**
  - Downloaded raw datasets (Users, Cards, Transactions) from **Kaggle**.
2. **Data Storage**
  - Loaded datasets into **MySQL** database for structured storage and efficient querying.
3. **Data Cleaning & Transformation**
  - Used **SQL queries** and **Power Query (in Power BI)** to:
    - Remove duplicates and null values
    - Standardize formats (e.g., dates, text fields)
    - Handle outliers and missing values
    - Join tables using foreign keys (`client_id`, `card_id`)
4. **Data Modeling**
  - Created relationships between **Users**, **Cards**, and **Transactions** tables in Power BI's data model.
  - Defined calculated columns and measures using **DAX** (e.g., Total Credit, Avg Transaction).
5. **Data Visualization**
  - Designed interactive dashboard in **Power BI** with:
    - KPI cards, bar/line charts, maps, and filters
    - Visual insights on credit limits, card types, usage trends, and geographic data
6. **Dashboard Publishing**
  - Published the Power BI dashboard to the **Power BI Service** (optional)
  - Shared with stakeholders via **Power BI workspace** or exported PDF

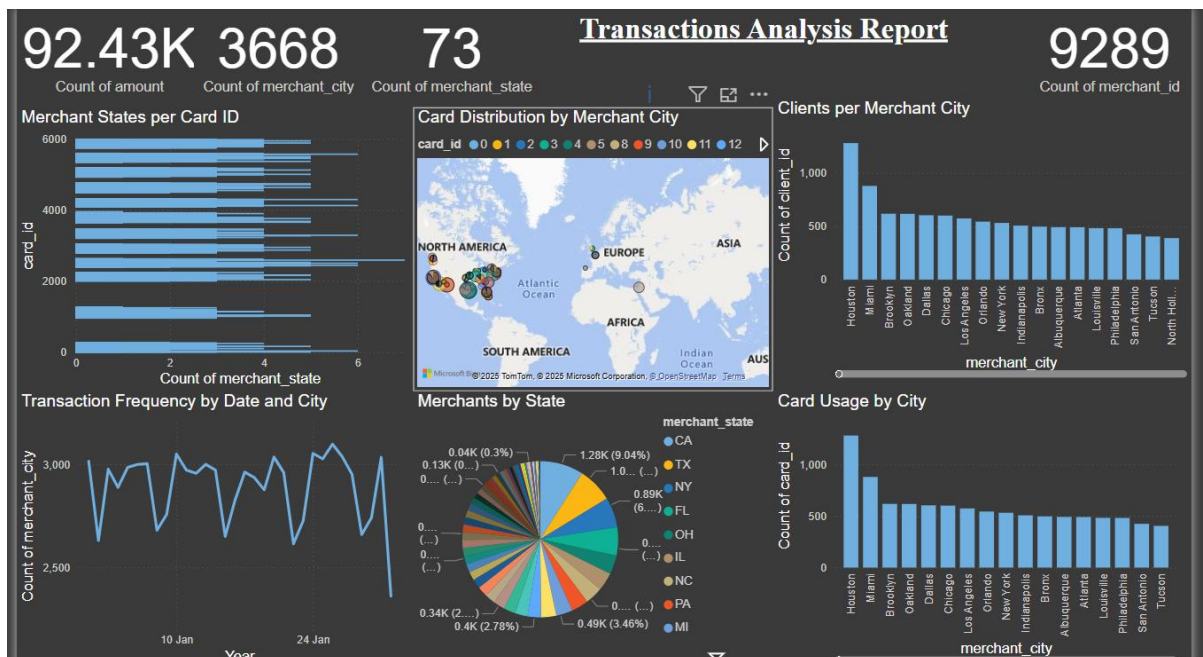
## Reports:



- Analyzed data for **2000 clients**.
- **3 card types**: Credit, Debit, and Debit (Prepaid).
- **4 card brands**: Visa, Mastercard, Amex, and Discover.
- **Average cards per client**: 1.5
- **Credit cards** hold the **highest credit limit** (57.13%).
- **Visa and Mastercard** are the most widely used brands.
- Most clients have credit limits between **\$0 and \$8000**.
- **Highest card count** issued at **\$0 credit limit**.
- Sharp **increase in card issuance around 2020**, especially for Debit (Prepaid).

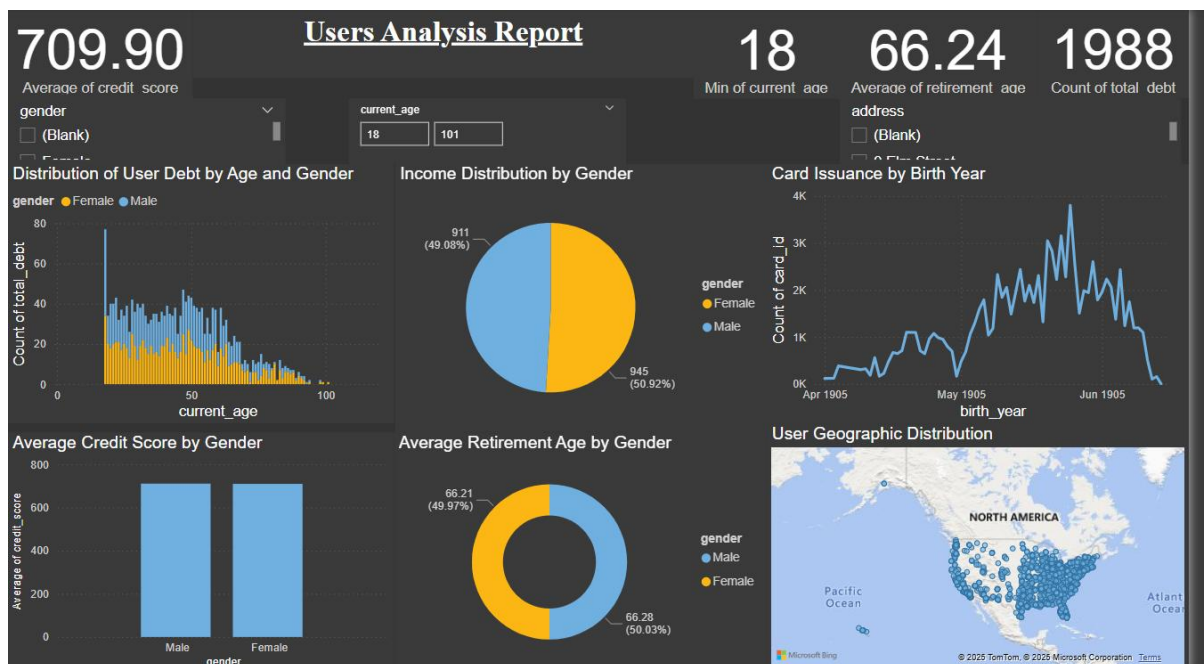
Here is a short and clear conclusion for the **Card Report**:

The card report provides insights into card type distribution, brand popularity, and credit limits. It helps understand customer preferences and supports better financial planning and decision-making for card services.



- **Total transaction amount:** 92.43K
- **Merchant cities:** 3,668
- **Merchant states:** 73
- **Merchant IDs:** 9,289
- **Top cities by usage:** Houston, Miami, Brooklyn
- **Geographical reach:** Mostly in North America, with a few in Europe and Asia
- **Top merchant states:** California (CA), Texas (TX)
- **Transaction trend:** Stable and frequent over the month
- **High client count and card usage** in top cities like Houston

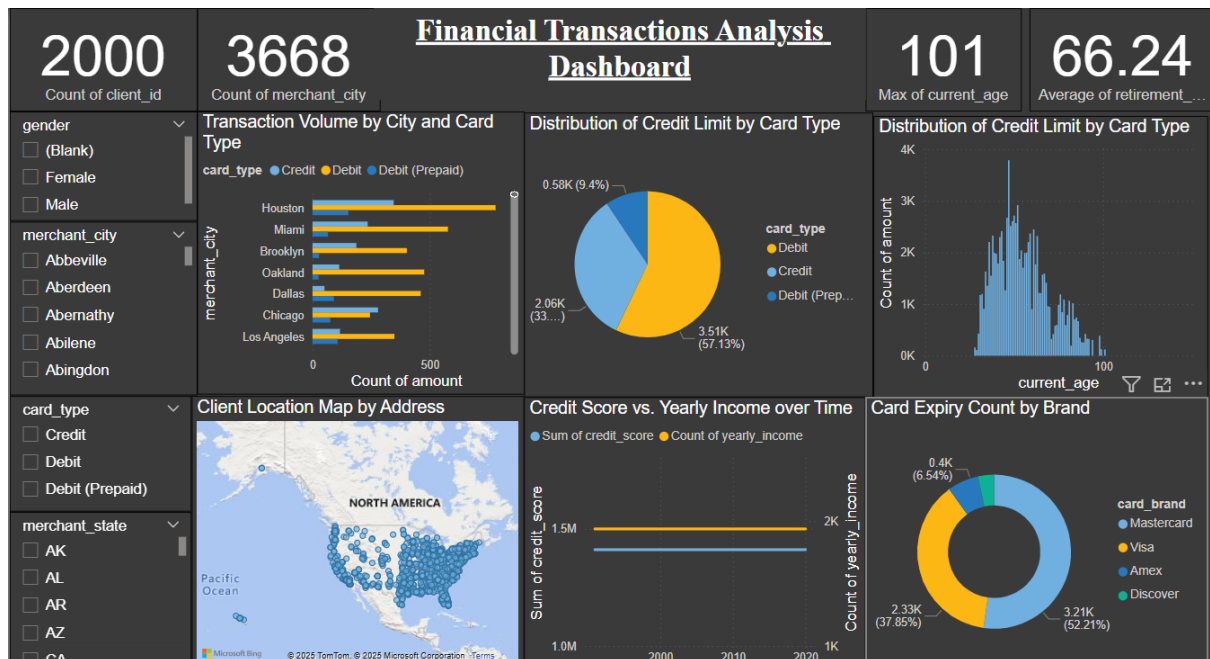
The transaction report highlights key trends in spending behavior, top transaction cities, and volume over time. It helps identify high-activity areas, monitor financial activity, and support strategic decisions based on customer transaction patterns.



- **Average credit score:** 709.90
- **Total user debt records:** 1,988
- **Minimum user age:** 18 years
- **Average retirement age:** 66.24 years
- **Debt distribution:** Higher among younger users, especially males
- **Card issuance peaks** between birth years of 1905–1910
- **Income distribution:** Almost equal between males (49.08%) and females (50.92%)
- **Credit scores** are similar for both genders
- **User location:** Mostly spread across the U.S.

The user report offers insights into customer demographics such as age, gender, income, and credit score. It helps segment users, understand financial behavior, and tailor services to meet the needs of different customer groups.

## Dashboard:



## Conclusion:

- Most transactions happen in cities like **Houston, Brooklyn, and Oakland**.
- Credit cards are the **most used card type**, especially **Visa** and **Mastercard**.
- Users have a good **average credit score of 709.90**.
- Majority of users are in the age group of **30 to 50 years**, which is the prime working age.
- Both **males and females** have similar retirement ages (~66 years).
- **Males tend to have slightly more total debt** than females.
- Users are spread across the U.S., with higher activity in **Texas, California, and Florida**.
- There are **2000+ unique clients** and over **3600 merchant cities**, showing a large network.
- **Income and credit scores** are improving over the years.
- Overall, users are **financially stable and active**, making them good targets for financial products.



