# Bank Loan Analysis

## 1.Project Overview

This project involves the analysis of a comprehensive **Bank Loan Dataset** to evaluate lending performance, customer profiles, credit risk, and repayment behavior.The objective of this analysis is to transform raw financial loan data into actionable insights that help financial institutions understand borrower characteristics, loan distribution patterns, and overall portfolio health.

The analysis covers **38,000+ loan records**, providing a consolidated view of loan amounts, interest rates, income levels, credit grades, and repayment trends.

## 2.Purpose & Objective

This Bank Loan Analysis is designed to provide a data-driven overview of lending operations and borrower behavior.

The primary objectives of this project are to:
• Monitor loan disbursement trends
• Analyze borrower income and employment patterns
• Evaluate credit grades and risk levels
• Understand interest rate distribution
• Assess repayment and loan performance

The analysis enables banks and financial analysts to make informed credit decisions, optimize risk management strategies, and improve lending efficiency.

## 3.Key Features

- Comprehensive borrower profiling based on income, employment length, and home ownership.
- Credit risk assessment using loan grades and sub-grades.
- Loan performance evaluation through total payment analysis.
- Interest rate and loan amount distribution analysis.
- Time-based analysis using loan issue dates

## 4.Visual Components

- Loan Grade Distribution (Bar Chart): Shows the distribution of loans across credit grades from A to G.
- Loan Amount Analysis (Histogram): Highlights the most common loan amount ranges.
- Employment Length Analysis (Bar Chart): Displays borrower stability based on years of employment.
- Home Ownership Distribution (Pie Chart): Compares RENT, MORTGAGE, and OWN categories.
- Interest Rate Trend (Line Chart): Shows variation in interest rates across loan grades.

## 5.Tools & Technologies Used

- Python – Data analysis and processing
- Pandas & NumPy – Data cleaning and aggregation
- Matplotlib & Seaborn – Data visualization
- Jupyter Notebook – Interactive analysis environment
- Excel Dataset – Source data

## 6.Dataset Summary

The dataset contains **38,576 loan records** with **24 attributes**, covering borrower demographics, loan details, credit risk indicators, and repayment metrics..

### ➢ Dataset Size

- **Number of Rows:** 38,576
- **Number of Columns:** 24

### ➢ Key Attribute

- Loan ID – Unique identifier for each loan
- Address State – Borrower's state
- Application Type – Individual or joint application
- Employment Length – Years of employment
- Employment Title – Borrower occupation
- Loan Grade & Sub-grade – Credit risk classification
- Issue Date – Loan disbursement date
- Term – Loan tenure (36 or 60 months)
- Annual Income – Borrower income
- Debt-to-Income Ratio (DTI) – Financial burden indicator
- Interest Rate – Cost of borrowing
- Loan Amount – Approved loan value
- Total Payment – Amount repaid

### ➢ Data Preparation

- Removed duplicate records
- Handled missing values in employment and income fields
- Standardized categorical variables (Grade, Term, Home Ownership)
- Converted date columns for time-based analysis
- Ensured numeric consistency for income, loan amount, interest rate, and DTI

## 7.Key Performance Indicators (KPI Section)

### ◈ Total Loan Amount Disbursed – 435+ Million

This KPI represents the total value of loans issued.
It helps financial institutions understand:

- Portfolio size
- Capital deployment
- Lending scale

### 🔹 Average Loan Amount – 11,296

This metric indicates the typical loan size issued to borrowers.

- Reflects moderate lending exposure per customer
- Helps in segmenting retail vs high-value borrowers

### 🔹 Average Interest Rate – 12.05%

This KPI shows the overall cost of borrowing across all loans.

- Higher rates indicate riskier borrower segments
- Strong correlation with lower credit grades

### 🔹 Average Annual Income – 69,644

Represents the average borrower income.

- Indicates lending is targeted towards middle-income groups
- Useful for affordability and risk analysis

## 8.Visual Analysis Sections

### ➢ Loan Grade Distribution

- Majority of loans fall under Grade B and C
- Fewer loans in high-risk grades (F and G)

**Insight:** The bank maintains a balanced risk profile with limited exposure to high-risk borrowers.

### ➢ Employment Length Analysis

- Highest borrowers have 10+ years of employment
- Lower counts for <1 year employment

**Insight:** Preference toward financially stable and experienced borrowers

### ➢ Home Ownership Analysis

- RENT and MORTGAGE categories dominate
- OWN category is comparatively lower

**Insight:** Renting and mortgaged customers are primary loan seekers.

- **Loan Amount Distribution**

- Majority of loans range between 5,000 – 15,000
- Very high loan amounts are less frequent

**Insight:** The portfolio is focused on small-to-mid ticket loans.

- **Loan Term Analysis**

- 36 Months Loans:28,237
- 60 Months Loans:10,339

**Insight:**Most borrowers prefer shorter-term loans, indicating lower long-term risk exposure.

## 9.Buisness Insight

- Strong loan portfolio with over $435M in funded loans.
- Majority of loans are 36-month term**,** reducing long-term default risk.
- Medium-grade borrowers (A–C) dominate the portfolio.
- Average DTI is healthy, indicating good borrower affordability.
- Interest rates are well-calibrated against credit risk.

## 10.Conclusion

This Bank Loan Analysis project examined 38,576 loan records using Python and Excel to evaluate loan performance and borrower risk. The analysis revealed that most loans are short-term, medium-risk, and issued to borrowers with manageable debt levels. A total loan amount of $435.7M and repayment of $473.1M highlights strong portfolio performance. Overall, the project demonstrates effective financial data analysis and supports informed, data-driven lending decisions.