Bank Loan Data Analysis

An end-to-end Bank Loan Performance Analysis using Python and Microsoft Excel. This project analyzes bank loan application data, evaluates loan performance, classifies loans into good and bad categories, and extracts meaningful business insights using data analysis and visualization techniques.

BUSINESS CHALLENGE

The Problem Banks Face

Banks manage thousands of loan applications and repayments daily. Without proper analysis, critical challenges emerge that impact profitability and risk management.

This project addresses these challenges through comprehensive Python-based data analysis and visual exploration, transforming raw data into actionable insights.

Key Challenges

- Tracking total and monthly loan applications
- Monitoring funded amounts and repayments
- Identifying risky or bad loans
- Understanding borrower financial behavior
- Analyzing trends across time, regions, and categories

Project Objectives

Application Analysis

Analyze total and month-to-date (MTD) loan applications to identify trends and patterns

Financial Evaluation

Evaluate funded loan amounts and total amounts received to measure performance

Risk Classification

Classify loans into Good Loans and Bad Loans for risk assessment

Pattern Recognition

Analyze interest rate and debt-to-income (DTI) patterns across borrower segments

Trend Identification

Identify trends by state, loan purpose, employment length, and home ownership

Insight Generation

Generate actionable insights using charts and summary statistics

Technology Stack

Python Ecosystem

- NumPy for numerical computing
- Pandas for data manipulation
- Matplotlib & Seaborn for visualization
- Plotly Express for interactive charts

Development Tools

- Jupyter Notebook for analysis
- Microsoft Excel for reporting
- CSV/Excel datasets

DATASET

Comprehensive Loan Data

The dataset contains detailed information related to bank loan applications and borrower profiles, providing a complete view of lending activities and borrower characteristics.

Loan Details

Loan Status, Issue Date, Funded Amount, Total Amount Received, Interest Rate, Loan Purpose, Loan Term

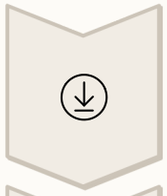
Borrower Profile

Debt-to-Income Ratio (DTI), Employment Length, Home Ownership Status

Geographic Data

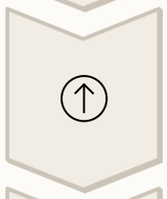
State-level information for regional analysis and trend identification

Project Workflow



Data Collection

Collected loan data in CSV/Excel format



Data Loading

Loaded data into Python using Pandas

Data Cleaning

Cleaned and preprocessed data for analysis

EDA

Performed exploratory data analysis

Metrics

Calculated key metrics and summaries

Visualization

Created charts using Matplotlib, Seaborn, and Plotly

Insights

Interpreted insights from analysis

Analysis & Visualizations

Key Analyses Performed

- **Temporal Trends**

  Loan application trends over time

- **Financial Performance**

  Funded amount vs amount received analysis

- **Risk Assessment**

  Good loan vs bad loan classification

- **Rate Analysis**

  Interest rate distribution patterns

- **DTI Evaluation**

  Debt-to-income ratio analysis

- **Geographic Insights**

  Regional loan distribution

- **Borrower Segmentation**

  Loan purpose and employment length analysis

Visualization Types

- Line Charts
- Bar Charts
- Donut/Pie Charts
- Heatmaps
- Interactive Charts (Plotly)

DASHBOARD 1

Summary Dashboard: Portfolio Overview

Provides a high-level overview of the bank's loan portfolio with essential KPIs and performance metrics.

8

Core KPIs Tracked

Total Loan Applications, MTD Applications, Total Funded Amount, MTD Funded Amount, Total Amount Received, MTD Amount Received, Average Interest Rate, Average DTI

Good Loan Metrics

- Good Loan Application Percentage
- Number of Good Loan Applications
- Total Funded Amount (Good Loans)
- Total Amount Received (Good Loans)

Bad Loan Metrics

- Bad Loan Application Percentage
- Number of Bad Loan Applications
- Total Funded Amount (Bad Loans)
- Total Amount Received (Bad Loans)

Key Insights & Conclusion

Seasonal Patterns

Loan applications show clear seasonal patterns, enabling better resource planning and forecasting

Regional Concentration

Certain regions contribute significantly more to loan volume, indicating market opportunities

Employment Stability

Borrowers with stable employment demonstrate better loan performance and lower default rates

Bad Loan Impact

Bad loans significantly impact financial returns, highlighting the need for improved risk assessment

---

> This project successfully analyzes bank loan data using Python and Excel to evaluate loan performance and borrower risk. Through comprehensive data cleaning, analysis, and visualization, it identifies key trends, distinguishes good and bad loans, and provides actionable insights to support data-driven financial decision-making.