Lending Club Case Study

EDA Case Study
upGrad – IIITB ML and AI Program – Feb 24 Cohort

Creator - Narasimha Patro

01

Objective

02

Data
Processing

03

Insight
&
Analysis

04

Recommendations

01 | OBJECTIVE

Objective

Identifying
Risk Factors

Portfolio
Optimization

Business
Decision Support

Risk
Mitigation

Enhancing Risk
Assessment Models

Content

- ***Identifying Risk Factors***: The primary goal is to identify consumer and loan attributes that significantly influence the likelihood of loan default. This involves examining patterns and correlations within the data to pinpoint variables that serve as strong indicators of default risk.

- ***Risk Mitigation***: By understanding the driving factors behind loan default, the company aims to develop strategies to mitigate credit risk. This could include refining its lending criteria, adjusting interest rates, or implementing other risk management measures to minimize financial losses associated with defaulting borrowers.

- ***Portfolio Optimization***: Insight gained from EDA can inform portfolio optimization strategies. By identifying and managing riskier loan applicants more effectively, the company can optimize its loan portfolio to improve overall profitability and sustainability.

- ***Enhancing Risk Assessment Models***: The findings from the analysis can be used to enhance existing risk assessment models or develop new predictive models for more accurate identification of high-risk applicants. This can improve the company's ability to make informed decisions regarding loan approvals and reduce instances of default.

- ***Business Decision Support***: Ultimately, the objective is to provide actionable insights that support strategic decision-making within the company. This may involve recommending specific actions such as adjusting lending policies, reallocating resources, or implementing targeted marketing strategies to mitigate risk and improve overall loan performance.

- ***Outcome:*** By achieving these objectives, the company aims to enhance its ability to identify and manage credit risk effectively, ultimately leading to improved financial performance and sustainable growth in the competitive consumer finance market.

02 | **Data Processing**

Content

- Data Exploration
  - Data Source: upGrad community (Loan Data Set) - CSV format
  - Data Dictionary: Excel file containing definitions for each data column

- Data Processing
  - The dataset consists of 39,717 rows and 111 columns.
  - Data types include:
    - 74 float
    - 13 integer
    - 24 object
  - Analysis revealed:
    - 57 columns with over 50% missing values (excluded)
    - 9 columns with only unique values (excluded)
  - This resulted in a reduced set of 45 columns for further analysis

○ From the remaining columns, 18 were selected for their relevance to loan analysis:

loan_status	annual_inc	dti	grade	sub_grade	int_rate
loan_amnt	term	emp_length	revol_utill	total_acc	deling_2yrs
home_owner ship	verfication_st atus	purpose	revol_bal	addr_state	issue_d

○ Among these 18 columns, emp_length has 1,075 missing values and revol_util has 50 missing values.

○ Standardization and Datatype Conversion:

- int_rate & revol_util :- Remove suffix % and convert into float data type

- annual_inc :- Converting string data type to int data type

- issue_d :- Converting string data type to datetime type

- term :- Converting string data type to Categorical type

- Filling or dropping null values in the considered columns of new dataframe:
  - emp_length :- Filling **'Self Employed'** for NULL records in emp_length column
  - revol_untill :- Filling **median** value for NULL record in revol_untill column
- Derived Column
 - issue_d :- Derive month and year column and converting to int data type

03 | Insights and Analysis

Analysis of Borrower Financial Health

- **Title** - Financial Health and Loan Characteristics of Borrowers
  - **Annual Income Overview** - Median annual income of $58,868 with a right-skewed distribution, highlighting a concentration of borrowers in lower income brackets. The right skew in income tells us that while we have some high earners, a large segment of our borrower base has lower annual income. This influences their borrowing needs and risk profiles.
   - **Graph**
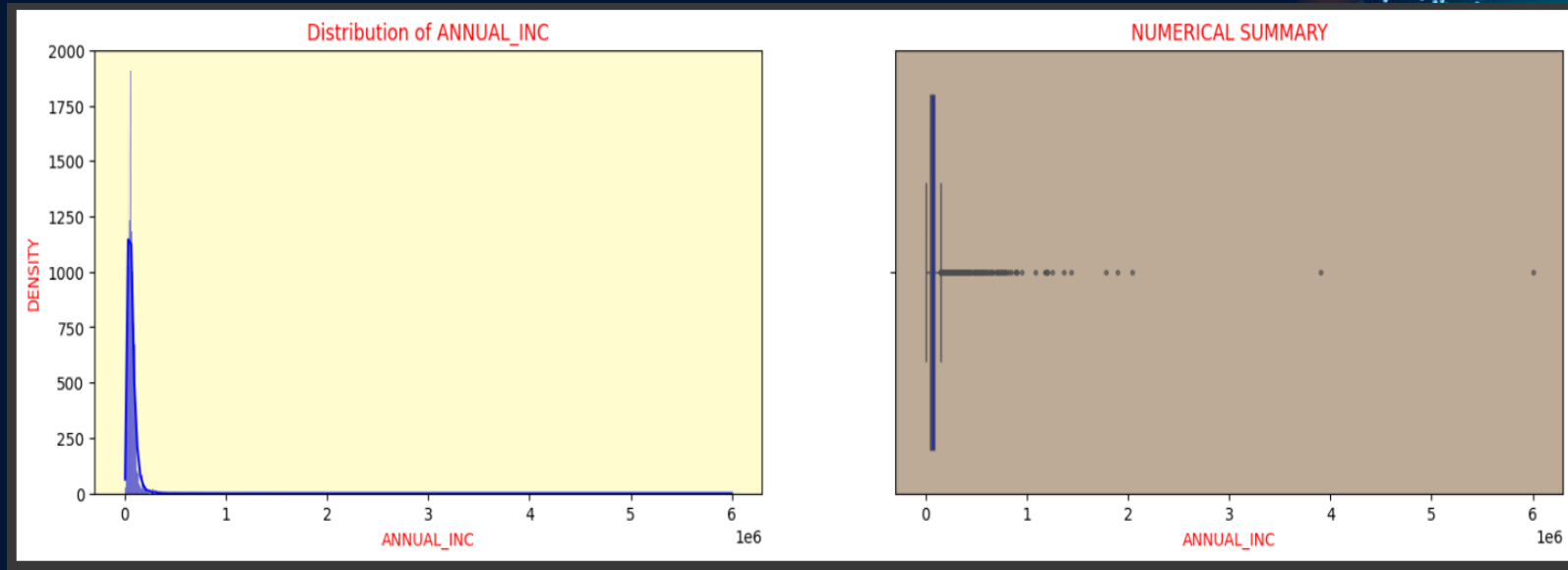
○ **Debt-to-Income Ratio (DTI)** - Median DTI of 13; skewed towards lower values, indicating most borrowers manage a reasonable level of debt relative to their income. DTI gives us an insight into how much of their income our borrowers are using to service debt. A median DTI of 13 is quite healthy, indicating that most of our borrowers are not overly burdened by debt.

■ **Graph**
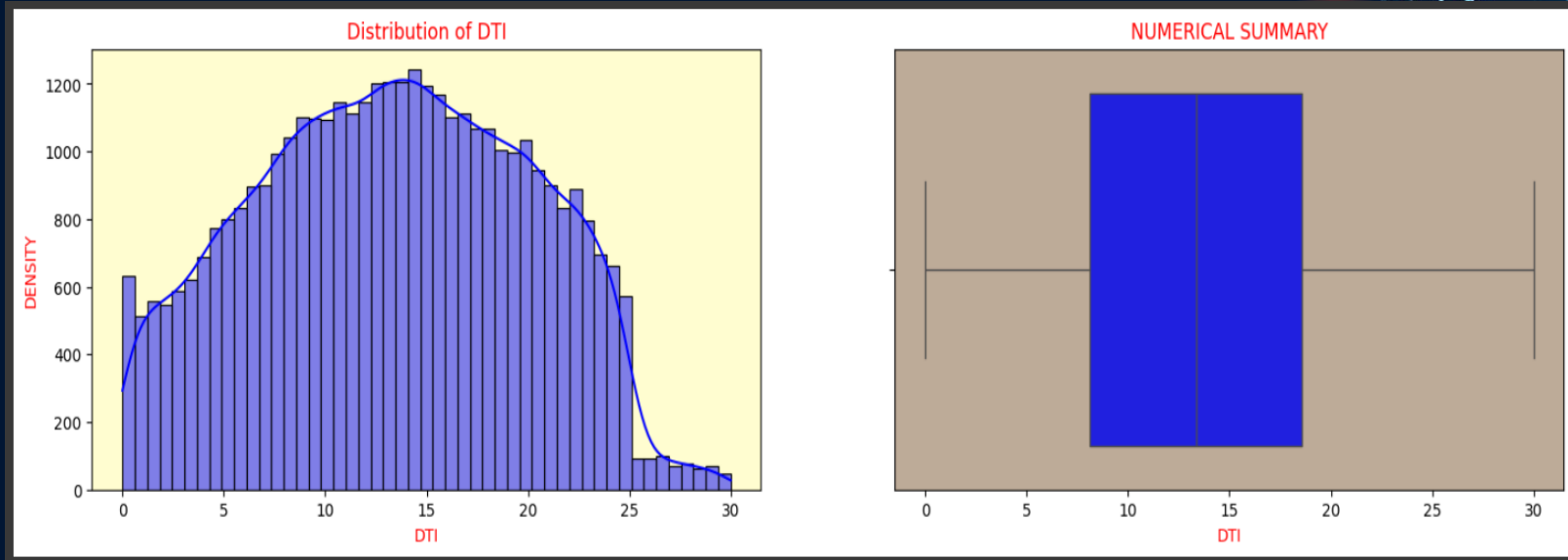
○ **Interest Rates** - Median interest rate at 11%; right-skewed distribution shows a majority of loans at lower interest rates, suggesting favorable terms for most borrowers. Observing the interest rates, we see that most of our loans are offered at lower rates, which is beneficial for the borrowers and indicates a lower risk portfolio.

■ **Graph**
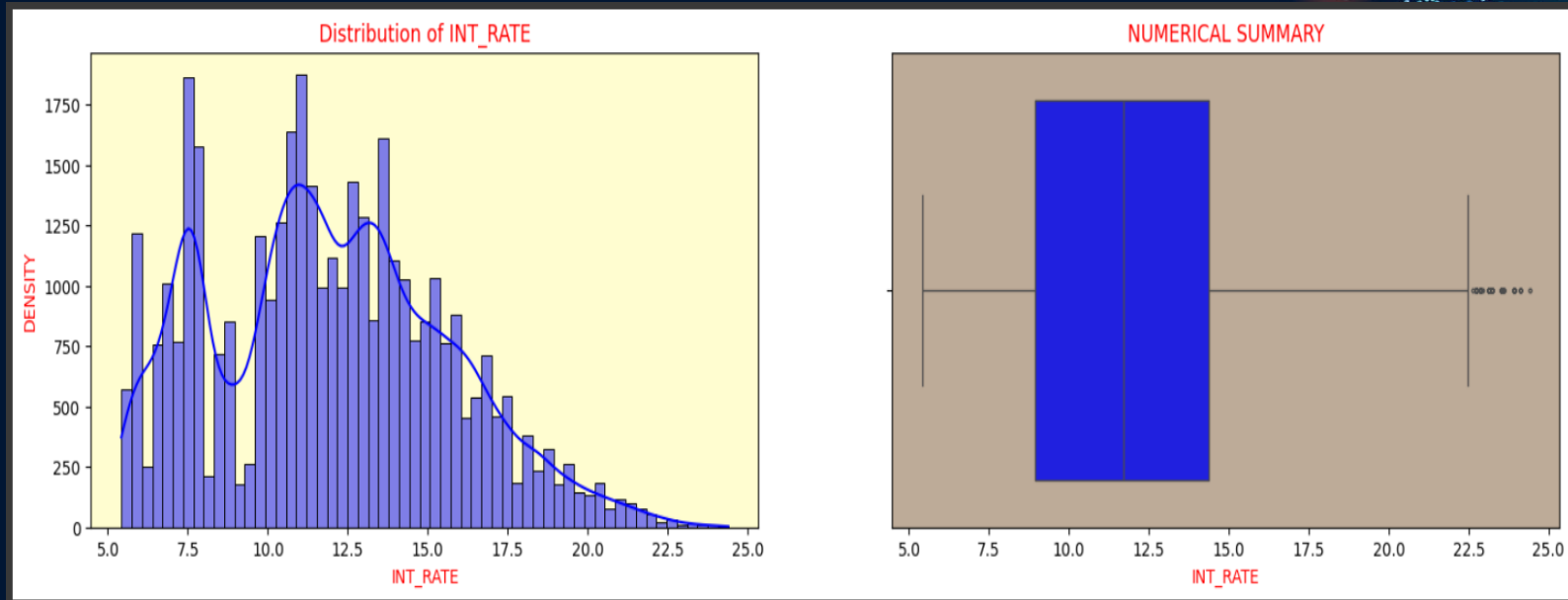
Credit Management and Loan Purposes

- **Title** - Borrower Credit Management and Predominant Loan Purposes

  - **Credit Card Balance and Utilization**- Majority of borrowers maintain moderate credit card balances and utilization rates, indicating prudent credit management. Both metrics exhibit right-skewed distributions, suggesting that high balances or high utilization are exceptions rather than the norm. Discuss the implications of credit card balance and utilization data: "Most borrowers show moderate credit card balances and utilization, which indicates a conservative approach to credit management. The skew towards lower balances and utilization further reassures us of the general financial prudence among our borrowers.

  - **Graph**
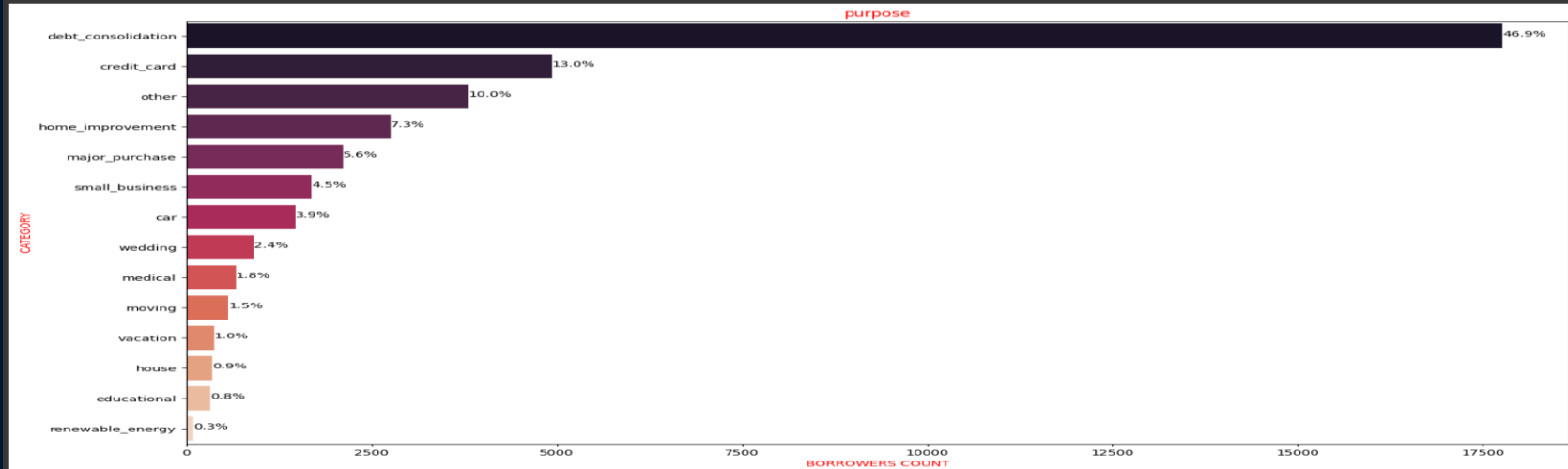
○ **Most Common Loan Purposes** - Debt consolidation is the most frequent purpose for borrowing, followed by home improvement and credit card refinancing. This trend underscores the borrowers' focus on managing existing debt and improving financial conditions. Moving on to the reasons our customers borrow, we see a clear preference for debt consolidation. This not only helps them manage debt better by possibly lowering interest rates but also simplifies their financial commitments. The dominance of debt consolidation as a loan purpose can guide our product development and marketing strategies, helping us tailor offers that meet our borrowers' predominant needs.

■ **Graph**
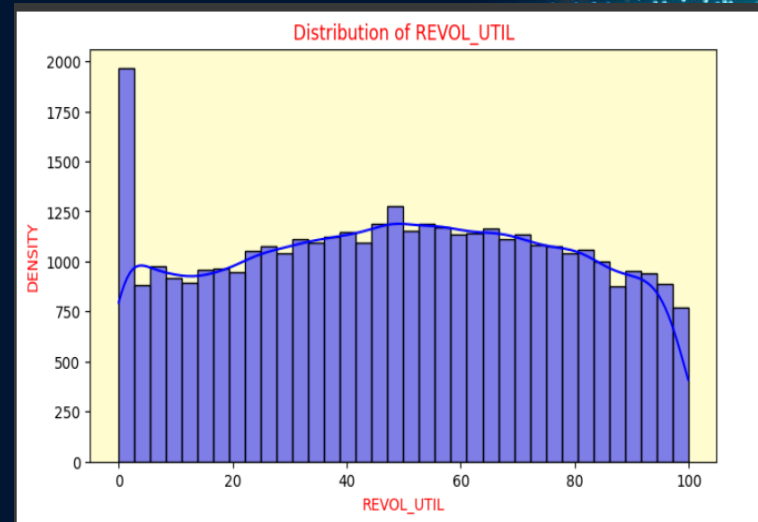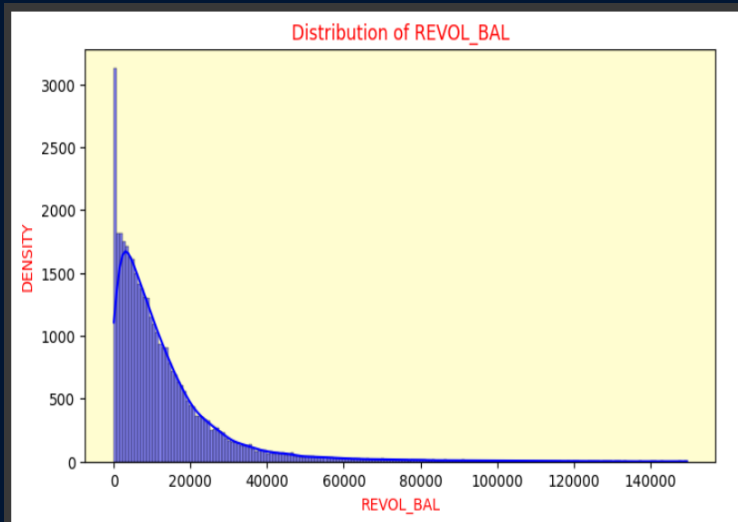
Borrower Profiles and Risk Factors

- **Title** - Profiling Borrowers: Employment, Home Ownership, and Verification
  - **Employment Length** - Significant portion of borrowers with 10+ years of employment, indicating a stable and experienced borrower base. Employment stability is a positive indicator of reliable income, which is crucial for loan repayment. A majority of our borrowers have been employed for over 10 years, which typically correlates with higher financial stability and lower risk in lending.
  - **Graph**
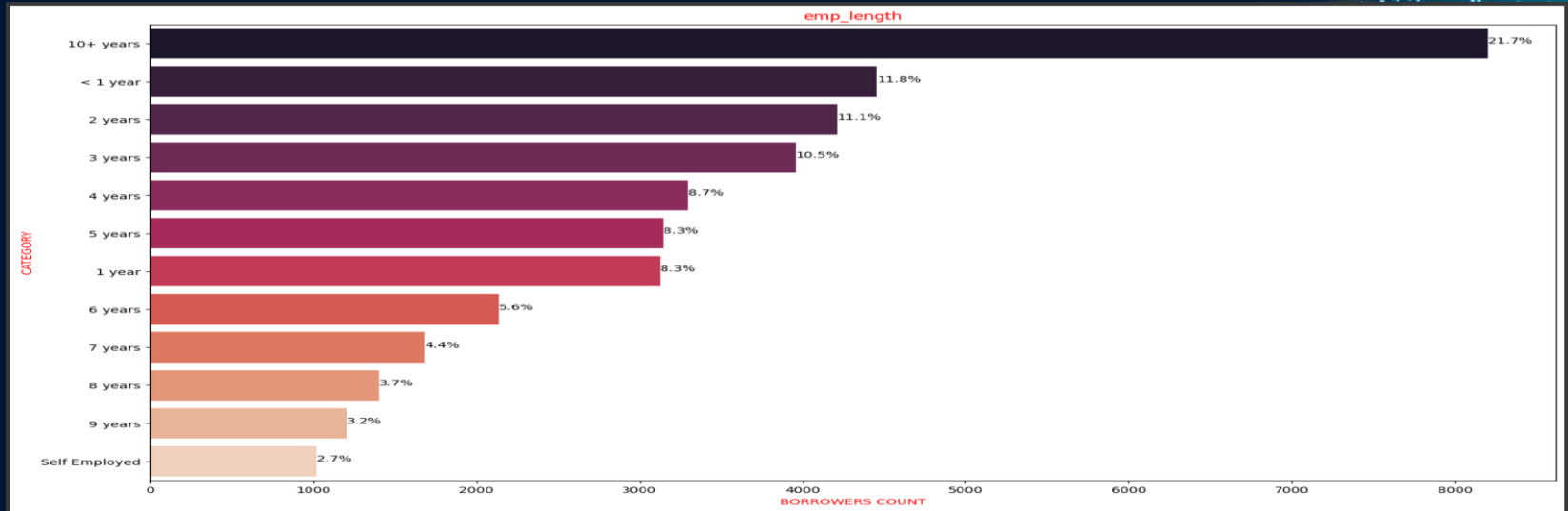
○ **Home Ownership** - Distribution nearly balanced between renters and homeowners, showing diversity in the borrower pool. Homeowners may have additional financial obligations; however, they often have more assets, which could be beneficial for securing larger loans. Our data shows a good mix of homeowners and renters. Homeownership often indicates higher financial commitments but also suggests the availability of assets that could serve as collateral.

○ **Graph**
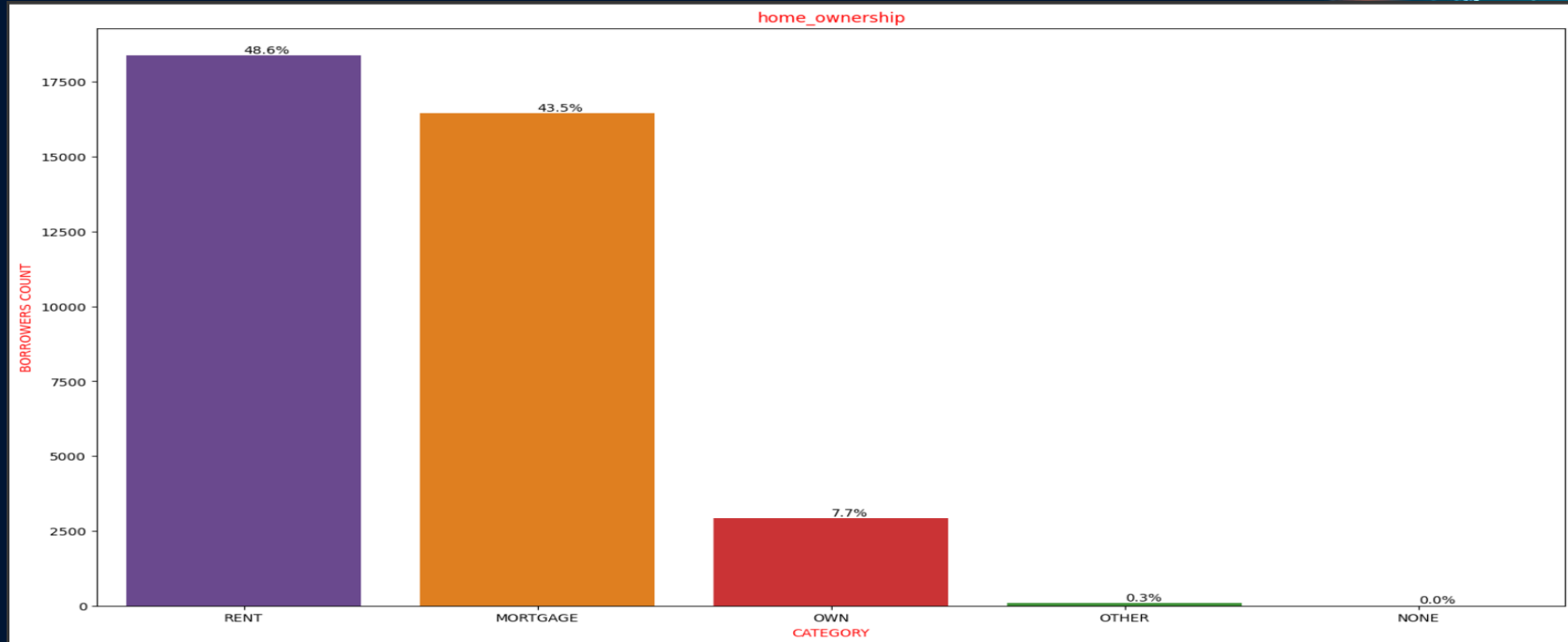
○ **Verification Status** - A high percentage of loans are unverified, which introduces potential risks due to less confirmed borrower information. Increasing verification could reduce default risk and improve loan performance. Despite the financial stability indicated by other metrics, the high rate of unverified loans is a concern. Enhancing our verification processes could lead to better risk assessment and potentially lower default rates.

○ **Graph**
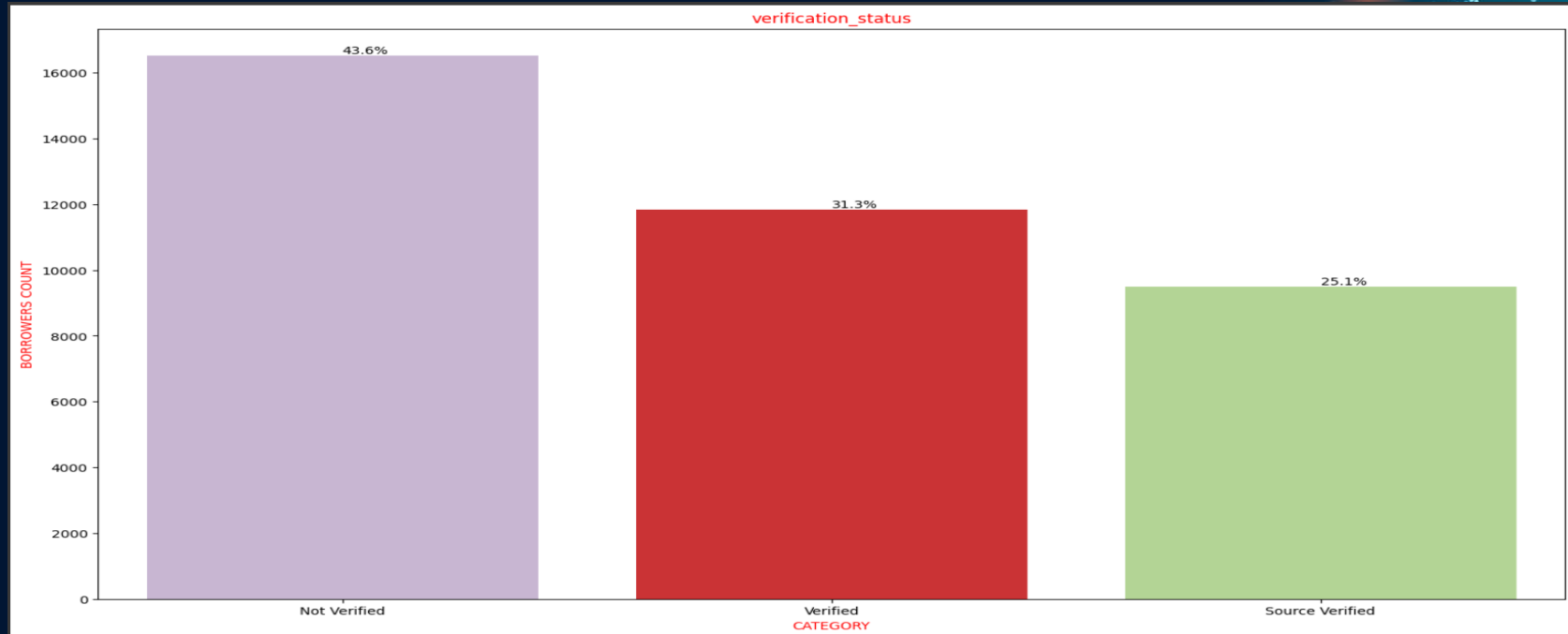
04 | Recommendations

Recommendations and Strategic Directions

- **Title** - Strategic Recommendations for Enhanced Loan Management

  - **Enhance Verification Processes** - Implement stricter verification procedures to reduce the risk associated with unverified loans. Use advanced data analytics to assess borrower credibility and enhance loan performance. By tightening our loan verification processes, we can significantly mitigate risk and improve the accuracy of our lending decisions

  - **Tailored Loan Products for Debt Consolidation** - Develop specialized loan products for debt consolidation to cater to the primary borrowing need. Offer competitive interest rates and flexible terms to encourage refinancing with our institution. By tightening our loan verification processes, we can significantly mitigate risk and improve the accuracy of our lending decisions.

  - **Educational Initiatives for Borrowers** - Launch financial literacy programs to help borrowers manage their debt more effectively. Provide tools and resources to aid in better financial decision-making and credit management. Financial education can empower our borrowers to make informed decisions, reducing defaults and fostering long-term customer loyalty.

  - **Marketing Strategies** - Target marketing efforts towards stable, long-term employed individuals and homeowners, who typically present lower risk. Utilize insights from loan purposes to drive promotions and product offerings. Utilizing demographic and financial behavior insights allows us to target our marketing more effectively, reaching the most promising potential borrowers.

THANKS!

Do you have any questions?
suraj.cse.28@gmail.com
+91 9493909179