



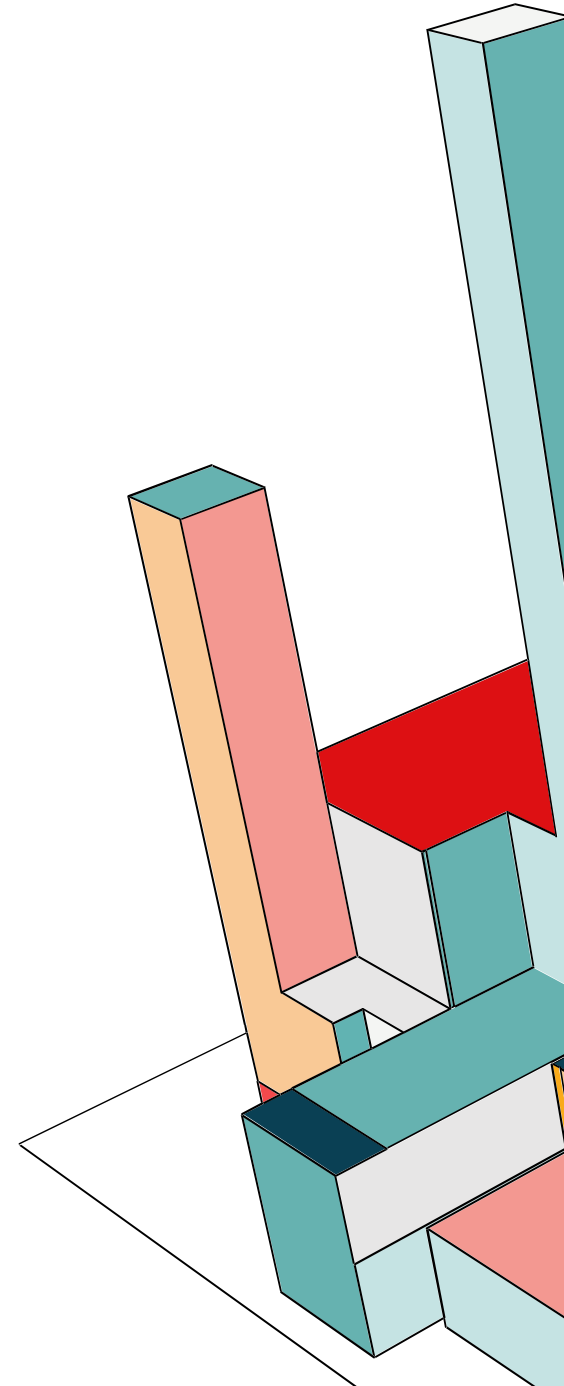
LENDING CLUB CASE STUDY

By-

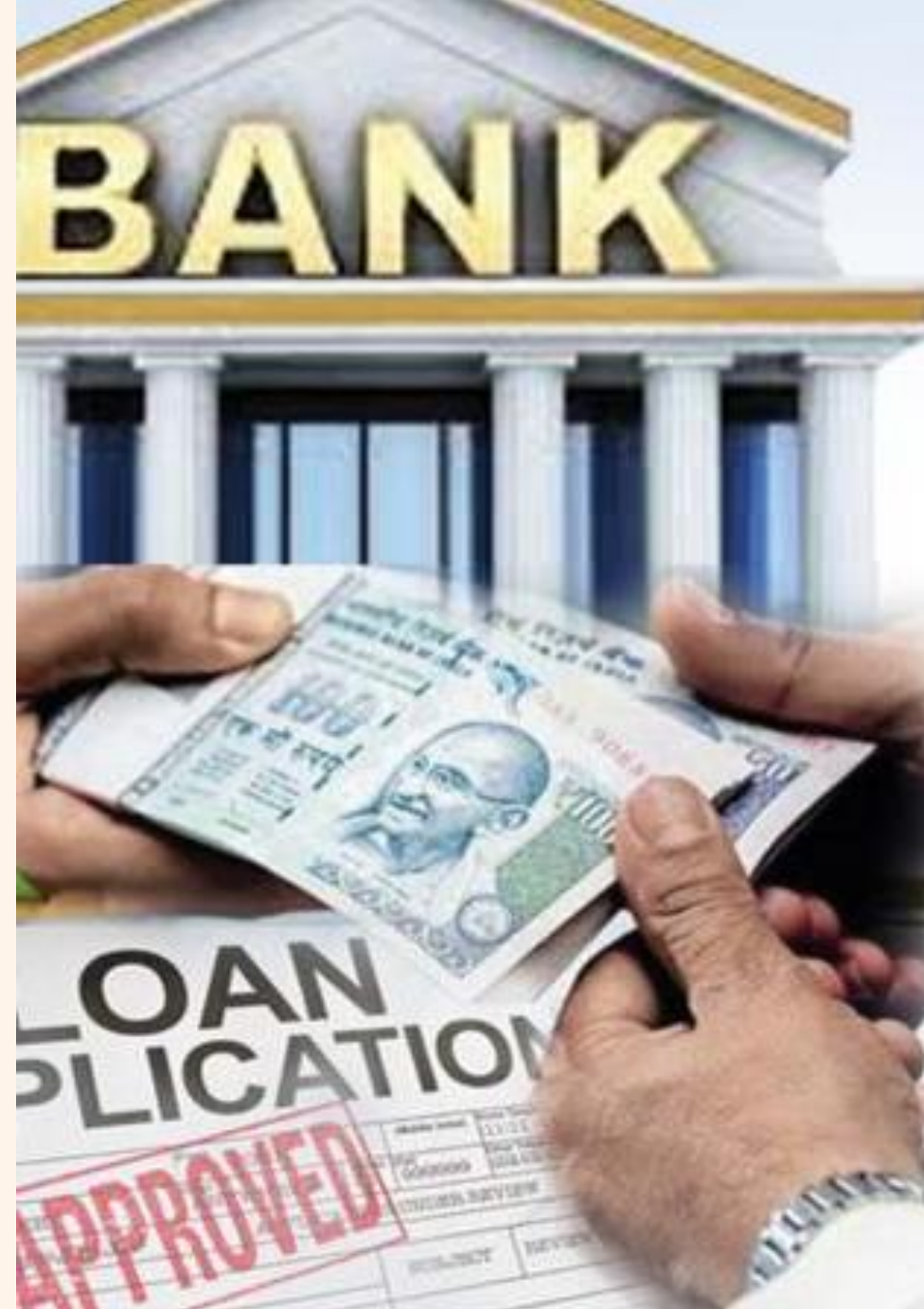
- Kavya Agrawal
- Srivathsav KM

OBJECTIVE

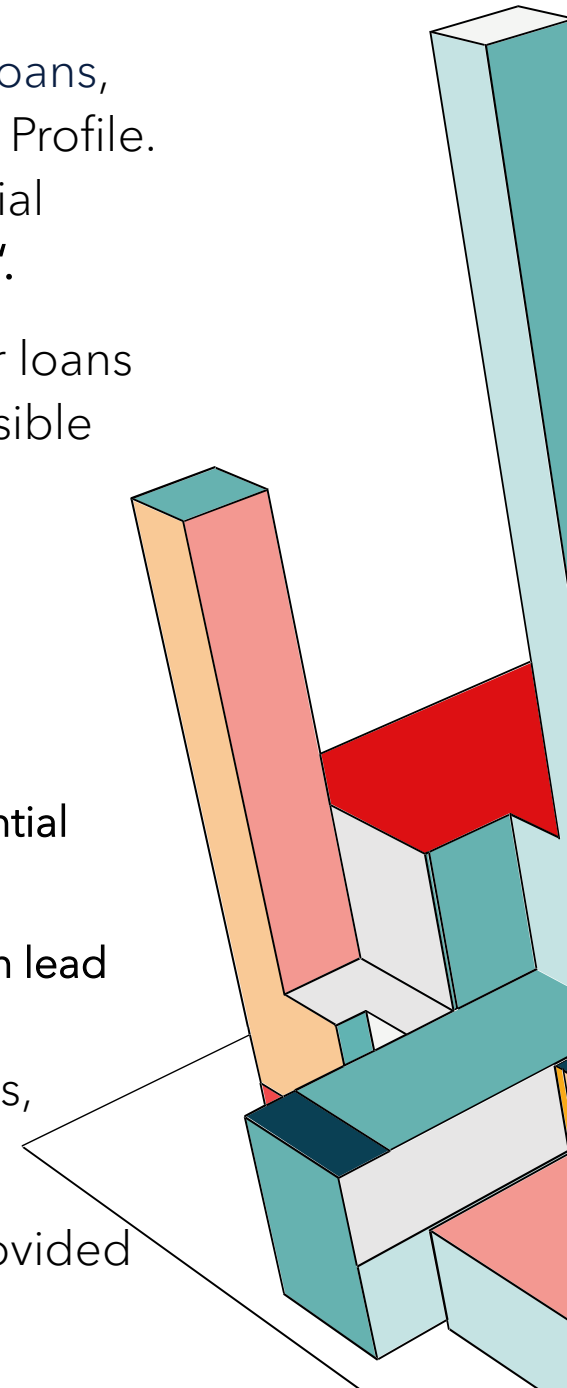
- The Objective of this case study is to implement EDA technique on a real-world problem and understand how **consumer attributes** and **loan attributes** influence the tendency of default.
- In this case study, we would be applying the techniques we have learnt in EDA, while developing a basic understanding of risk analytics in banking and financial services and understand how data is used to minimize the risk of losing money while lending to customers.



PROBLEM STATEMENT



- **LendingClub**, is the largest online loan marketplace, facilitating personal loans, business loans, etc . faces a critical challenge in managing its loan approval process based on Applicant's Profile. When evaluating loan applications, the company must make decisions to minimize financial losses , primarily stemming from loans extended to applicants who are considered "**Risky**".
- The financial losses, referred to as **Credit Losses**, occurs when borrowers fail to repay their loans or default. In simpler terms, borrowers with the Status "**Charged-Off**" are the ones responsible for occurring the most significant losses to the company.
- The main objective of this exercise is to assist Company in mitigating credit losses. This challenge arises from two potential scenarios:
 - 1) Identifying applicants likely to repay their loans is crucial, as they can generate profits for the company through interest payments. Rejecting such applicants would result in a loss of potential business.
 - 2) On the other hand, approving loans for applicants not likely to repay and at risk of default can lead to financial losses for the company.
- The objective is to pinpoint applicants at risk of defaulting on loans based on many factors, enabling company to reduce credit losses .
- Hence, We aim to achieve this goal through Exploratory Data Analysis (EDA) using the provided dataset and Understand the Driver Variables behind the Defaulters



DATA DICTIONARY

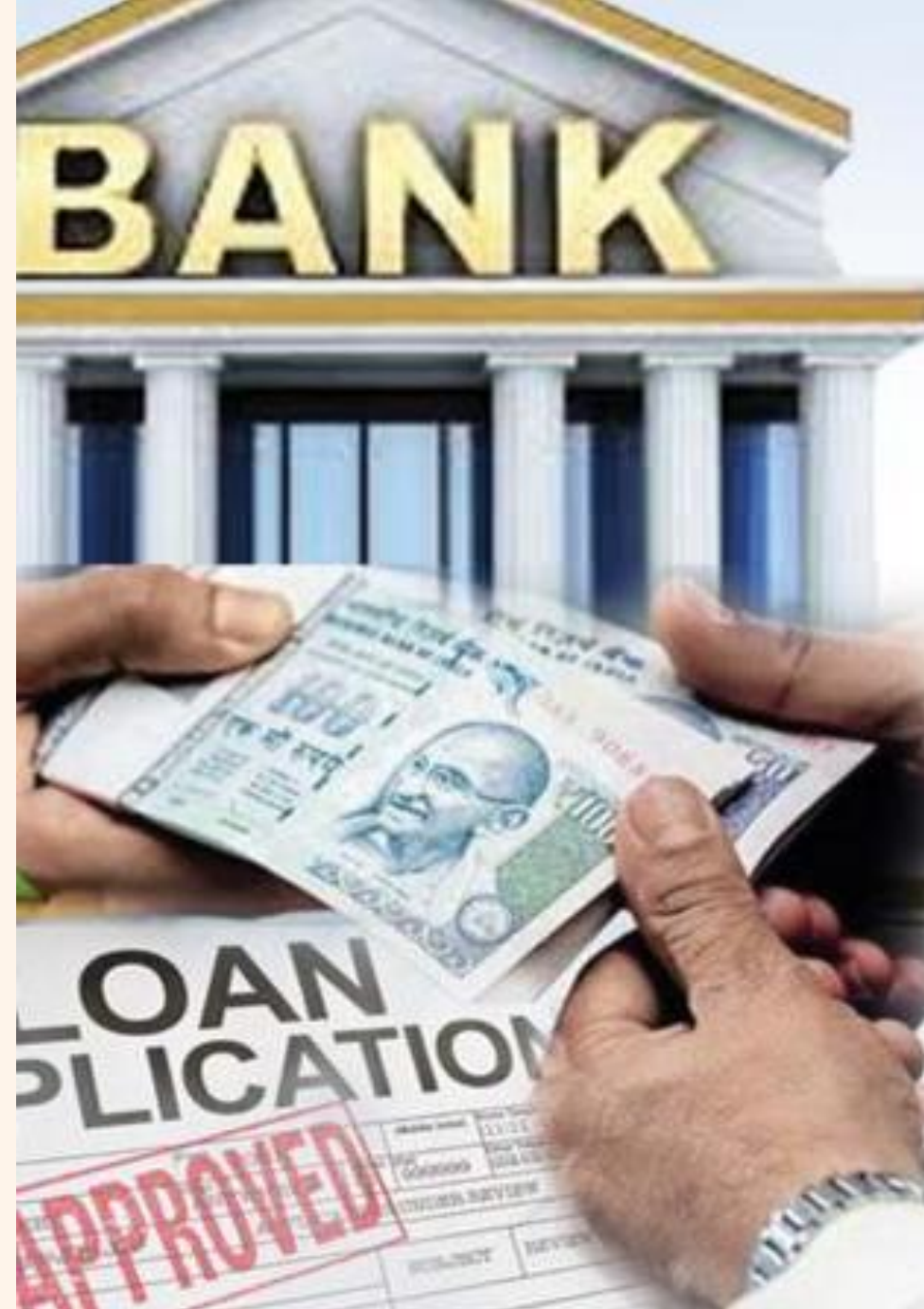
We have been provided with customer's historical data. This dataset contains information pertaining to the borrower's past credit history and Company's loan information. This dataset had over 39717 records and 111 columns, which was sufficient to conduct analysis. Variables in the dataset provided an ample amount of information which we could use to conduct our analysis for the company.

	A	B
1	LoanStatNew	Description
2	acc_now_delinq	The number of accounts on which the borrower is now delinquent.
3	acc_open_past_24mths	Number of trades opened in past 24 months.
4	addr_state	The state provided by the borrower in the loan application
5	all_util	Balance to credit limit on all trades
6	annual_inc	The self-reported annual income provided by the borrower during registration.
7	annual_inc_joint	The combined self-reported annual income provided by the co-borrowers during registration
8	application_type	Indicates whether the loan is an individual application or a joint application with two co-borrowers
9	avg_cur_bal	Average current balance of all accounts
10	bc_open_to_buy	Total open to buy on revolving bankcards.
11	bc_util	Ratio of total current balance to high credit/credit limit for all bankcard accounts.
12	chargeoff_within_12_mths	Number of charge-offs within 12 months
13	collection_recovery_fee	post charge off collection fee
14	collections_12_mths_ex_med	Number of collections in 12 months excluding medical collections
15	delinq_2yrs	The number of 30+ days past-due incidences of delinquency in the borrower's credit file for the past 2 years
16	delinq_amnt	The past-due amount owed for the accounts on which the borrower is now delinquent.
17	desc	Loan description provided by the borrower
18	dti	A ratio calculated using the borrower's total monthly debt payments on the total debt obligations, excluding mortgage and the requested LC loan, divided by the borrower's self-r
19	dti_joint	A ratio calculated using the co-borrowers' total monthly payments on the total debt obligations, excluding mortgages and the requested LC loan, divided by the co-borrowers' com
20	earliest_cr_line	The month the borrower's earliest reported credit line was opened
21	emp_length	Employment length in years. Possible values are between 0 and 10 where 0 means less than one year and 10 means ten or more years.
22	emp_title	The job title supplied by the Borrower when applying for the loan.*

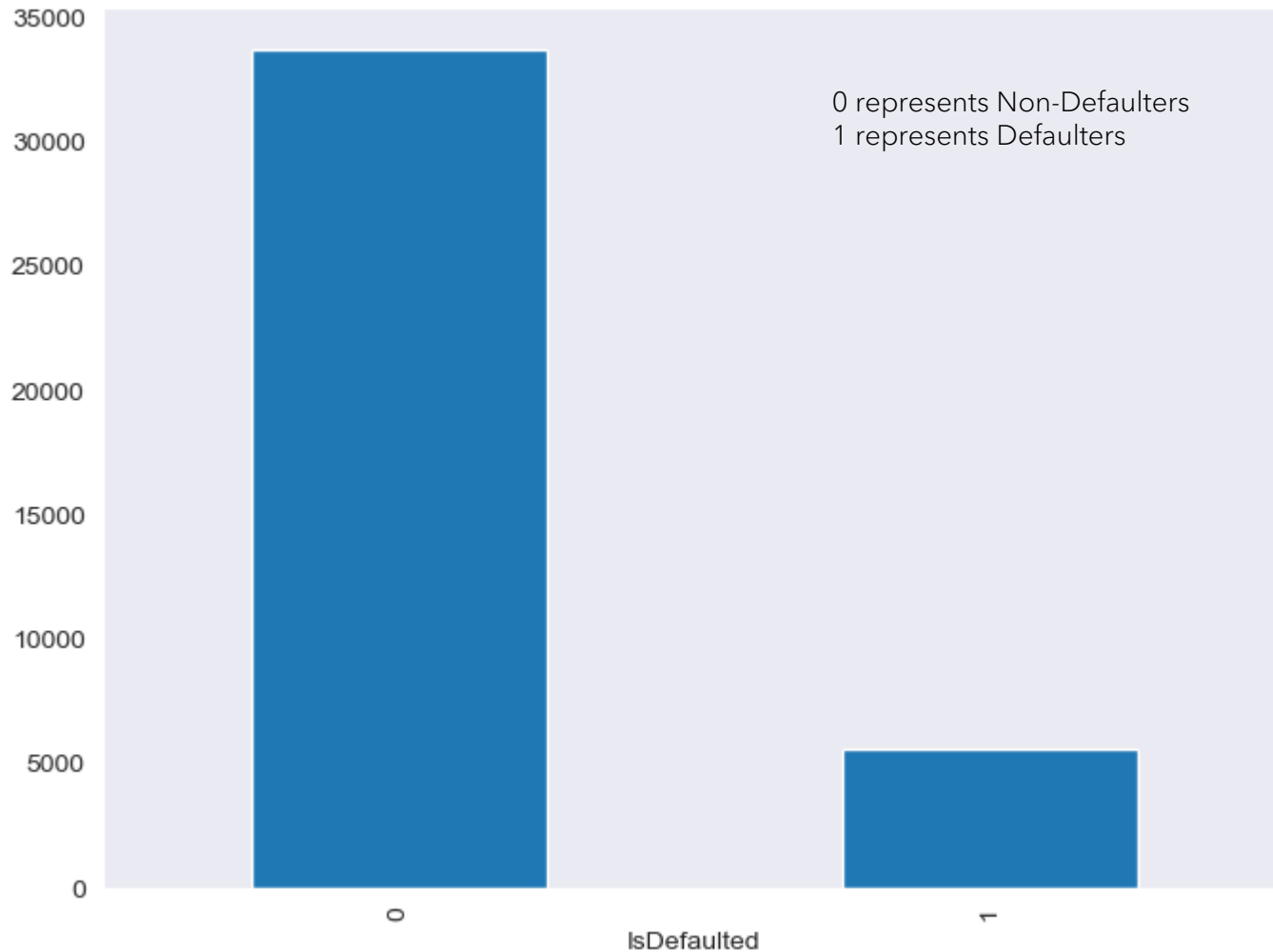
DATA CLEANUP & PREPARATION FOR ANALYSIS

- 1) Loading data from loan CSV
- 2) Checking for null values in the dataset
- 3) Checking for duplicated rows in data
- 4) Dropping unwanted Columns
- 5) Data Conversion
- 6) Adding Derived columns
- 7) Removing the Outliers

DATA ANALYSIS



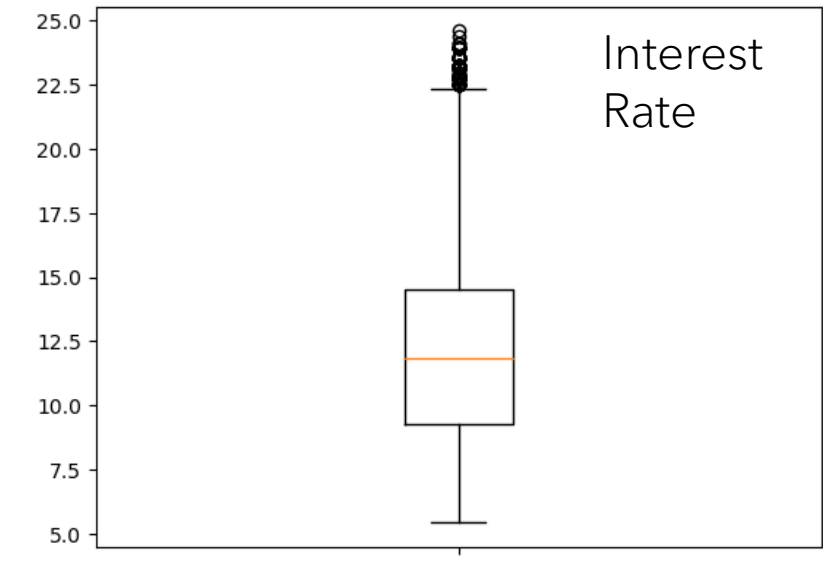
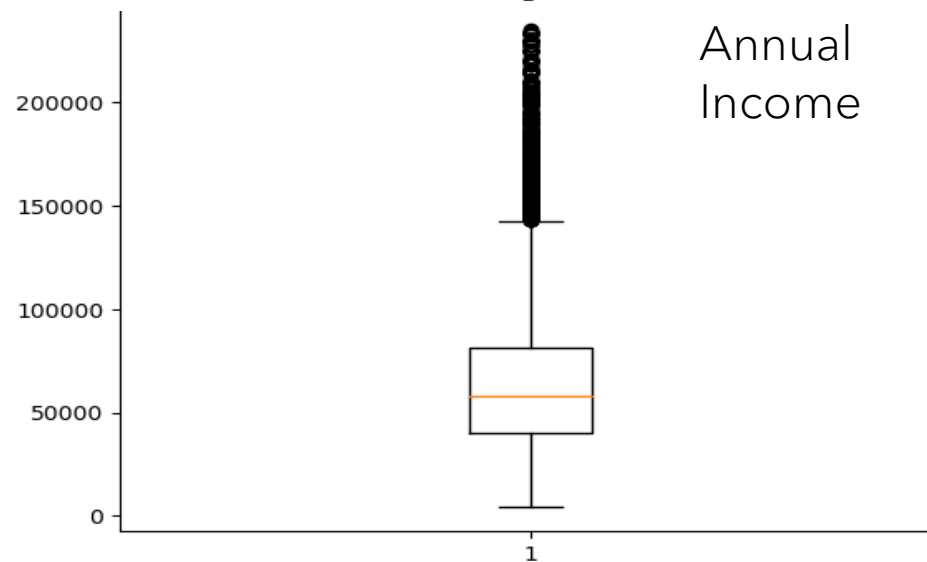
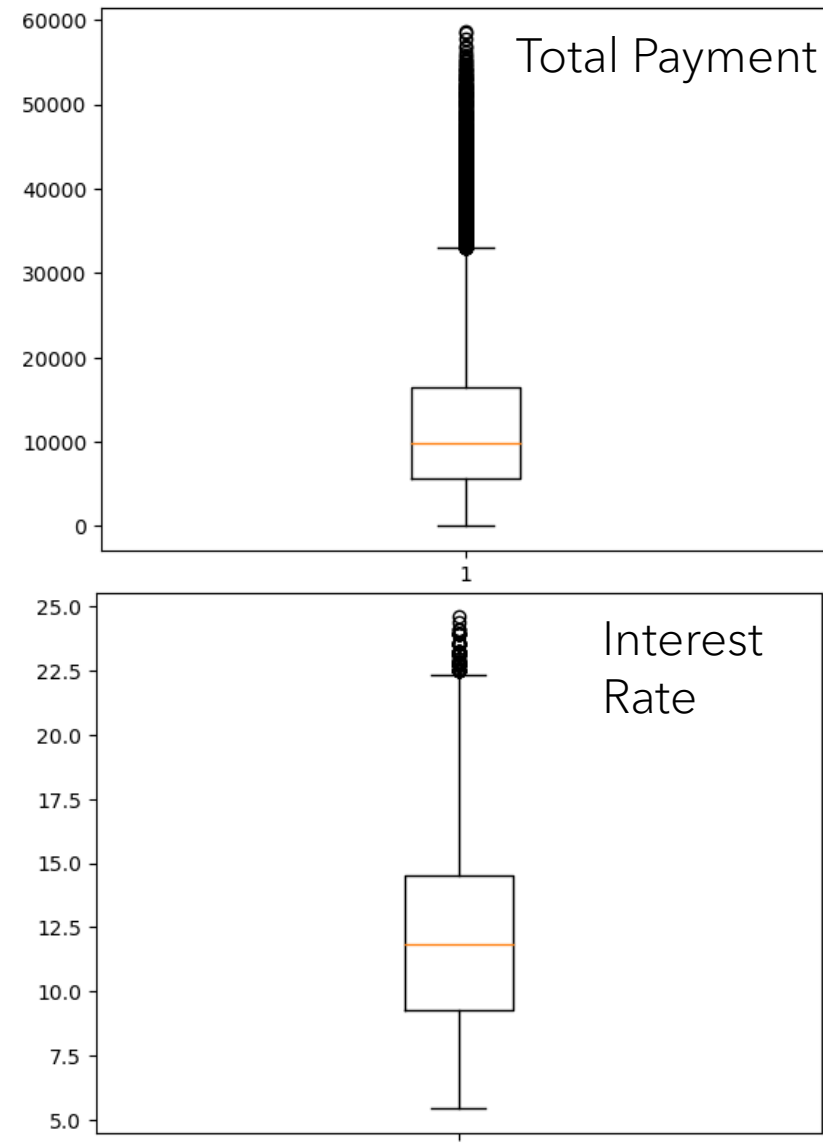
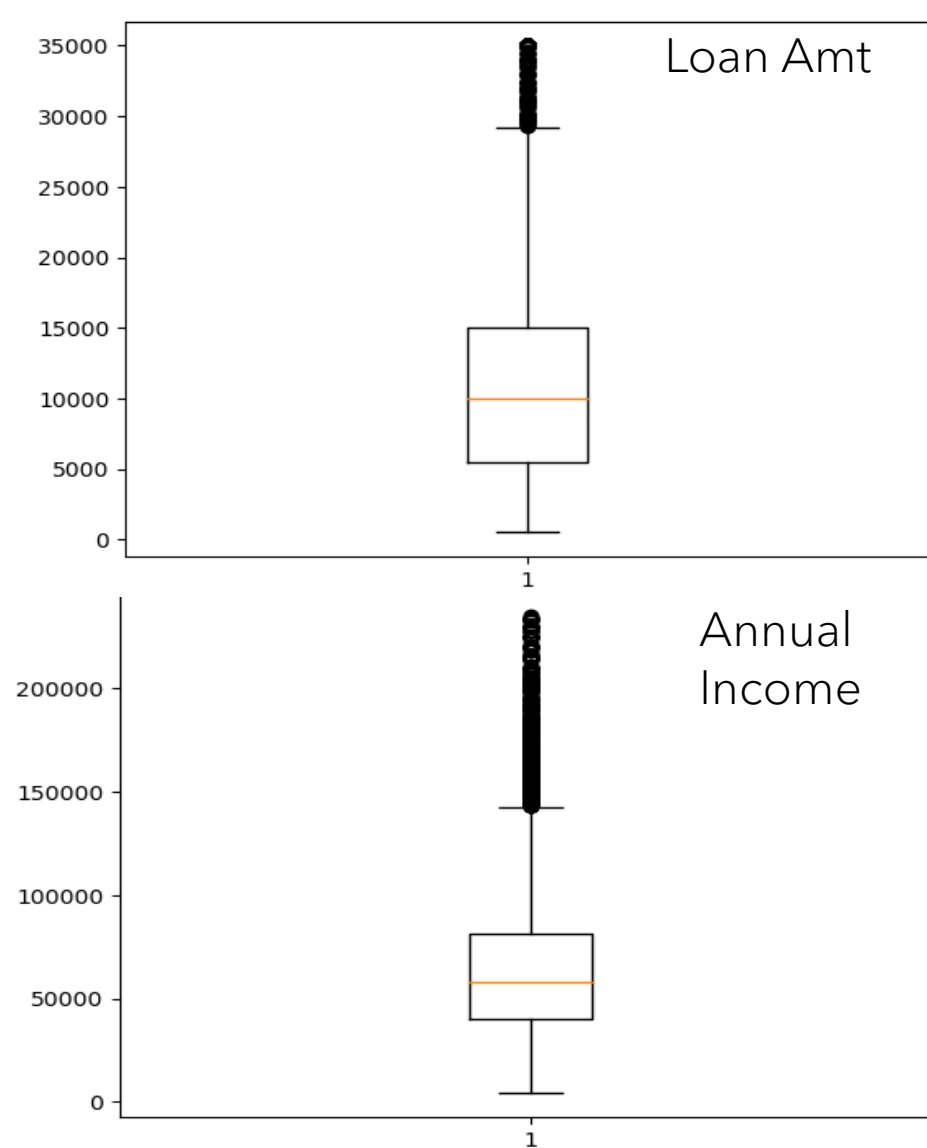
DEFAULTER VS NON-DEFAULTER



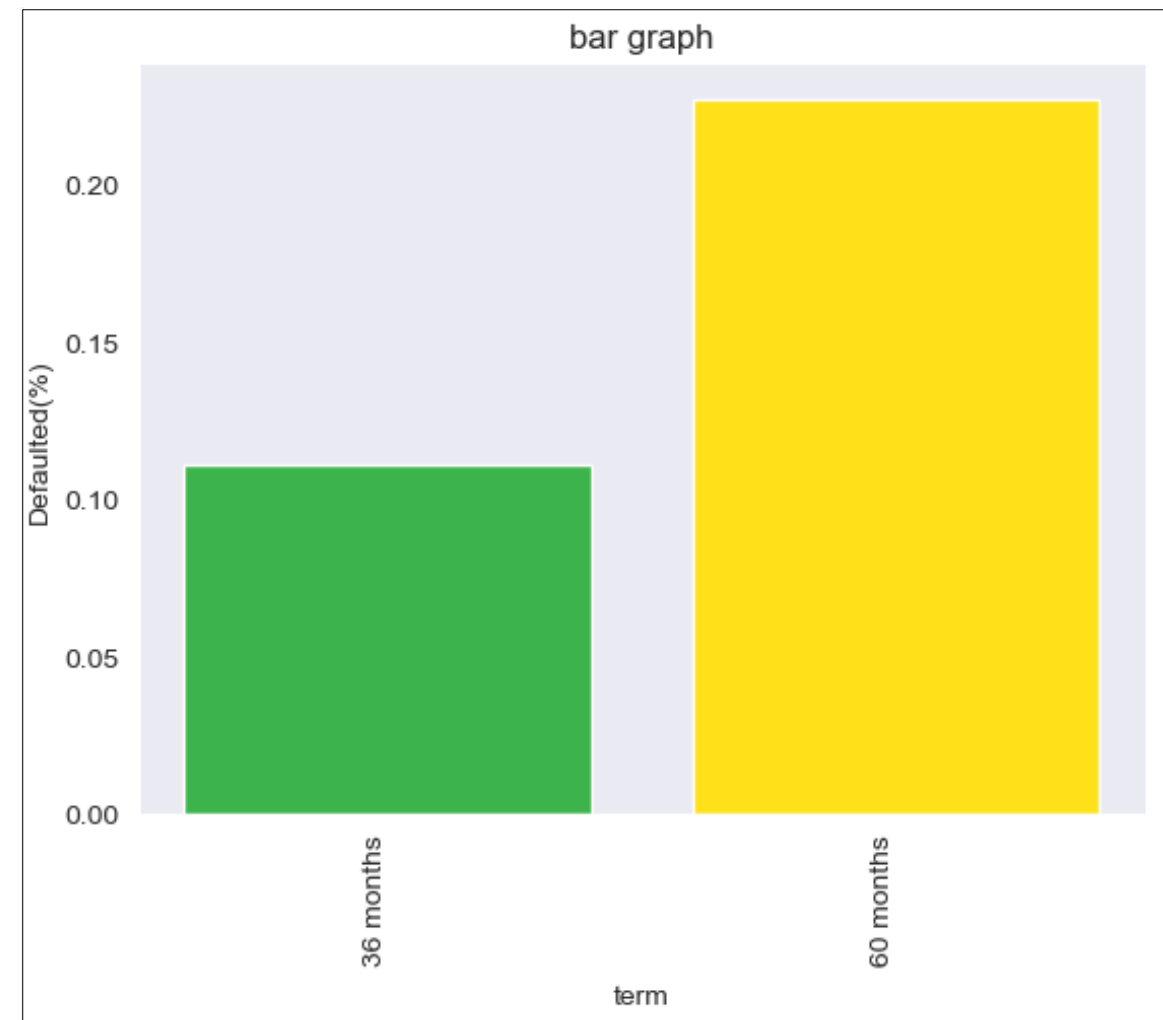
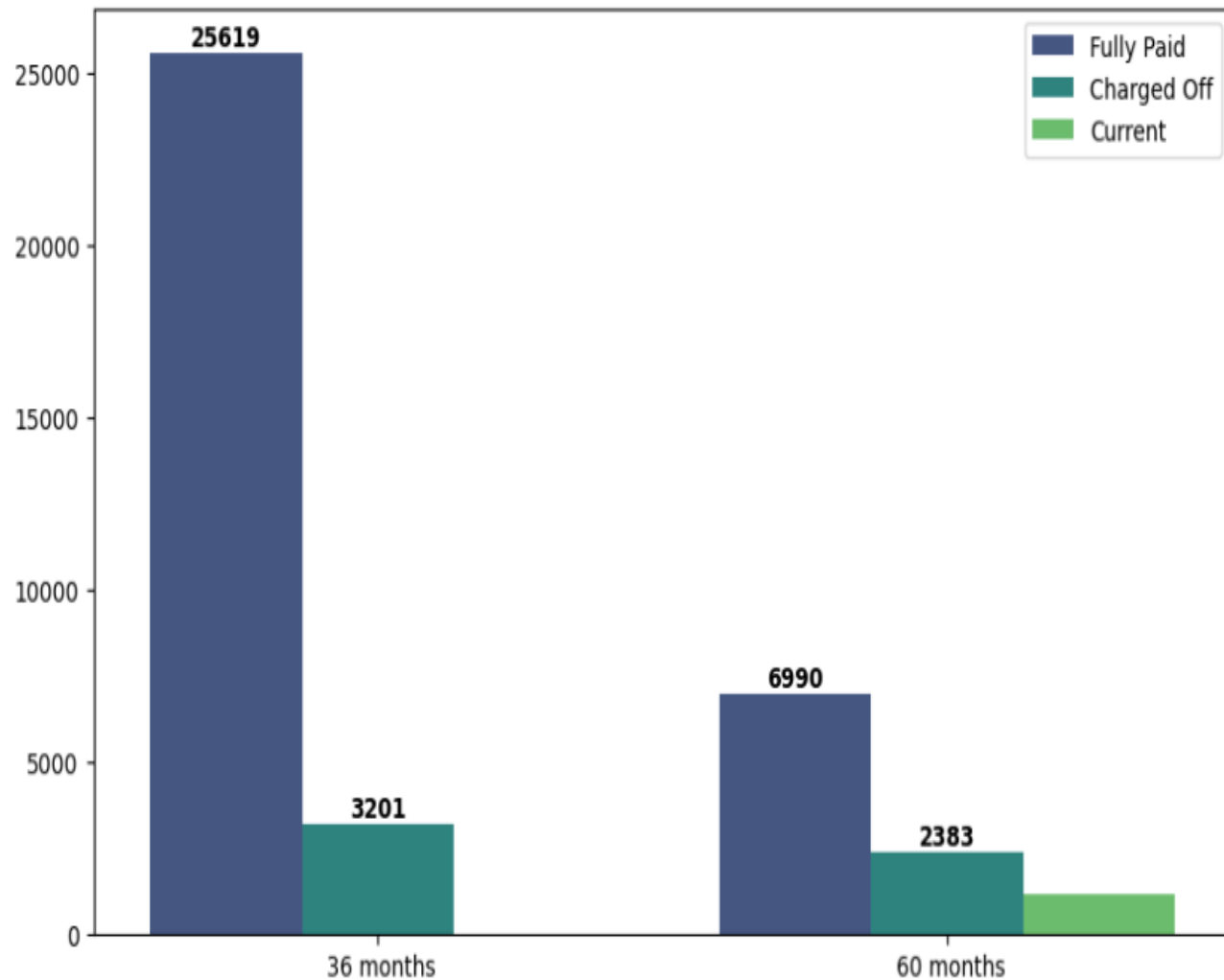
Inference

In the given Data set we have observed that the number of Defaulters are less than Non-Defaulters

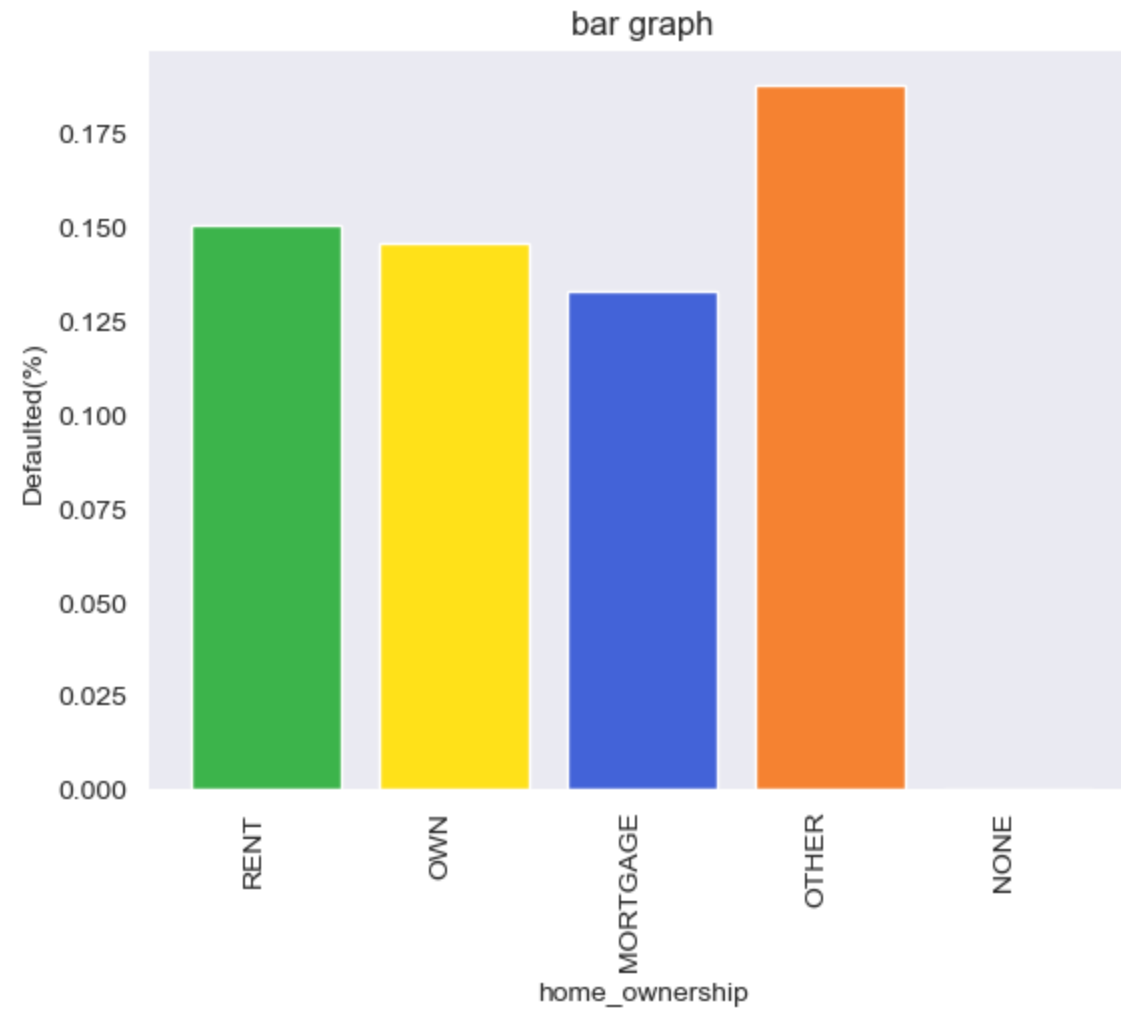
BOX PLOTS FOR LOAN AMOUNT, TOTAL PAYMENT, ANNUAL INCOME AND INTEREST RATE



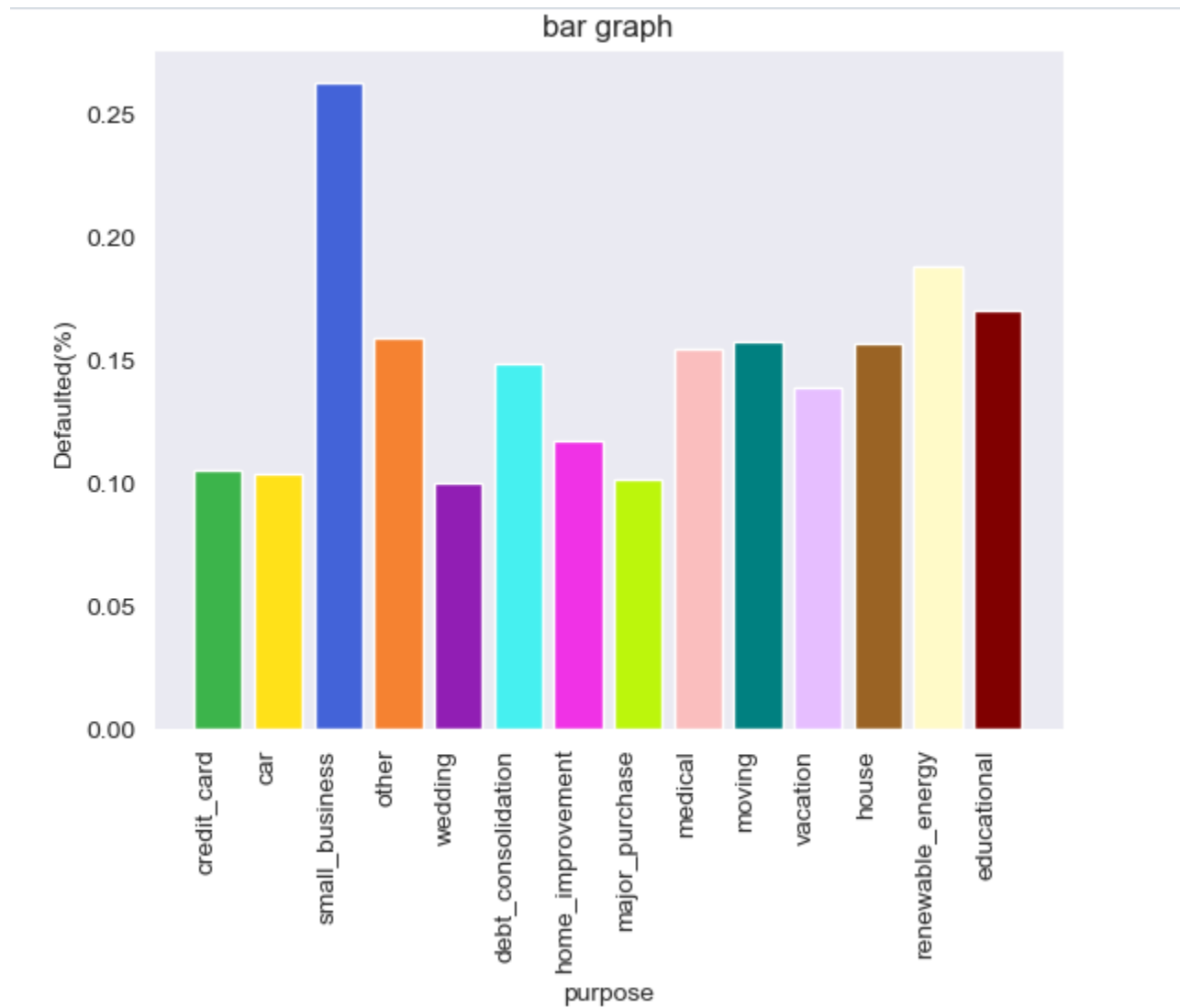
LOAN STATUS BASED ON TERMS



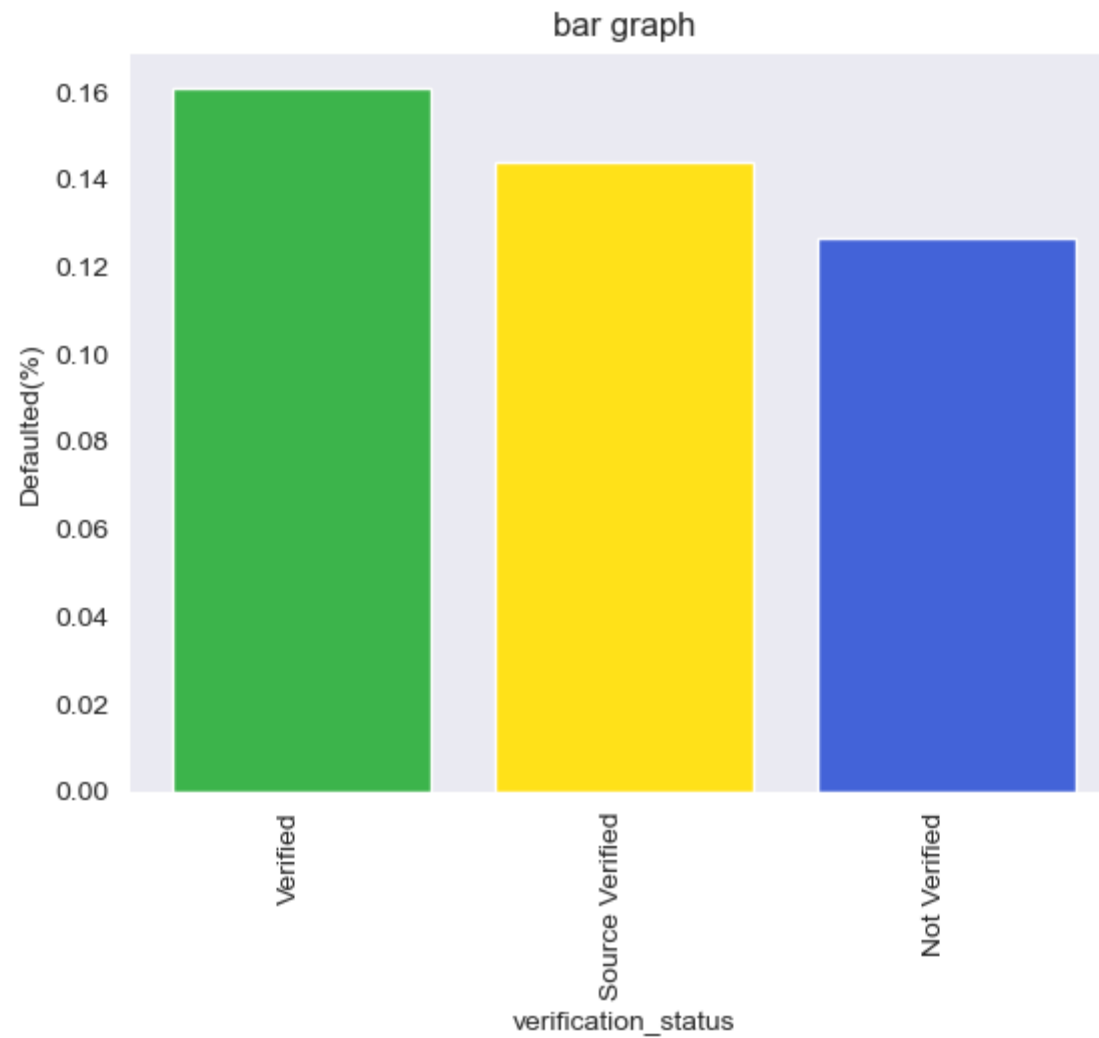
PERCENTAGE OF DEFAULTERS VS HOME OWNERSHIP



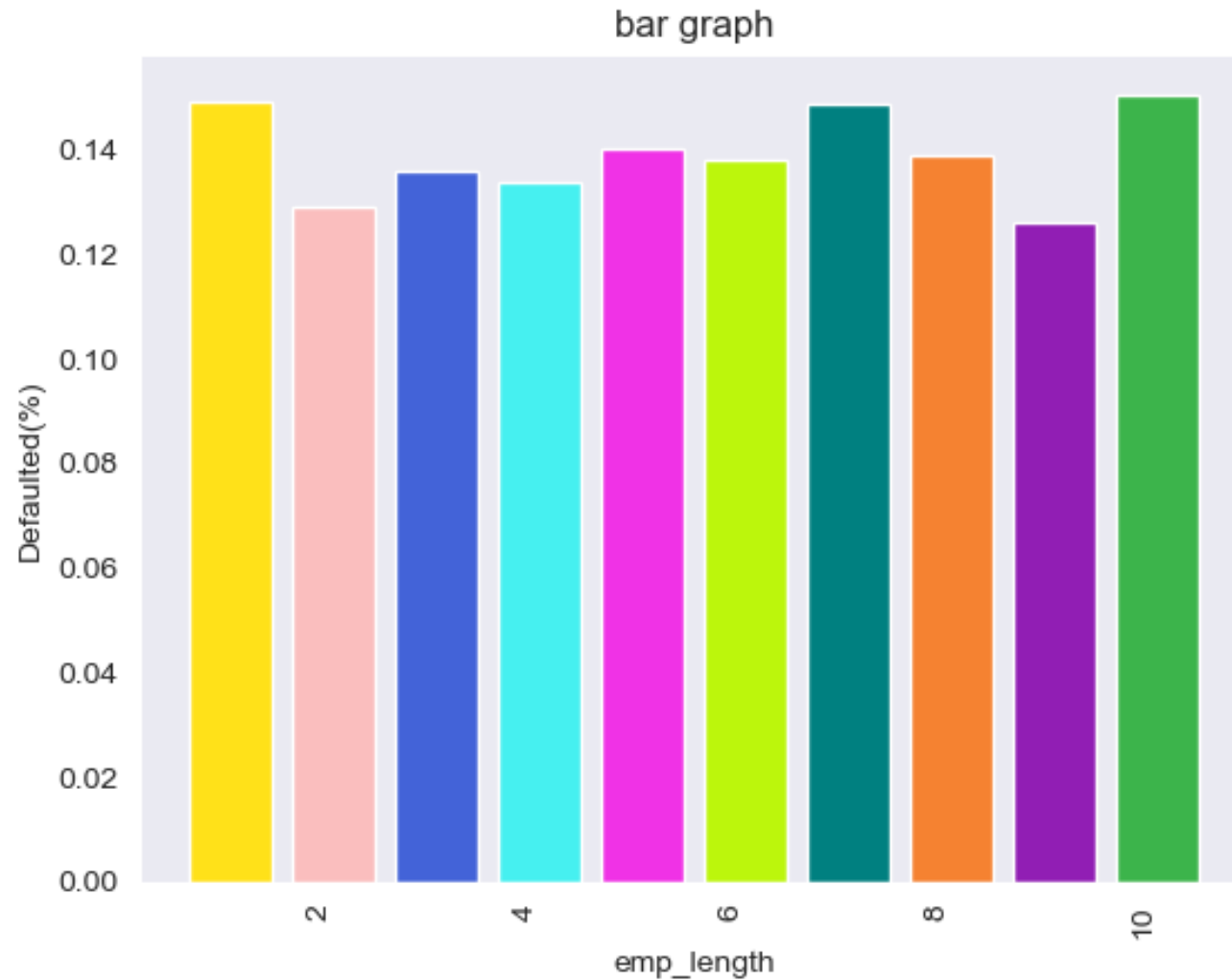
PERCENTAGE OF DEFAULTERS VS PURPOSE OF LOAN



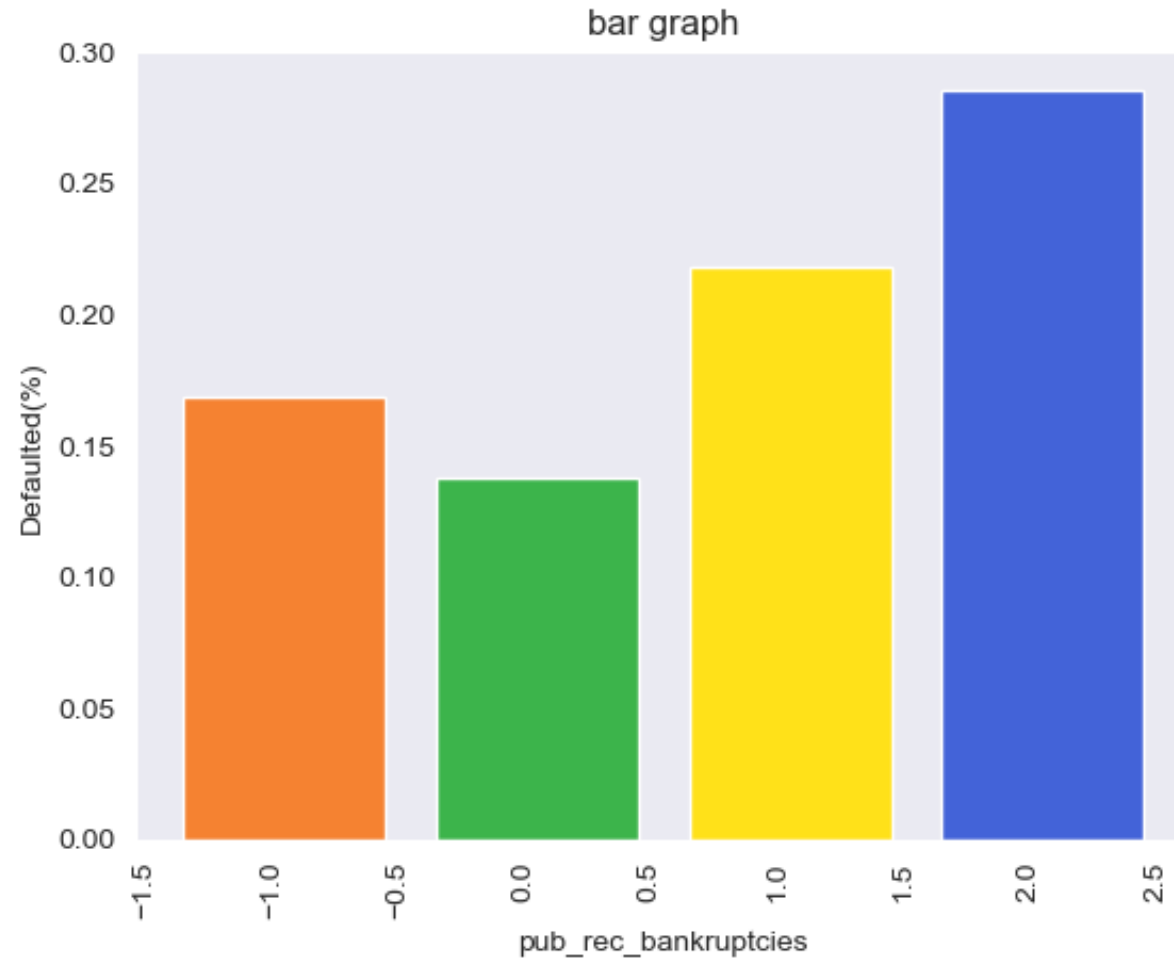
DEFAULTERS VS VERIFICATION STATUS



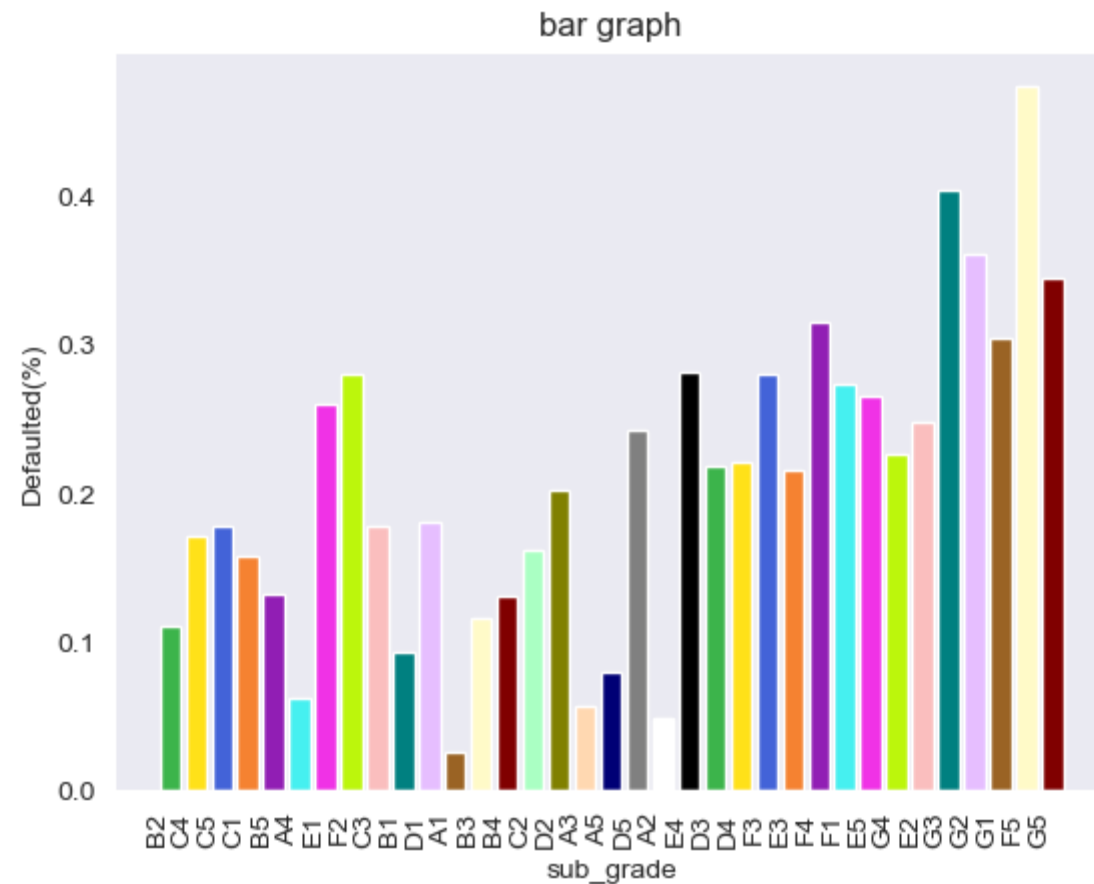
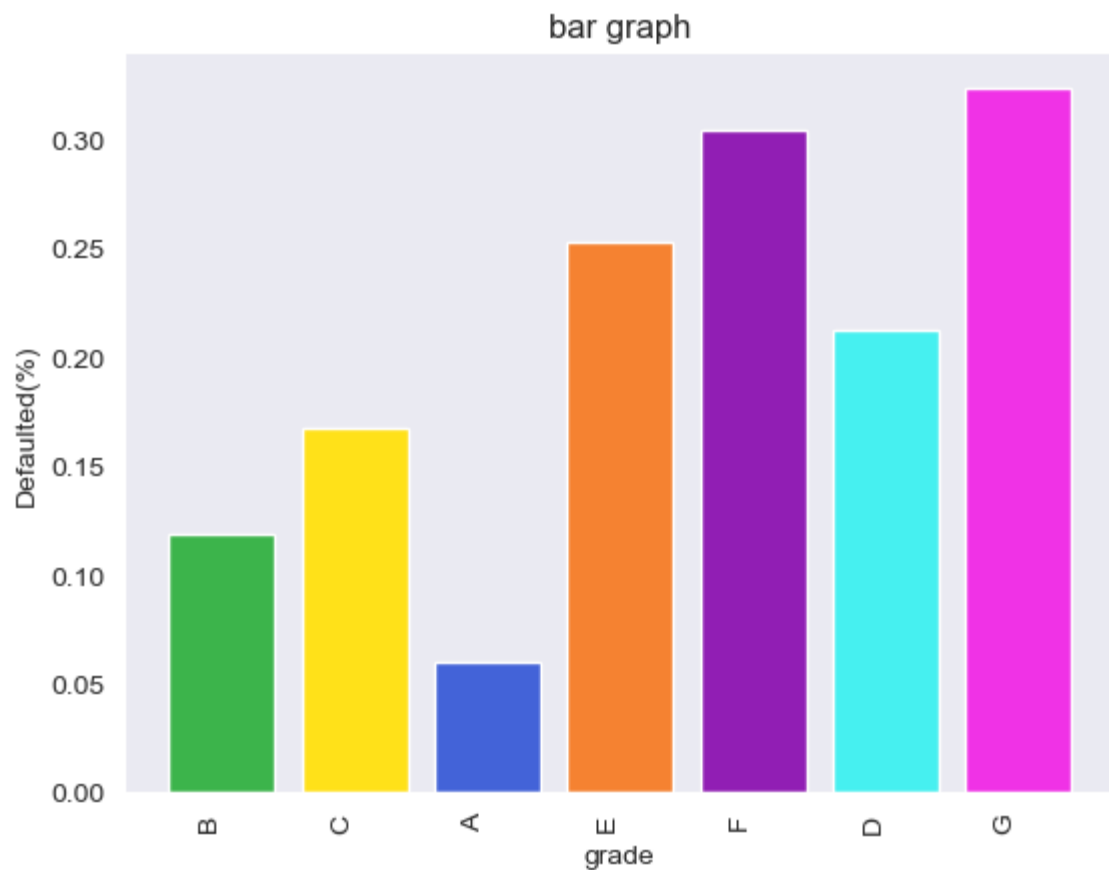
PERCENTAGE OF DEFAULTERS VS EMPLOYMENT PERIOD



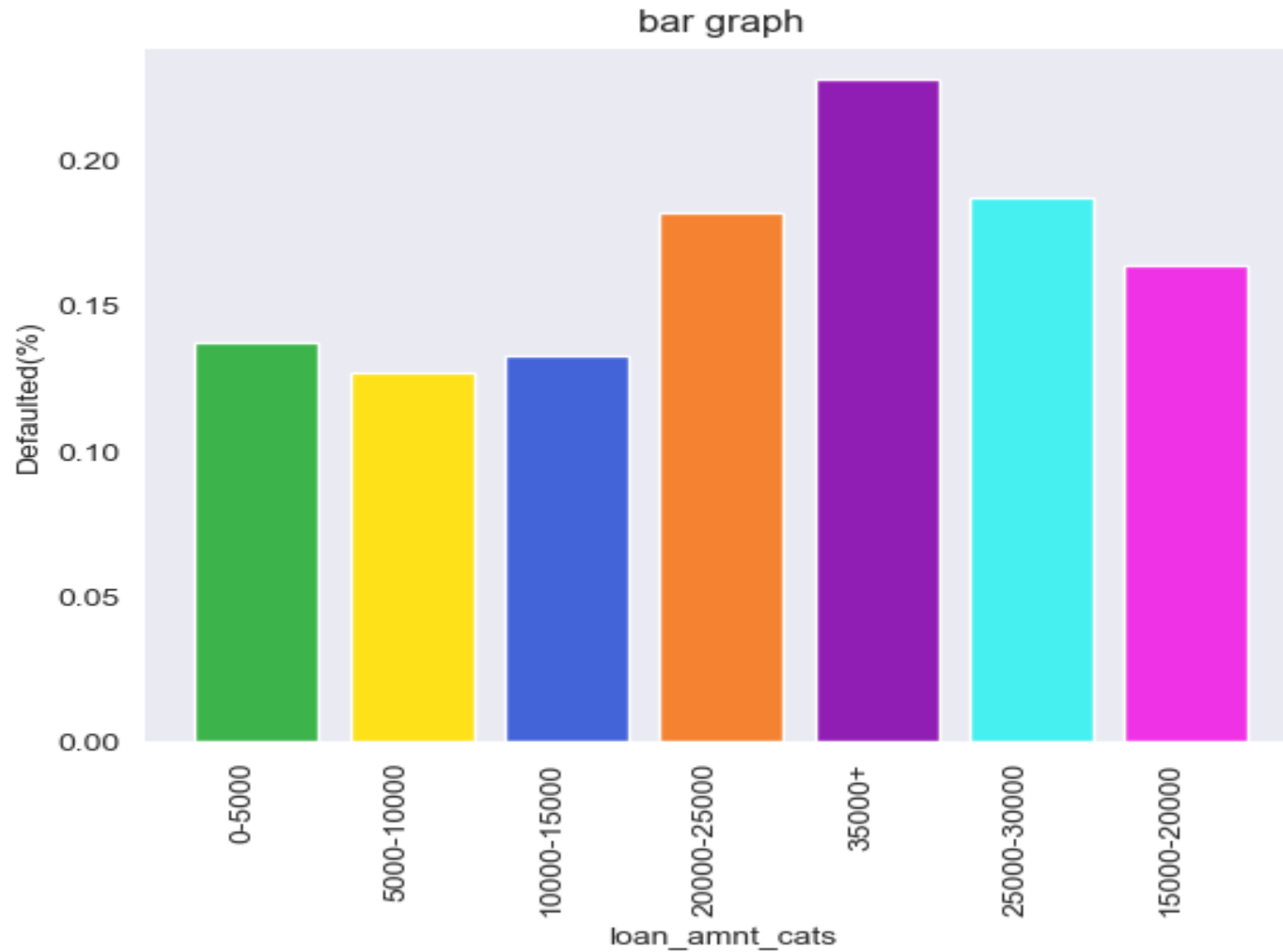
PERCENTAGE OF DEFAULTERS VS RECORDED BANKRUPTCIES



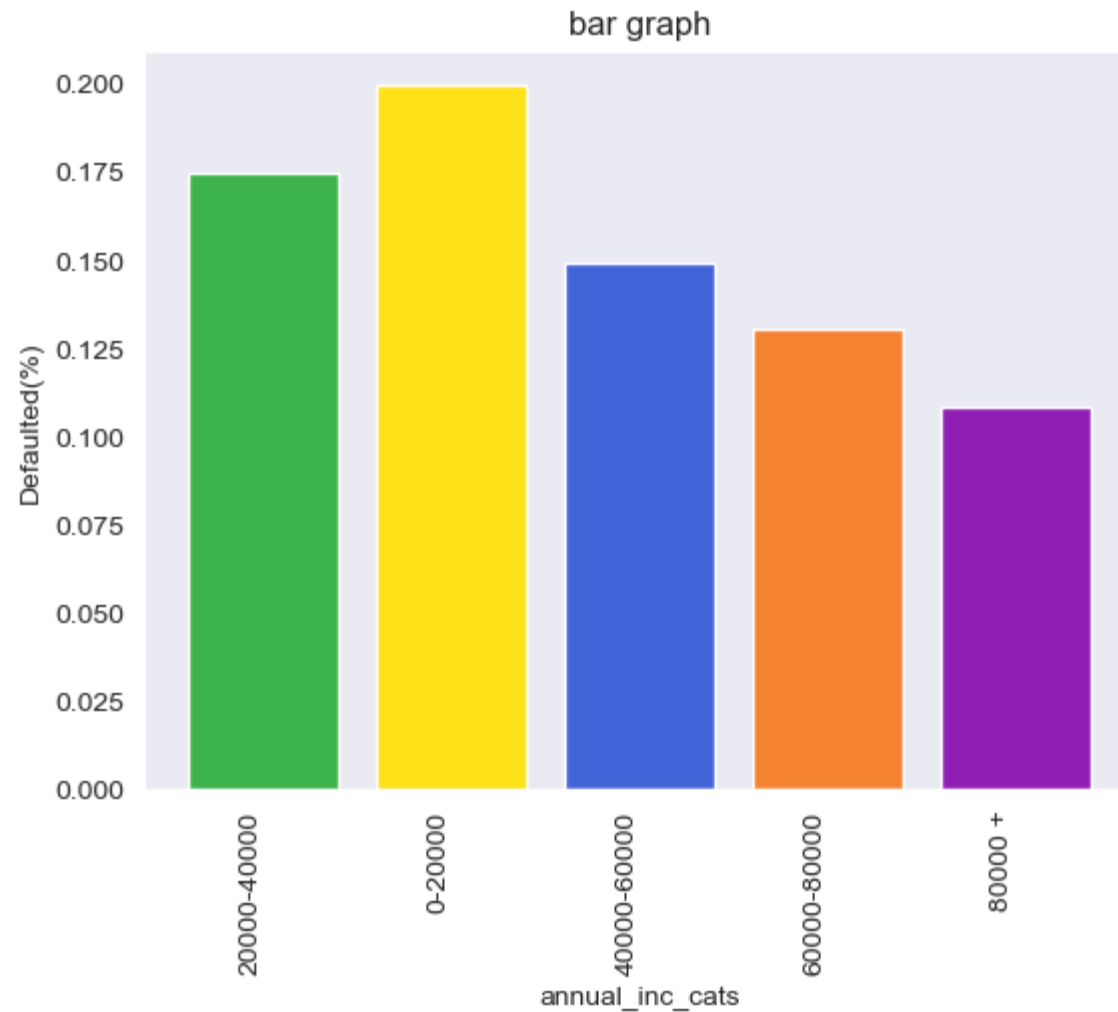
PERCENTAGE OF DEFAULTER VS GRADES AND SUBGRADES



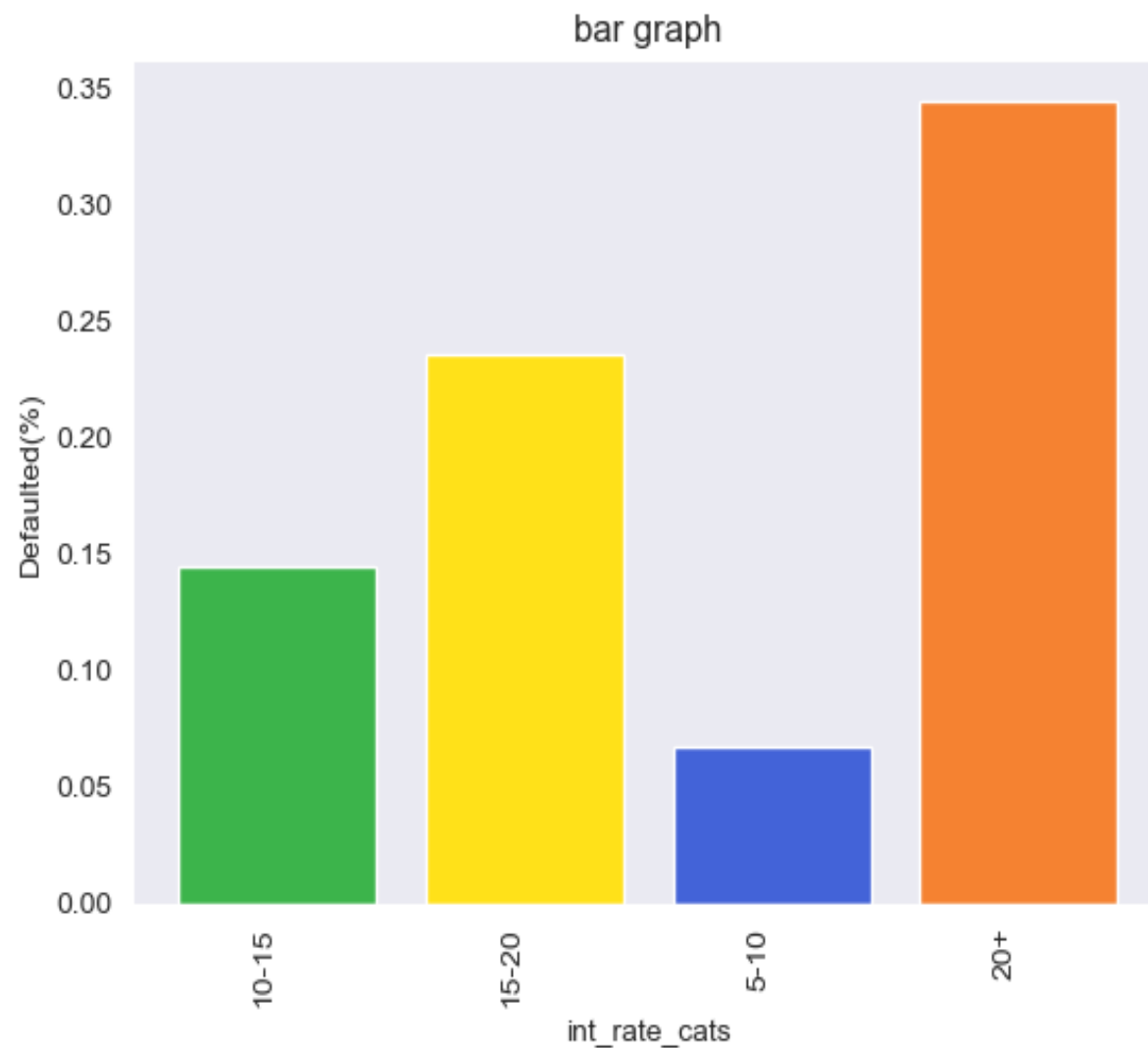
PERCENTAGE OF DEFAULTERS VS LOAN AMOUNT CATEGORY



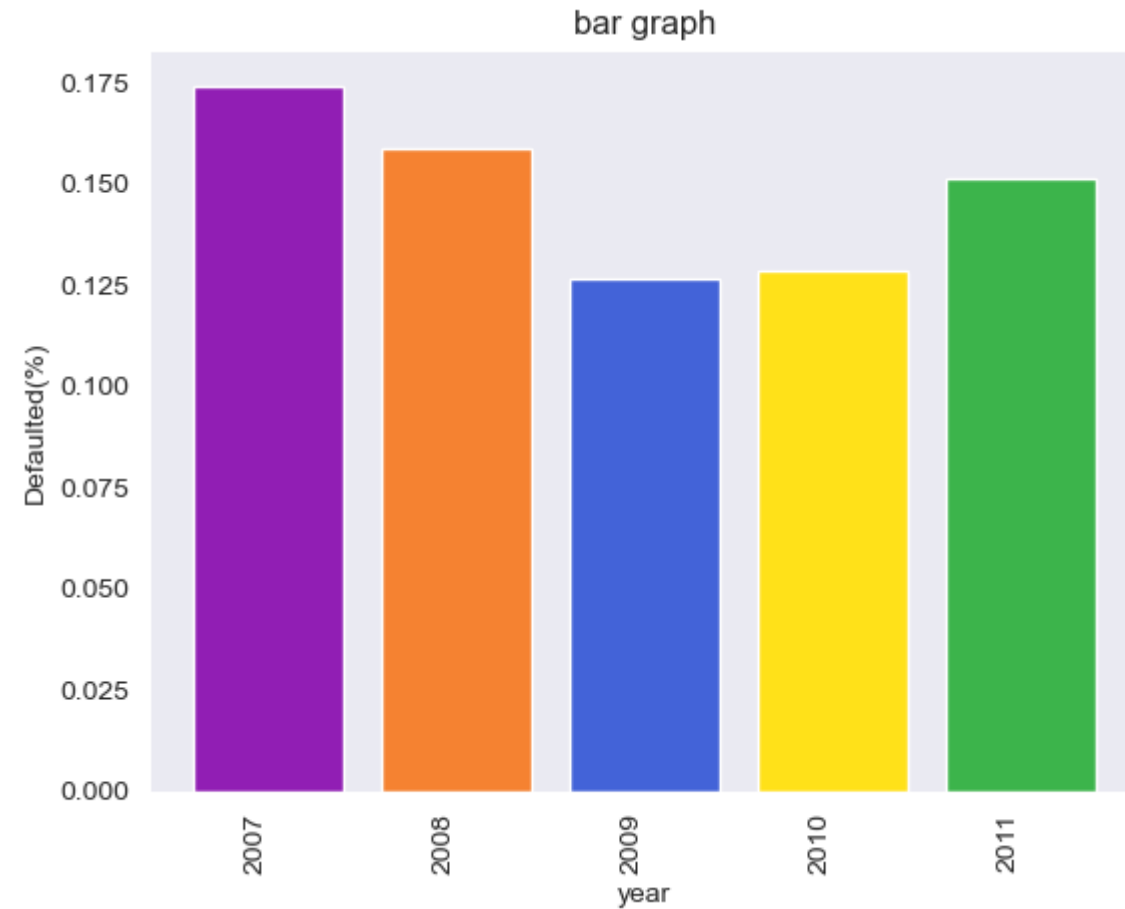
PERCENTAGE OF DEFAULTERS VS ANNUAL INCOME CATEGORY



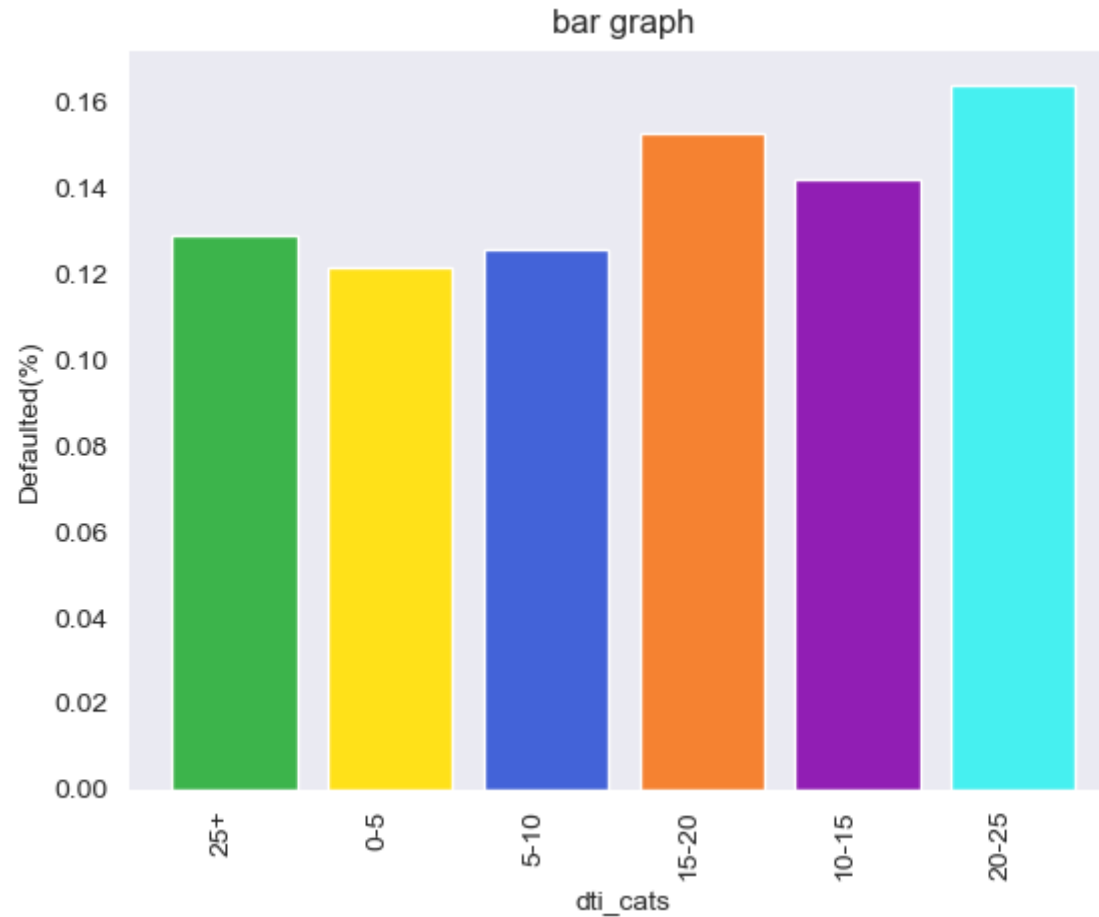
PERCENTAGE OF DEFAULTERS VS INTEREST RATES



PERCENTAGE OF DEFAULTERS VS LOAN ISSUED YEARS



PERCENTAGE OF DEFAULTERS VS DEBT TO INCOME RATIO CATEGORIES



PURPOSE OF LOAN VS TOTAL LOAN APPLICATION COUNT BASED ON THE LOAN STATUS





OBSERVATIONS AND INFERENCES:

- Short-term loans with a duration of 36 months were the most popular among the applicants. This suggests that a significant portion of applicants chose shorter repayment terms.
- Most percentages of defaulters are observed with 60 months repayment term
- Percentage of Applicants who had been employed for more than 10 years have also accounted for the highest number of "Charged off" loans indicating that long-term employment history did not necessarily guarantee successful loan repayment.
- The year 2007 recorded the highest percentage of "Charged off" loan applications, signaling a growth in the percentage of applicants facing loan defaults over the years. This could be indicative of economic or financial challenges during that year.
- Most of the applications received were for Debt consolidation. It seems to be the primary loan purpose for the loan applicants. However, it was observed that highest percentage of the "Charged Off" -Defaulters were applicants with Small businesses. The lending company needs to practice caution when approving loans for debt consolidation and Small businesses.



OBSERVATIONS AND INFERENCES:

- Grades F and G had the highest percentage of "Charged off" loan applicants with the sub grades F5,G2,G3,G5 having high percentages of defaulters, indicating that applicants with these credit grades faced challenges in repaying their loans.
- Data shows that majority of the defaulters are verified , however, percentage of unverified Applicants is considerably high as well. The company must make sure to verify the Applicants and consider some improvements.
- Percentages of Applicants with low incomes were seen most likely to default and it was observed that with increase in the Income bracket the Percentage of Defaulters were decreasing . Company must implement rigorous income verification considering the loan purpose and other factors and assess repayment capacity more thoroughly for applicants in low-income bracket.
- Among loan participants who defaulted, a considerable percentage belonged to the interest rate bucket more than 20%. To reduce the risk of default, the lending company should consider offering loans at lower interest rates when possible.
- It was also observed that higher Loan amount mostly likely it would get defaulted. Company must run a thorough check and based on important parameters to grant the loan.



SUGGESTIONS

- Careful Evaluations for lending loans to applicants with Small businesses.
- Company can consider House Ownership in account while evaluating an applicant's ability to repay the loan
- Thorough Verification Process must be implemented to ensure Applicant's credit worthiness. Based on this Adjustments can be made like Approved loan Amount etc.
- Consider Adjusting Interest Rates based on DTI.
- Company can consider setting Range of approved Loan amount based on Applicant's Creditability suggesting ability to pay Loan completely especially applicants with low-income bracket
- Implement Strict criteria for the Grade G and F , Subgrades G5,F5,G2,G3 to minimize risks of defaulting. Consider risk mitigation measures or offering lower loan amounts.
- Company can reevaluate the risk associated with long loan terms.
- Company can also consider capitalizing on market growth by observing a slight decrease in the percentage of defaulters from 2007- 2011 also ensuring risk management.

THANK YOU

