Lending Club Case Study

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Background and Business problem

Lending Club is a consumer finance company which specializes in lending various types of loans to urban customers.

Like most other lending companies, lending loans to 'risky' applicants is the largest source of financial loss (called credit loss).

Borrowers who default cause the largest amount of loss to the lenders and are labelled as 'charged-off' are the 'defaulters'

The company wants to understand the driving factors (or driver variables) behind loan default, i.e., the variables which are strong indicators of default.

LOAN DATASET

Loan
Accepted → Default
→ Non-Default

Loan
Rejected
(Not considered
in dataset)
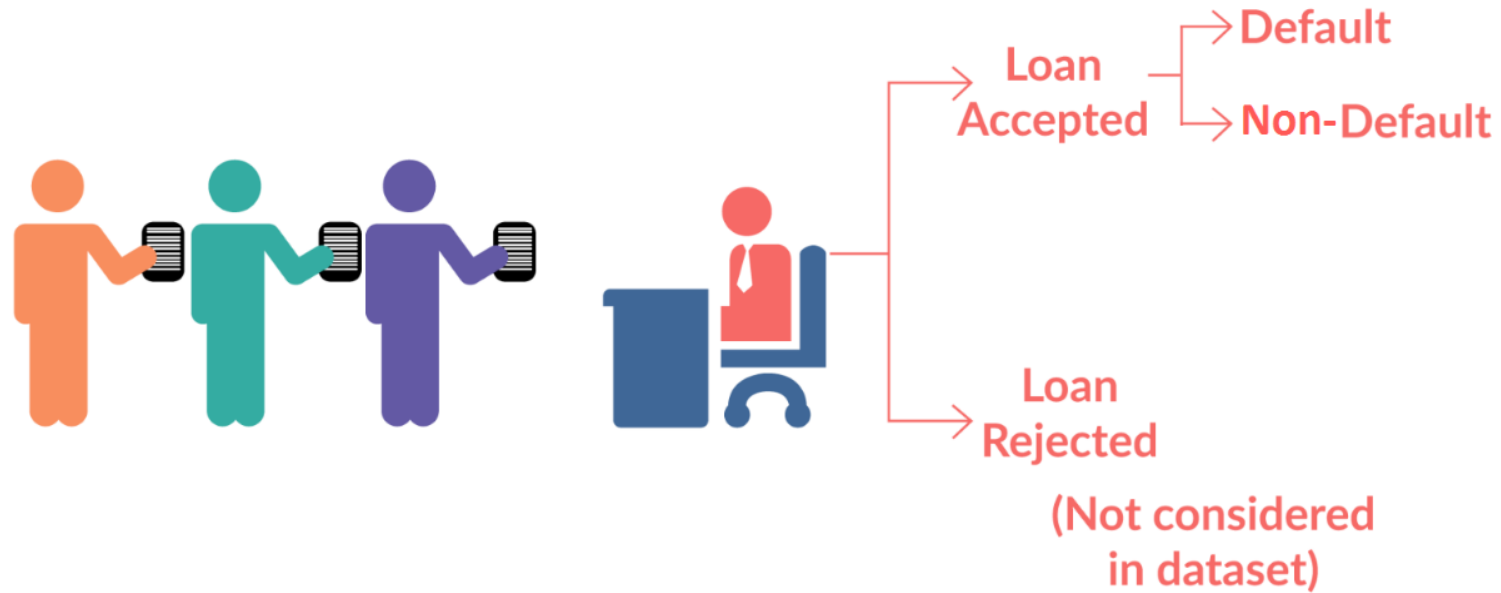
When a person applies for a loan, there are two types of decisions that could be taken by the company:
-> Loan accepted
-> Loan rejected

Problem solving methodology

Data Understanding

Data Cleaning

Exploratory Data Analysis
(Performed Univariate, Univariate Segmented & Multivariate analysis)

Data Understanding

The Dataset provided contains the complete loan data for all loans issued through the time period 2007 t0 2011.

Along with the data dictionary which describes the meaning of the variables in Data set.

It contains information about past loan applicants and whether they 'defaulted' or not.

Data Cleaning

Delete columns: Delete unnecessary columns.

Remove outliers: Remove high and low values that would disproportionately affect the results of your analysis.

Missing values: Treat missing values with appropriate approach.

Duplicate data: Remove identical rows, remove rows where some columns are identical.

Filter rows: Filter by segment, filter by date period to get only the rows relevant to the analysis.

Data Preparation

The main motive of this use case is to find what parameters are impacting Loan Status the most i.e., if an applicant will successfully complete the loan term or default.

So, we will be using a new term Percentage of Charged Off that will be equal to:

Percentage of Charged Off = (Number of Applicants Charged Off / Total No. of Applicants)*100

We will calculate this percentage w.r.t each column in bivariate analysis & will see how the Percentage of Charged Off changes with these columns.

Loan Amount Distribution

Observations: From the above plots, a greater number of people took loan amount of 10000, and median of distribution is 10000. And very few people took more than 30000 loan amount.


Loan Amount distribution
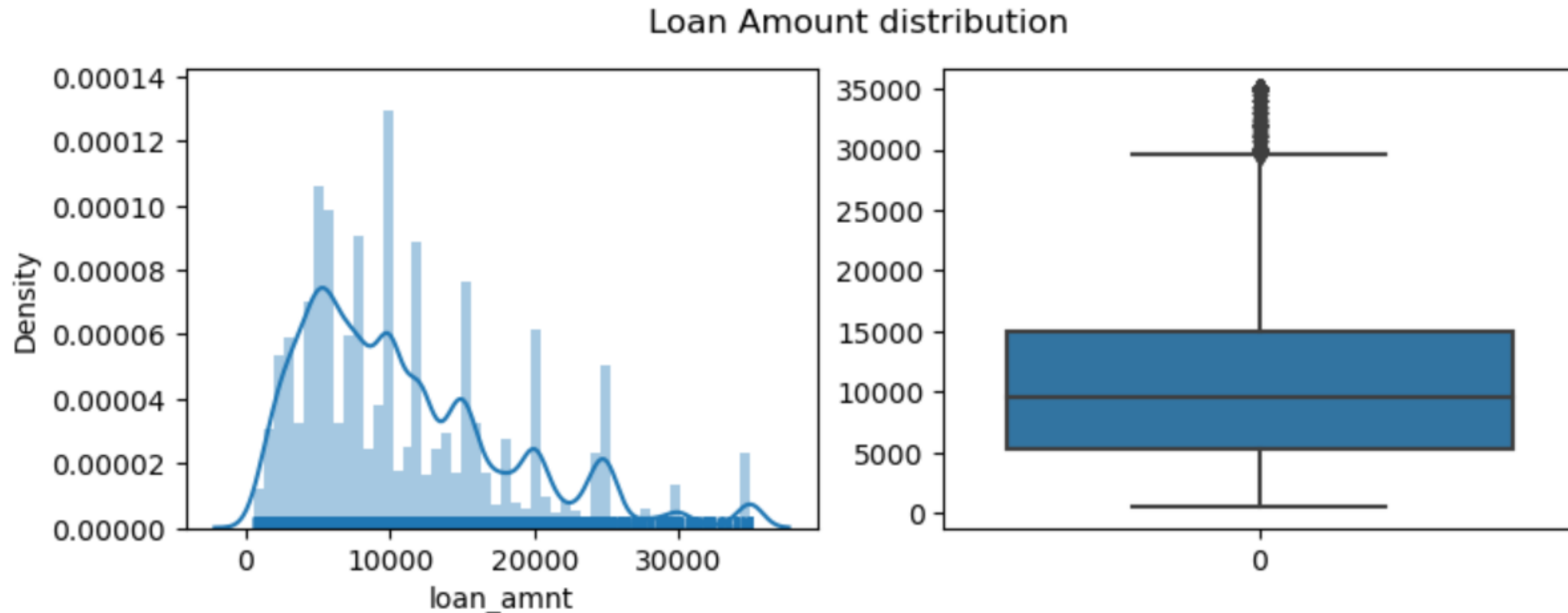
Interest Rate Distribution

Observations: From the above 2 plots and statistics of interest rates we can conclude that most of the interest rates lies between 9% to 14.5%. Some people took loan at higher rates of interest i.e., 22.5%


interest rate distribution
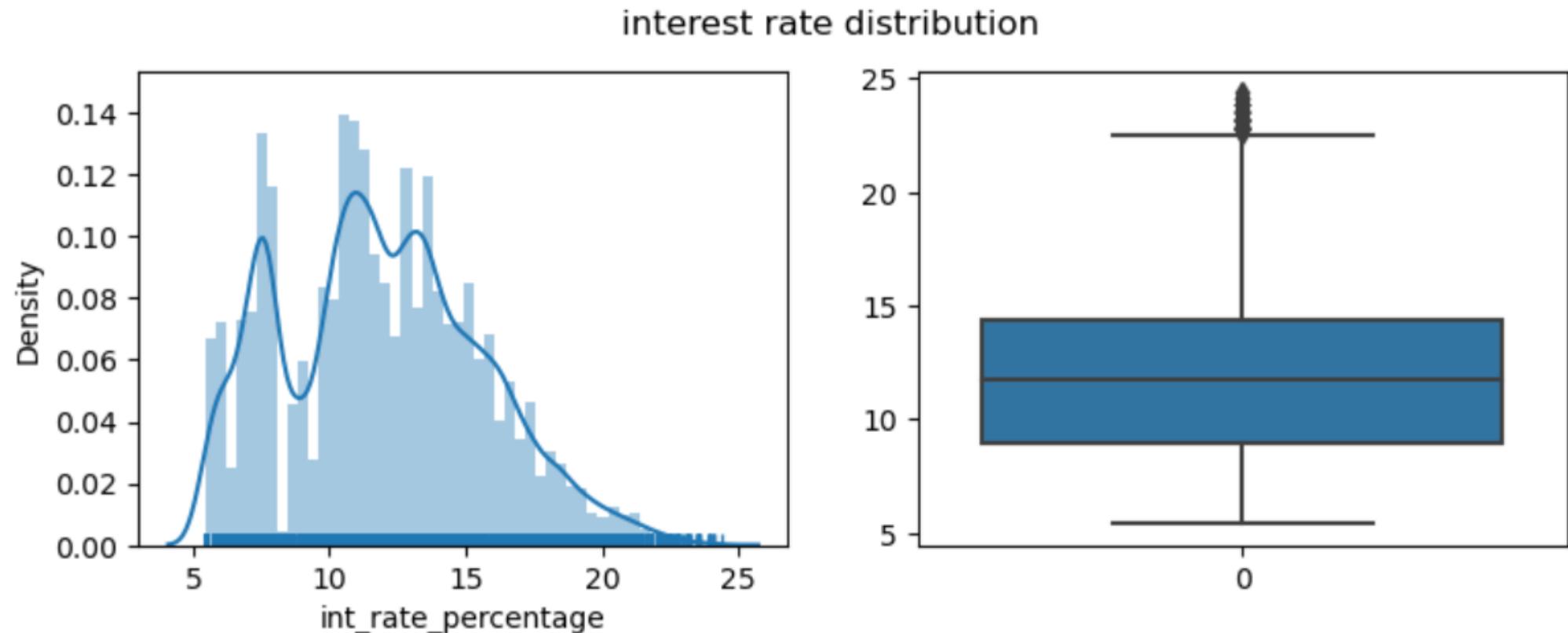
Verification Status

Observations: Majority of loans were given without verification of applicant's income.
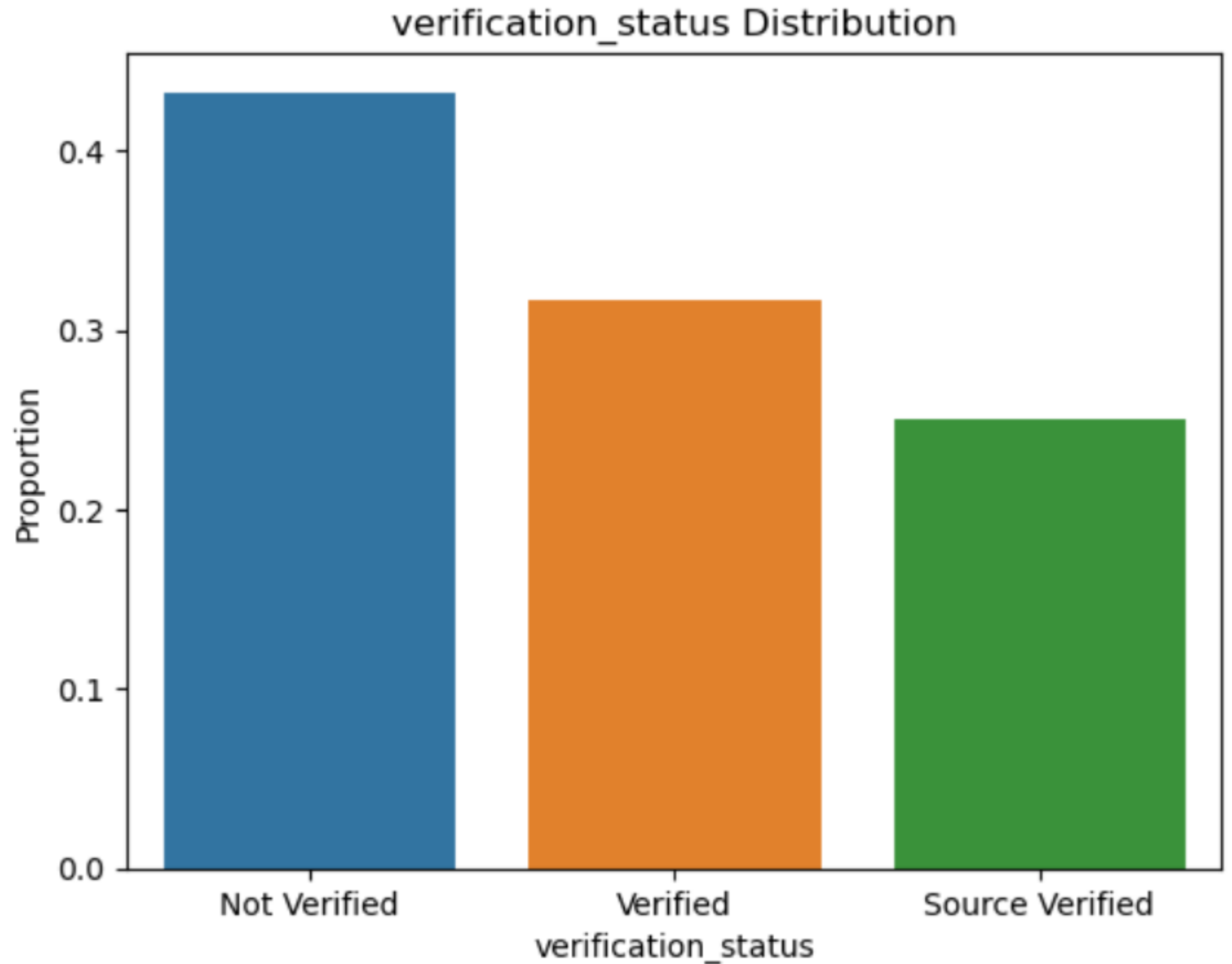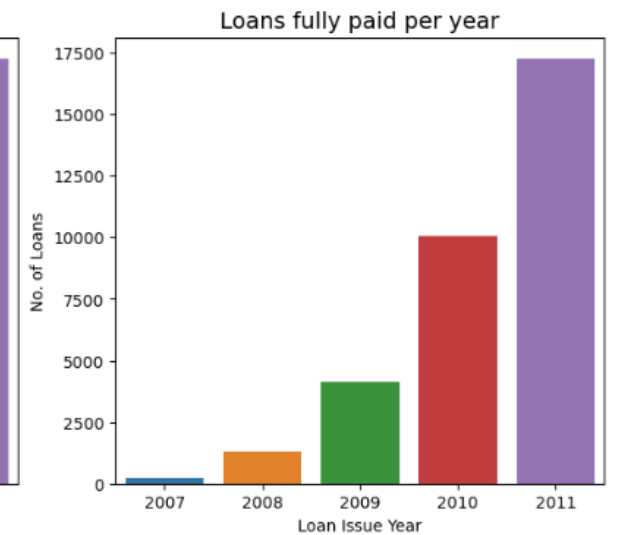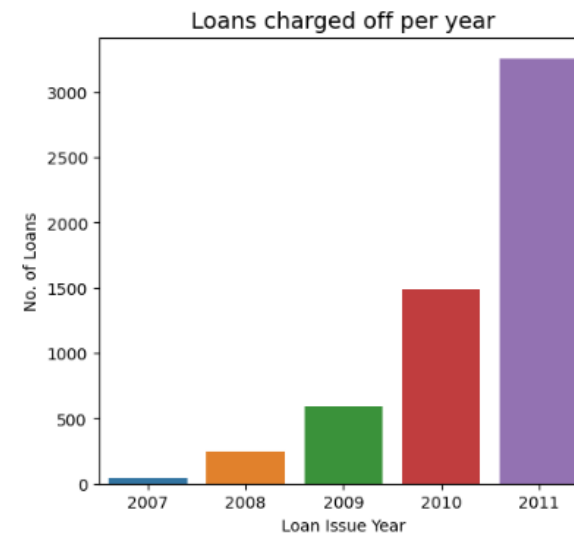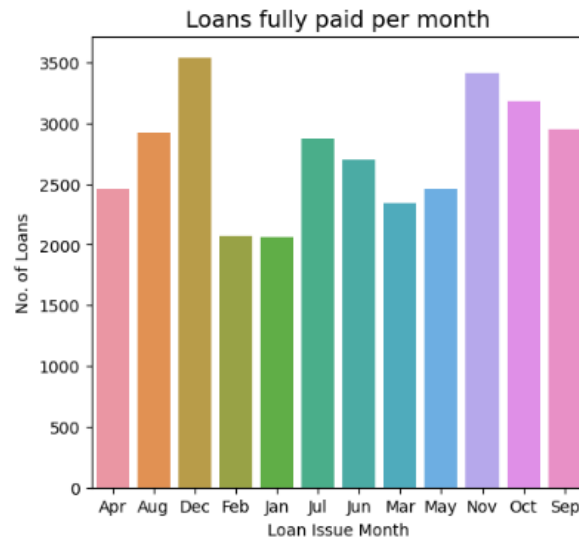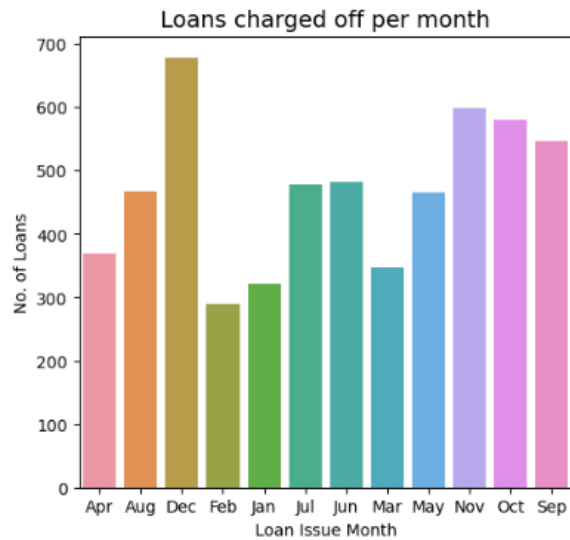
Loan Status Distribution

The above plot gives the overall idea of the loan classification count, it shows that more than 30000 loans are fully paid while close to 5000 loans are charged off. About 85% of borrowers has paid the loan fully whereas around 14% have loan default.
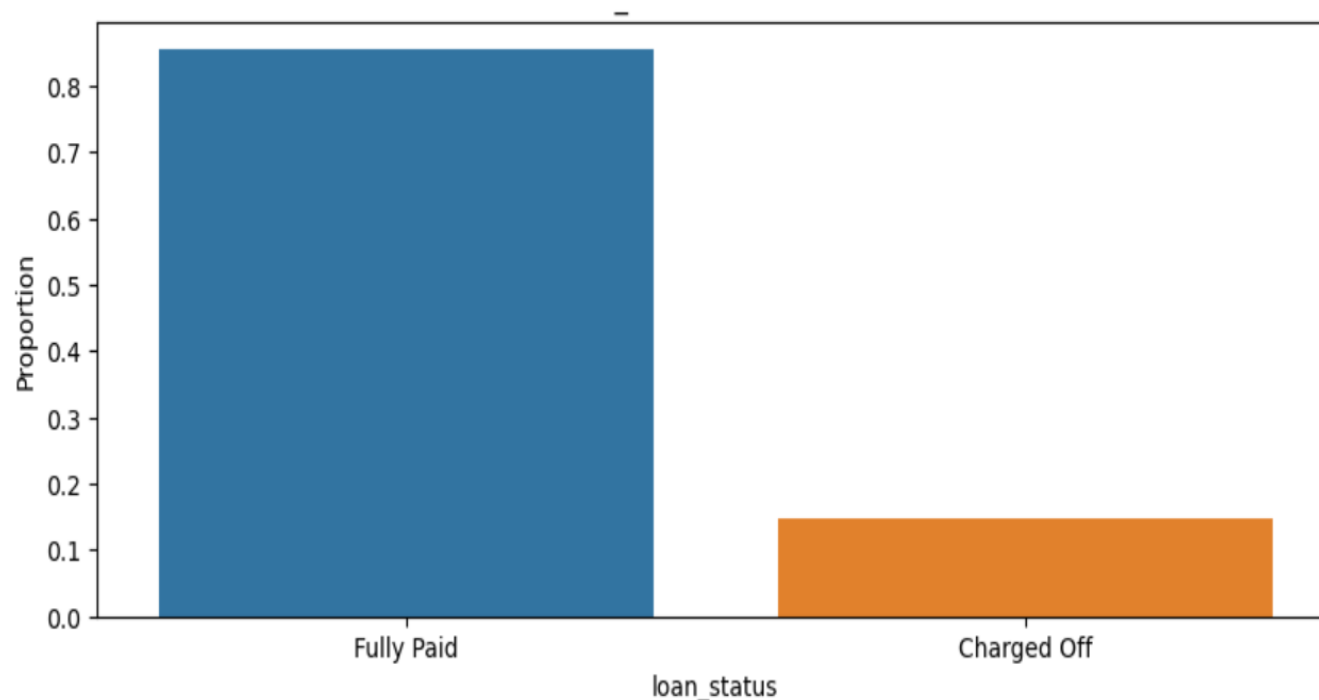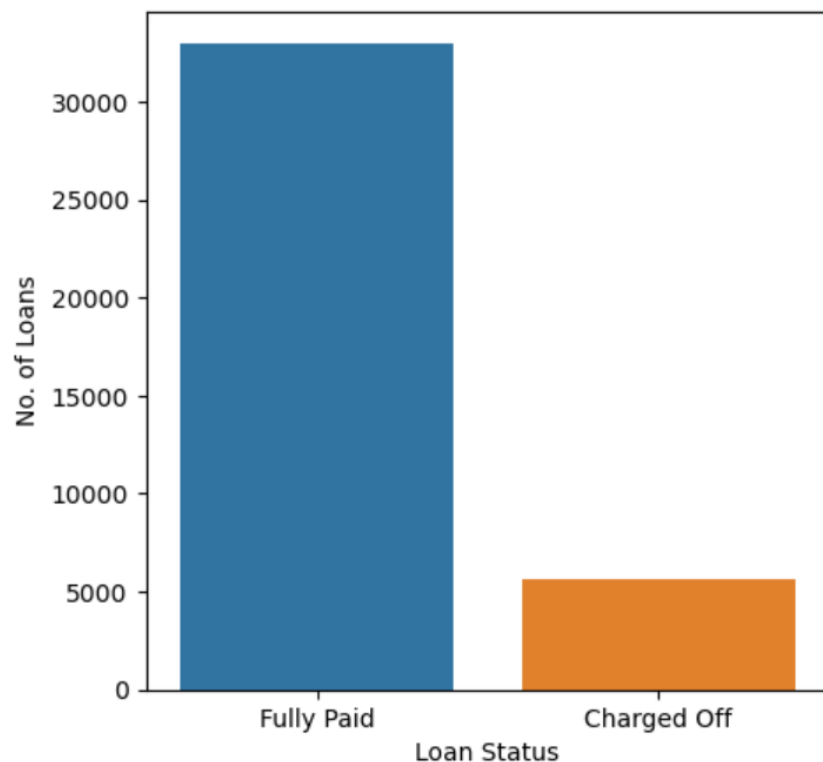
Year Wise and Month Wise Distribution of charged-off and fully paid loans

Year Wise and Month Wise Distribution of charged-off and fully paid loans

Observations:

- No of loans given out by lending club is increasing at almost twice the rate every year, with 2011 having the highest number of loans.

- The month-wise trend shows that most loans are fully paid as well as charged off as the year comes to an end, maximum in the month of December clearly stating the importance of year-end.

- There are more issues of loan in last 3 months every end of the ear i.e., Oct, Nov and Dec.

Loan Status vs Interest Rate

Observations: This clearly tells us, grater the interest rate more the chance of defaulting the loan.


loan_status vs Interest Rate
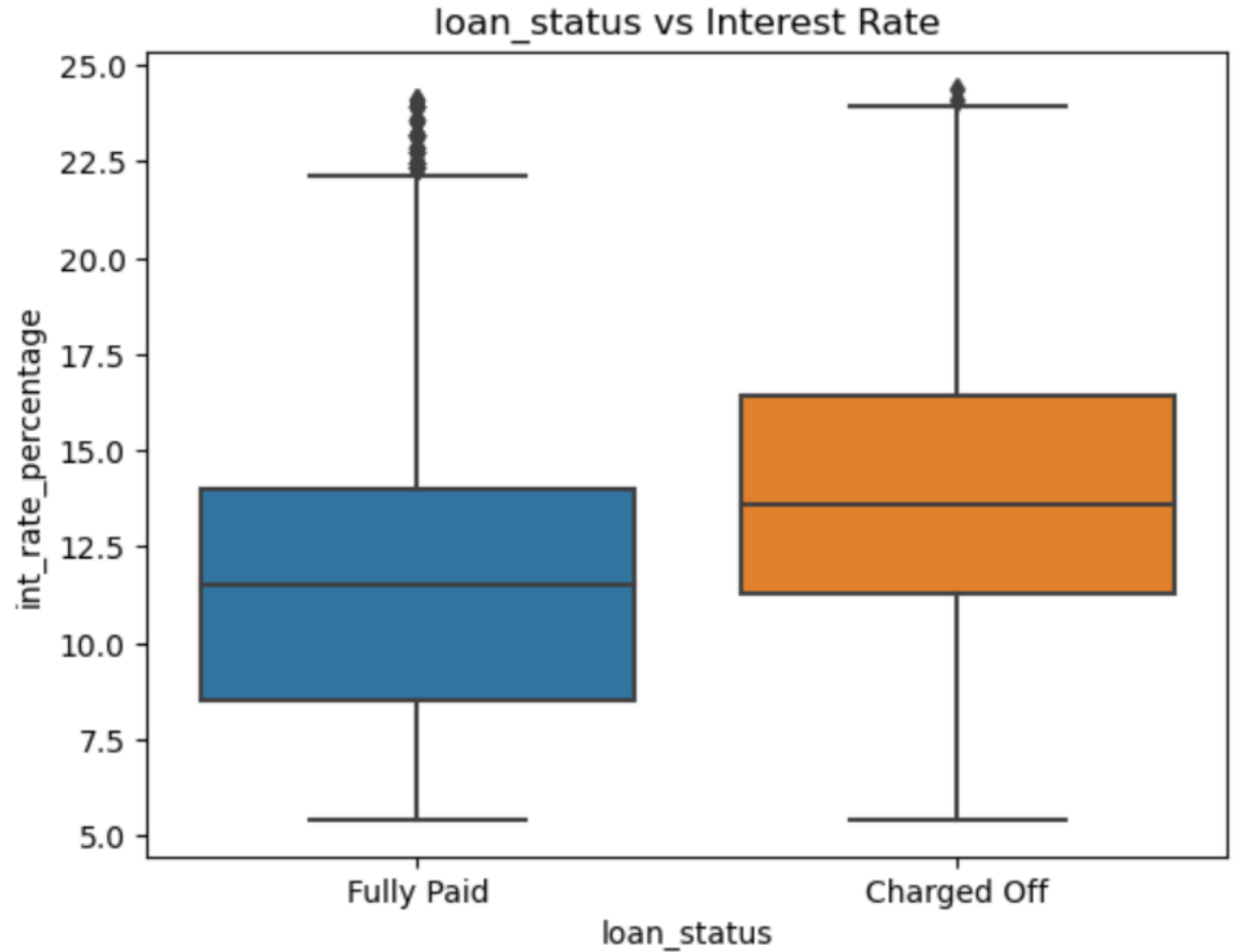
Purpose of loan w.r.t % of loans charged off and no. of loan applicants

- Maximum no. of loans i.e., 18055 are accepted for the purpose of Debt Consolidation out of which 15288 are fully paid and 2767 are charged off i.e., 15.32% charged off.

- Maximum % of a loan being charged off is for the purpose of small business is 27.1. charged off.

loan_status purpose	Charged Off	Fully Paid	All	Percentage_Charged Off
car	160	1339	1499	10.67
credit_card	542	4485	5027	10.78
debt_consolidation	2767	15288	18055	15.32
educational	56	269	325	17.23
home_improvement	347	2528	2875	12.07
house	59	308	367	16.08
major_purchase	222	1928	2150	10.33
medical	106	575	681	15.56
moving	92	484	576	15.97
other	633	3232	3865	16.38
renewable_energy	19	83	102	18.63
small_business	475	1279	1754	27.08
vacation	53	322	375	14.13
wedding	96	830	926	10.37

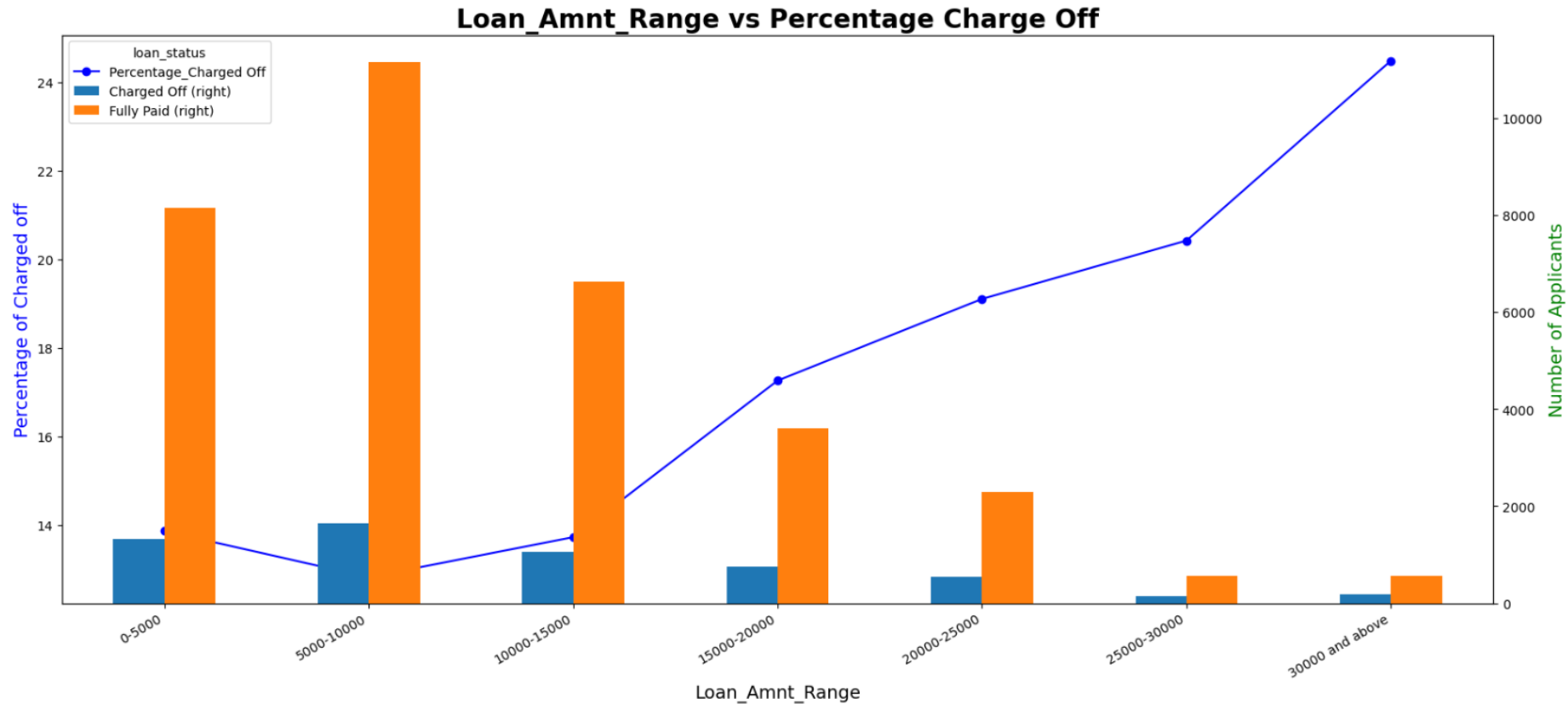**Purpose of loan w.r.t % of loans charged off and no. of loan applicants**

Right hand side marker is for number of loan applicants and left-hand side marker shows the percentage charged off
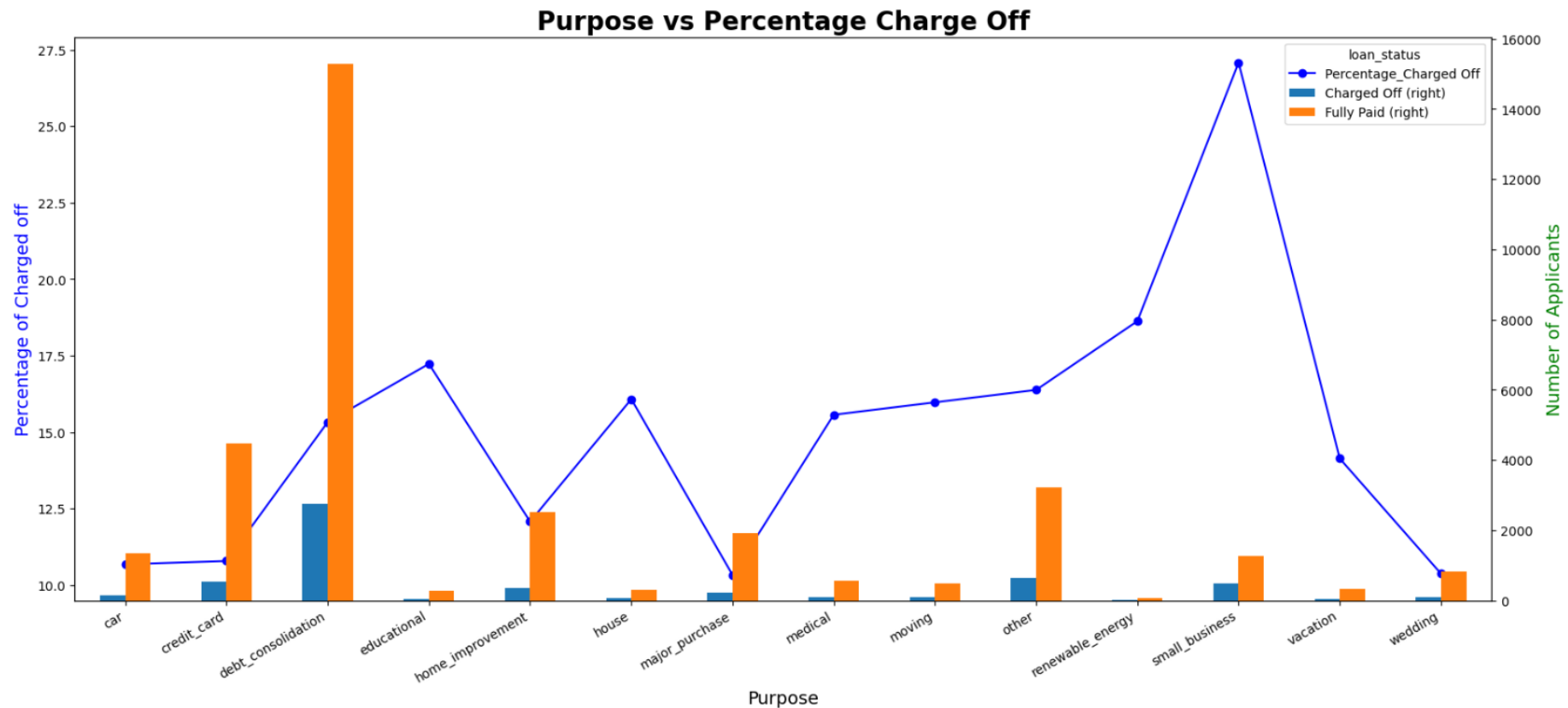
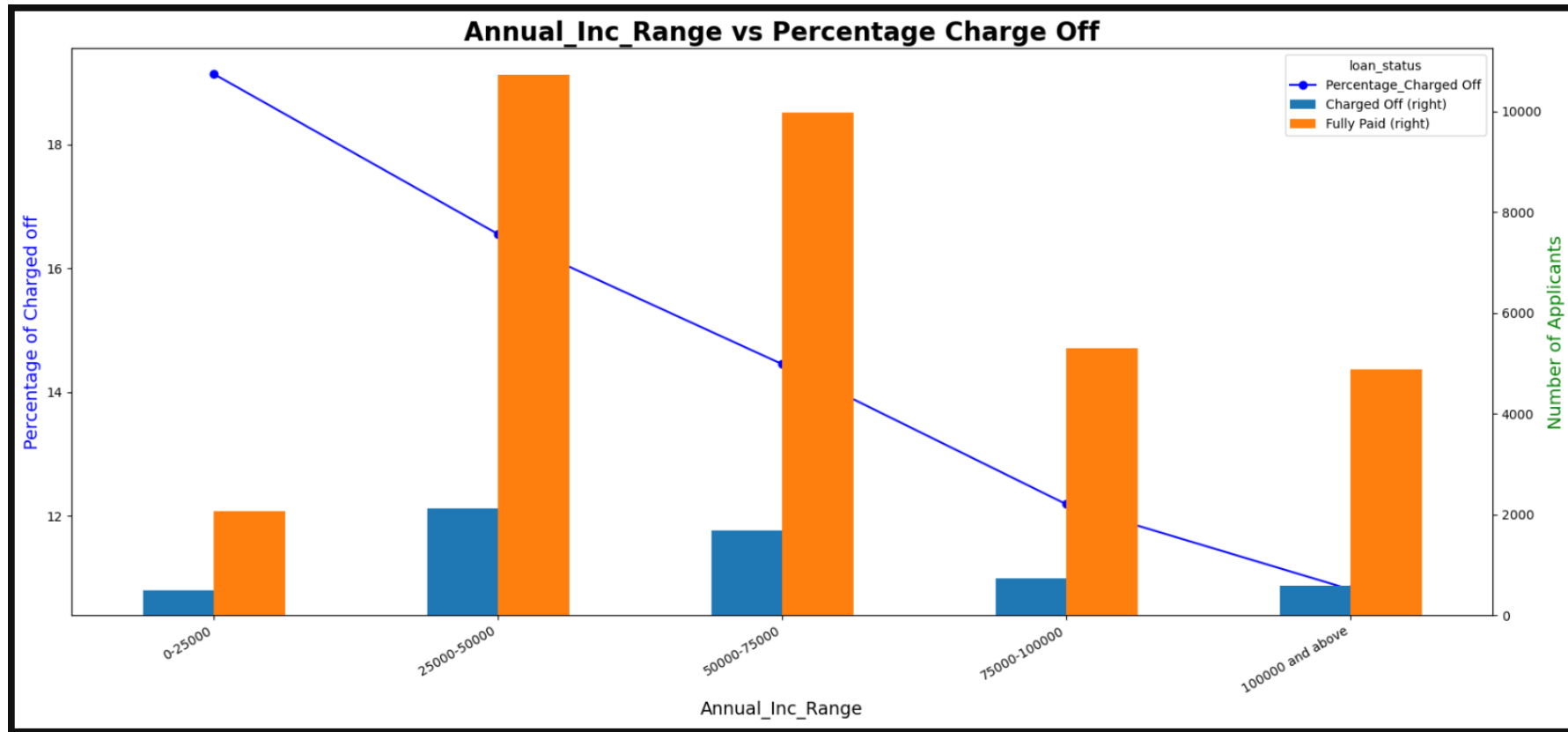# Loan amount w.r.t % of loans charged off and no. of loan applicants

Observations:

- Higher the loan amount higher is the chances of loan being charged off increases. It is maximum, 24.49% for $ 30,000 and above

- The maximum no. of loans, 12802 are applied where the loan amount ranges between $5000 and $10000.

Loan_Amnt_Range vs Percentage Charge Off

Annual Income Range w.r.t % of loans charged off and no. of loan applicants
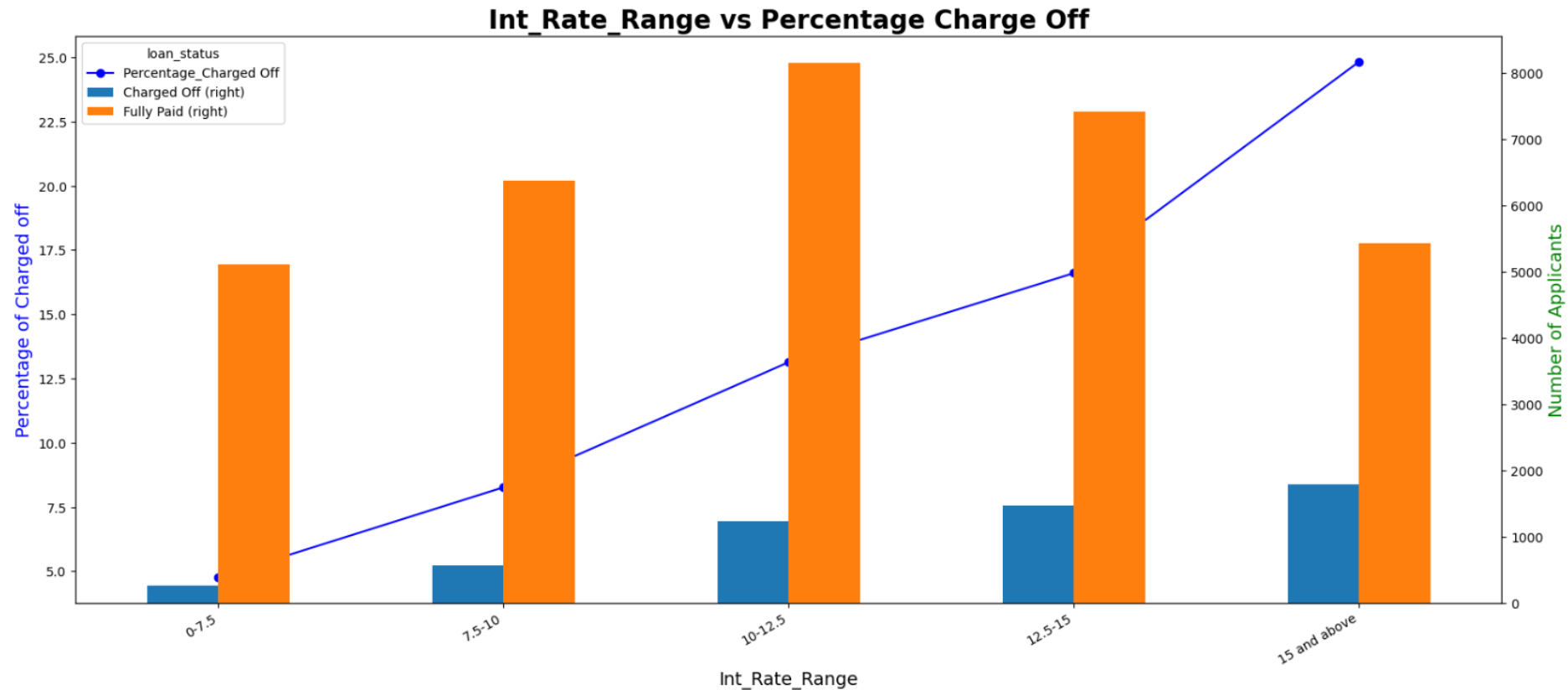
Observation:

- The % of loan getting charged off is inversely proportional to the Annual income. higher the income lower are the chances of loan getting charged off.

- It is lowest for max income i.e., 100,000 and above and highest for min income i.e., 25,000 and less.

- The income group which has applied for maximum loan are applicants with annual income between 25,000 to 50,000.

Interest Rate w.r.t % of loans charged off and no. of loan applicants
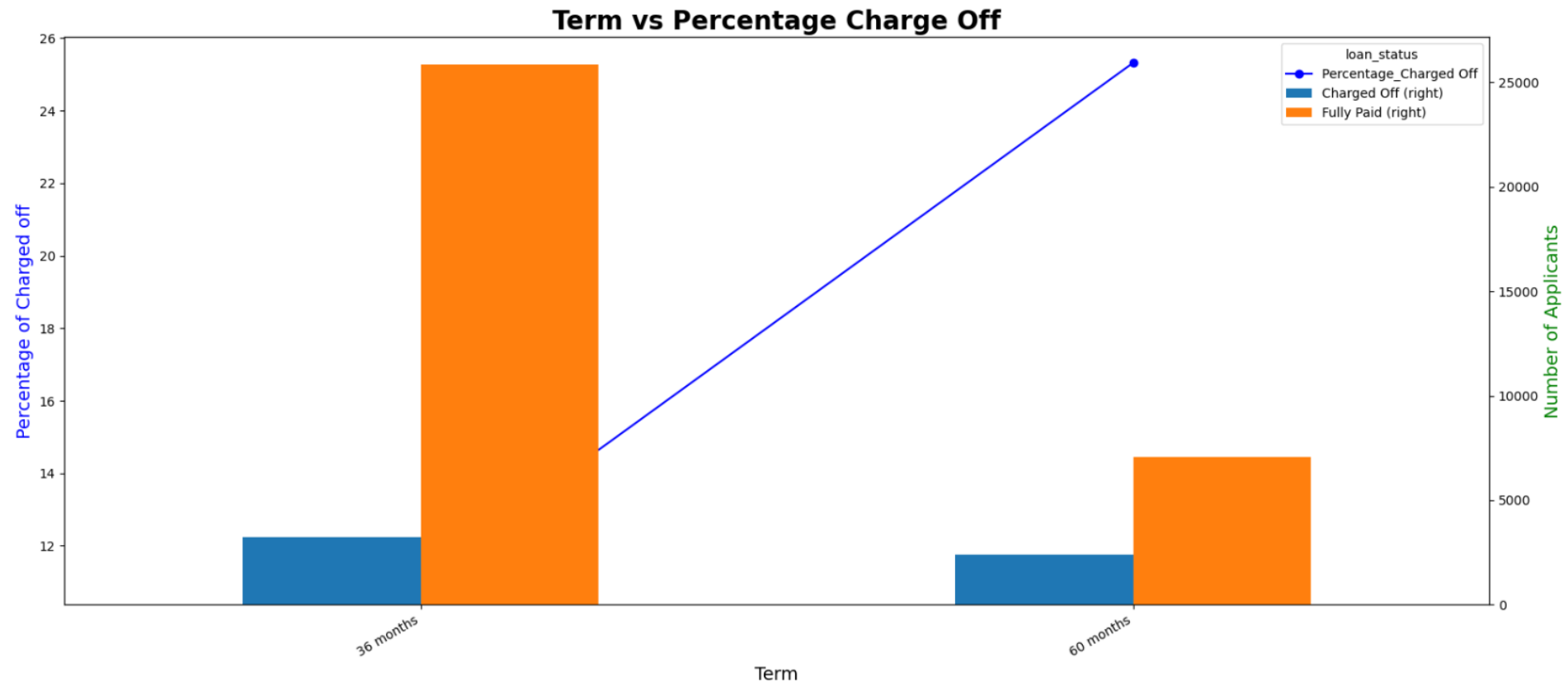
Observation:

- The % of loan getting charged off is directly proportional to the Interest rate. Higher the Interest rate higher are the chances of loan getting charged off.

- It is lowest for min Interest rate of 7.5% and below and highest for max Interest rate i.e., 15% and above.

- The maximum loan are with 10-12.5% Interest rate.

Term w.r.t % of loans charged off and no. of loan applicants

Observations:

- % of loans getting charged-off for 60-month term i.e., 25.31% is higher as compared to 36-month term i.e., 11.9%

- Total no. of loan applications are very high for 36-month term as compared to 60-month term.

Term vs Percentage Charge Off

Final Observations and Recommendations

- Quarter 4 of the year gets the most loans being either fully paid or being charged off. Lending club must be vigilant during this quarter of the year.

- Loans should be accepted from whose annual income is greater than 100000. While the number of applicants with high annual income is less, the LC could avoid loan requests from low-income group as they have high probability of being charged off.

- Applications with higher loan amounts have high chances of being charged off, while most of the loan amounts fall in 5000-1000 range and it has the lowest percentage of charge off. Lending club should consider if loan amount is high or low for accepting a loan request.

- Lower grade loans have high chances of defaulting. Keen observation and surveillance should be there for low grades.

Final Observations and Recommendations

- Just like the loan amount, high interest rates are also linked with higher chances of loans being charged off. The safest being 0 - 7.5% rates. The LC should consider and probably avoid loan applications with high loan amount and high interest rates.

- Similarly, the loan term is also a contributing factor along with above two (Amount and Rate), higher terms have led to higher charged off percentage. Loan with term of 36 months should be accepted.

- The purpose of loan can also be a deciding factor, most loans are taken for 'Debt Consolidation', but the highest loans charged off are for Small Businesses,

- While accepting loan for Car, Credit Cards, home improvement, major purchase and weddings is highly recommended.

- Loan application for Small Business should be verified properly before accepting.