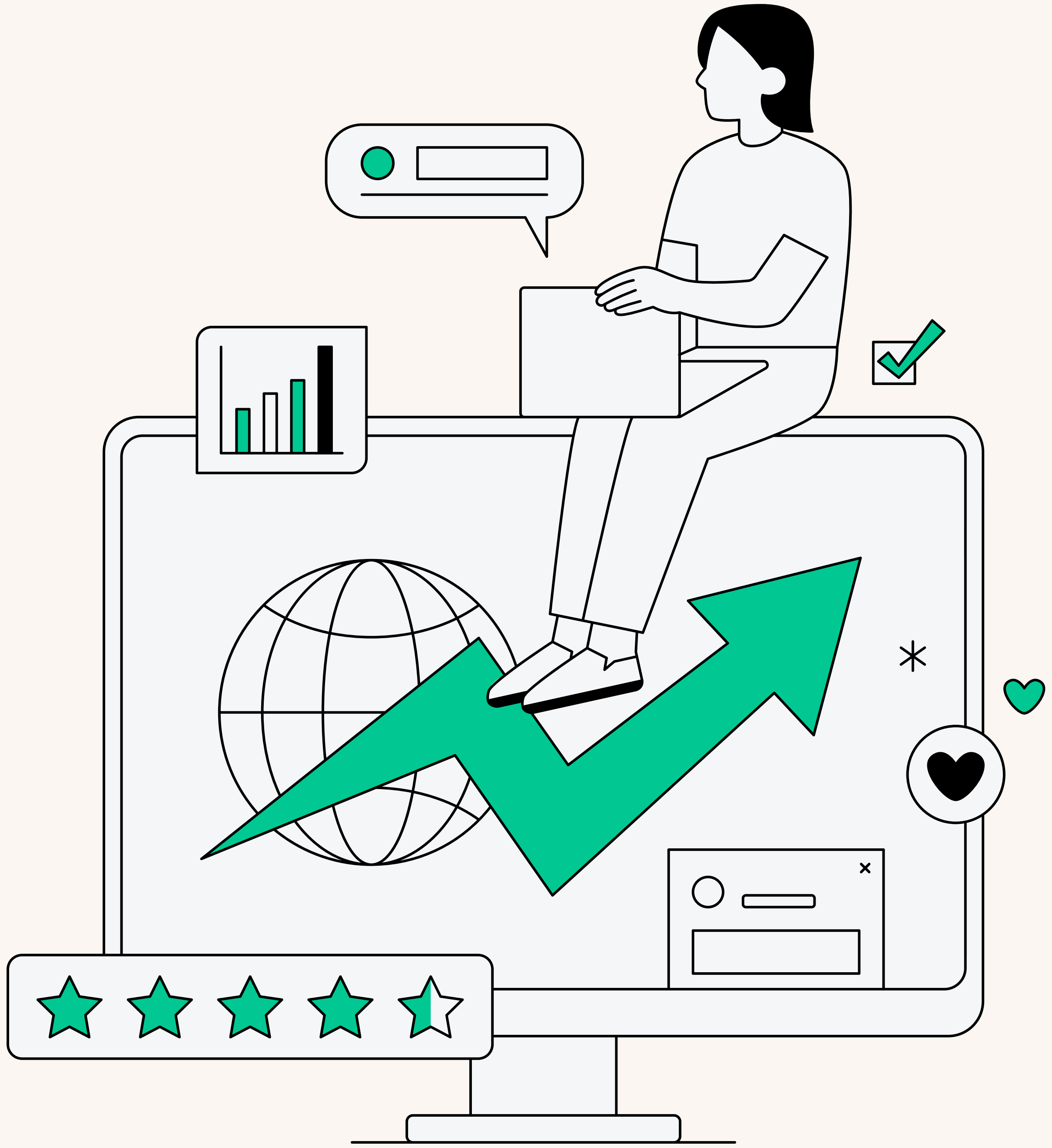
Presented by Akbar Khan and Amit Sharma

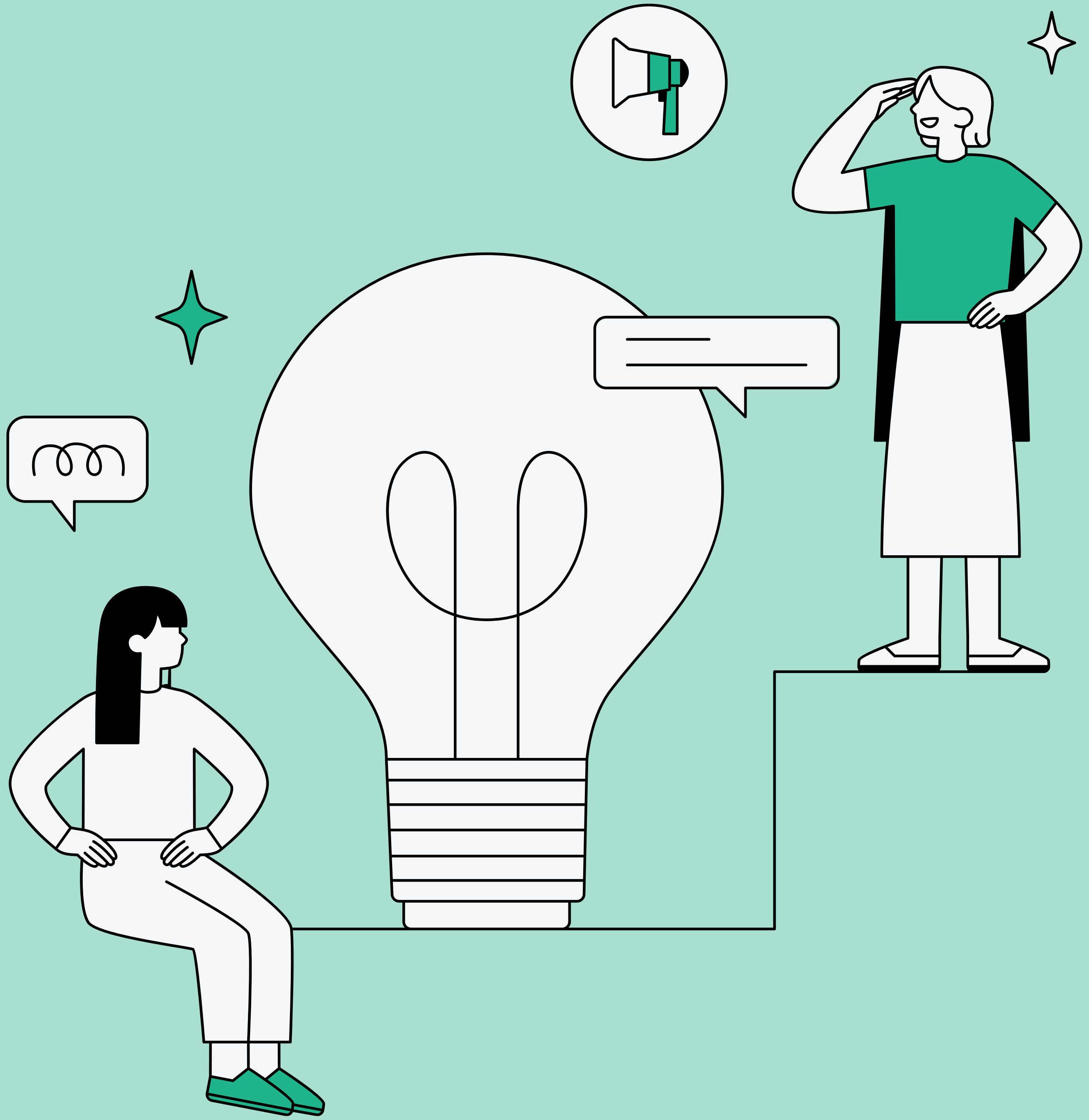
Lending Club Case Study

Trends, Challenges & Results



Problem Statement

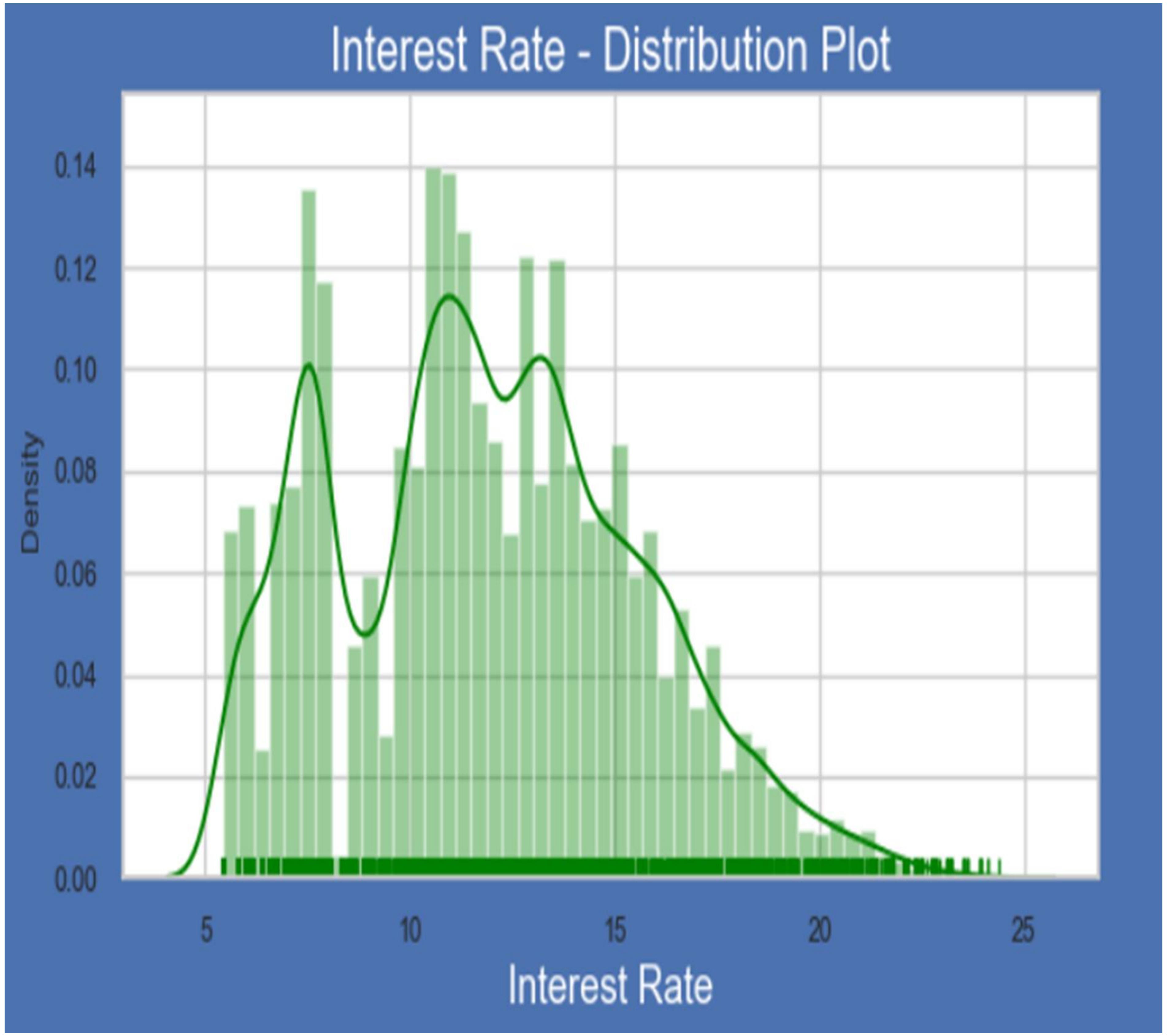
- Lending Club company is the largest online loan marketplace, facilitating personal loans, business loans, and financing of medical procedures.
- Borrowers can easily access lower interest rate loans through a fast online interface.
- Develop a basic risk analytics and understand how this data can be used to minimize the risk of losing money while lending to customers.
- Our main aim is to identify patterns which indicate if a person is likely to default, to facilitate decision making such as denying the loan, reducing the amount of loan, lending (to risky applicants) at a higher interest rate, etc.

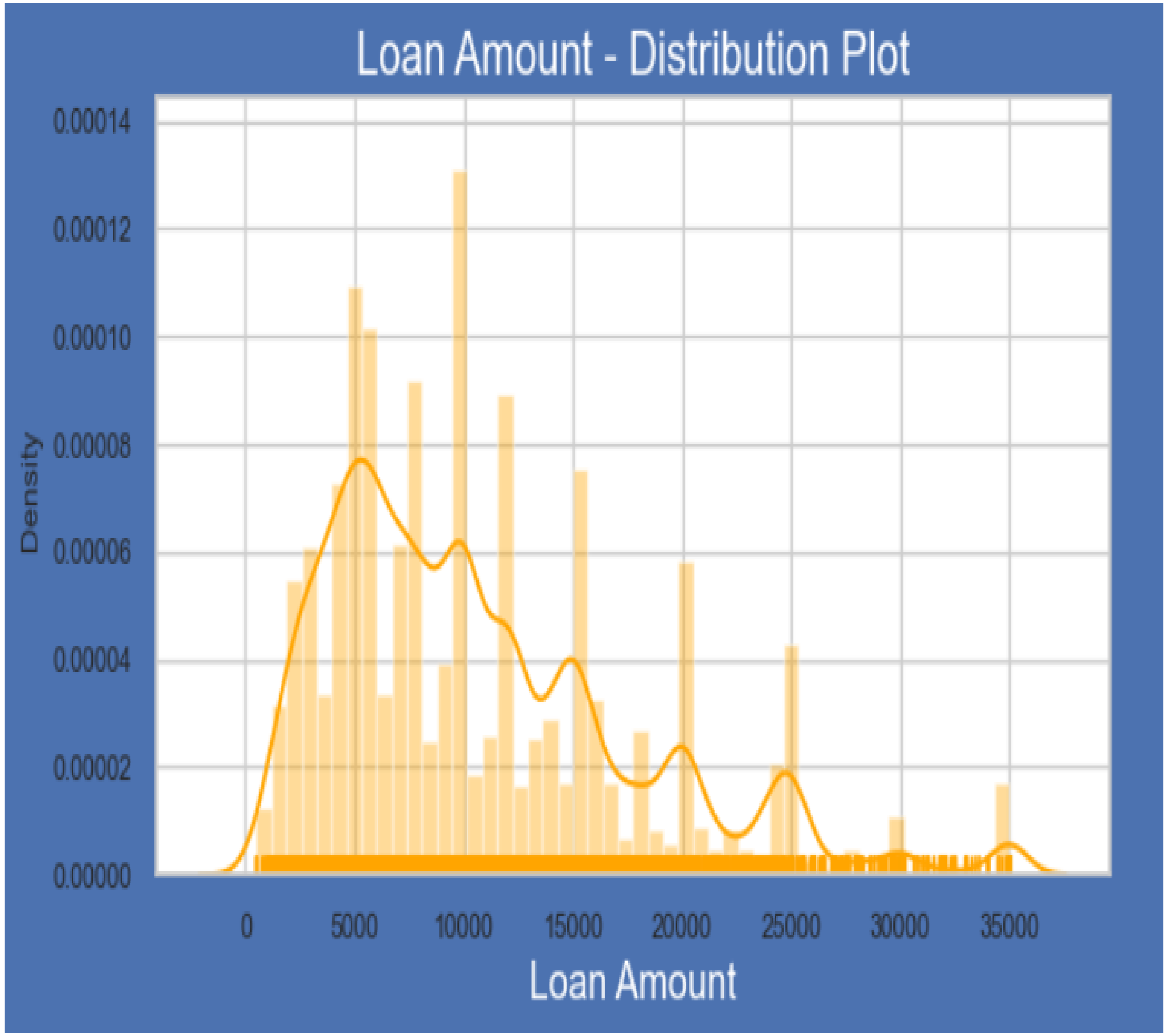


Methodology used in the analysis

- Lending Club dataset contained 39717 rows and 111 columns before the data cleanup activity
- After removing null value rows and columns, and unnecessary variables, that have no influence on loan defaulting, we are now left with 28 relevant columns
- Our analysis has given us the below details basis Loan Status:
  - Fully Paid - 32949
  - Charged Off - 5626
  - Current - 1140

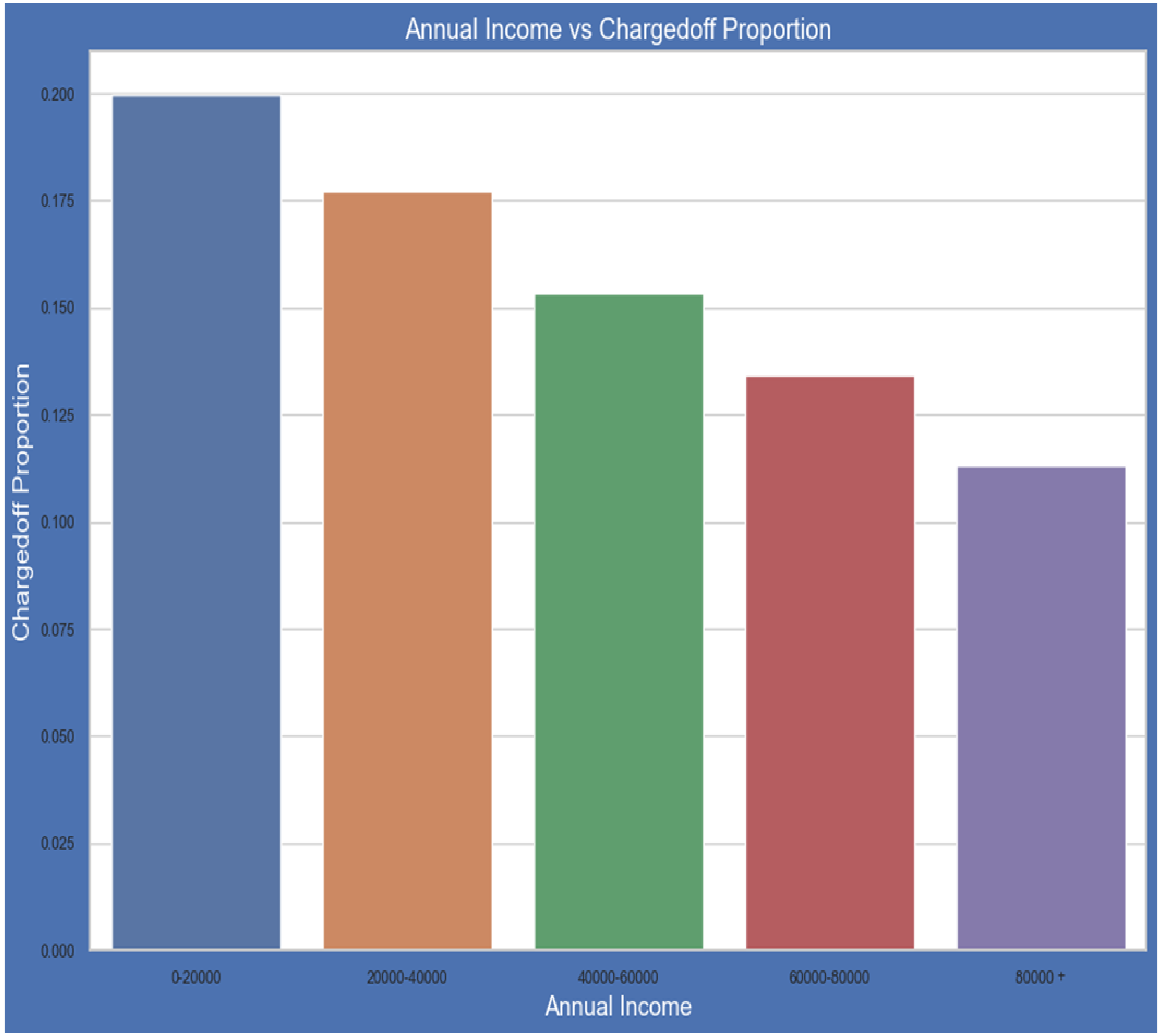
Data Cleaning	• Removed all null value columns, unnecessary variables • Checked all null value percentage and remove the respective rows.
Data Understanding	• Utilized Data Dictionary to gain insights into each column and their specific applications in the domain
Univariate Analysis	• Analyzed, Examined each column and visualized the distributions of each column
Segmented Univariate Analysis	• Examined the continuous data columns in relation to the categorical column
Bivariate Analysis	• Examined the behavior of two variables, namely term and loan status, in relation to the loan amount
Recommendations	• Evaluated all visualizations and suggested ways to minimize business losses by identifying the most influential columns that contribute to loan defaults

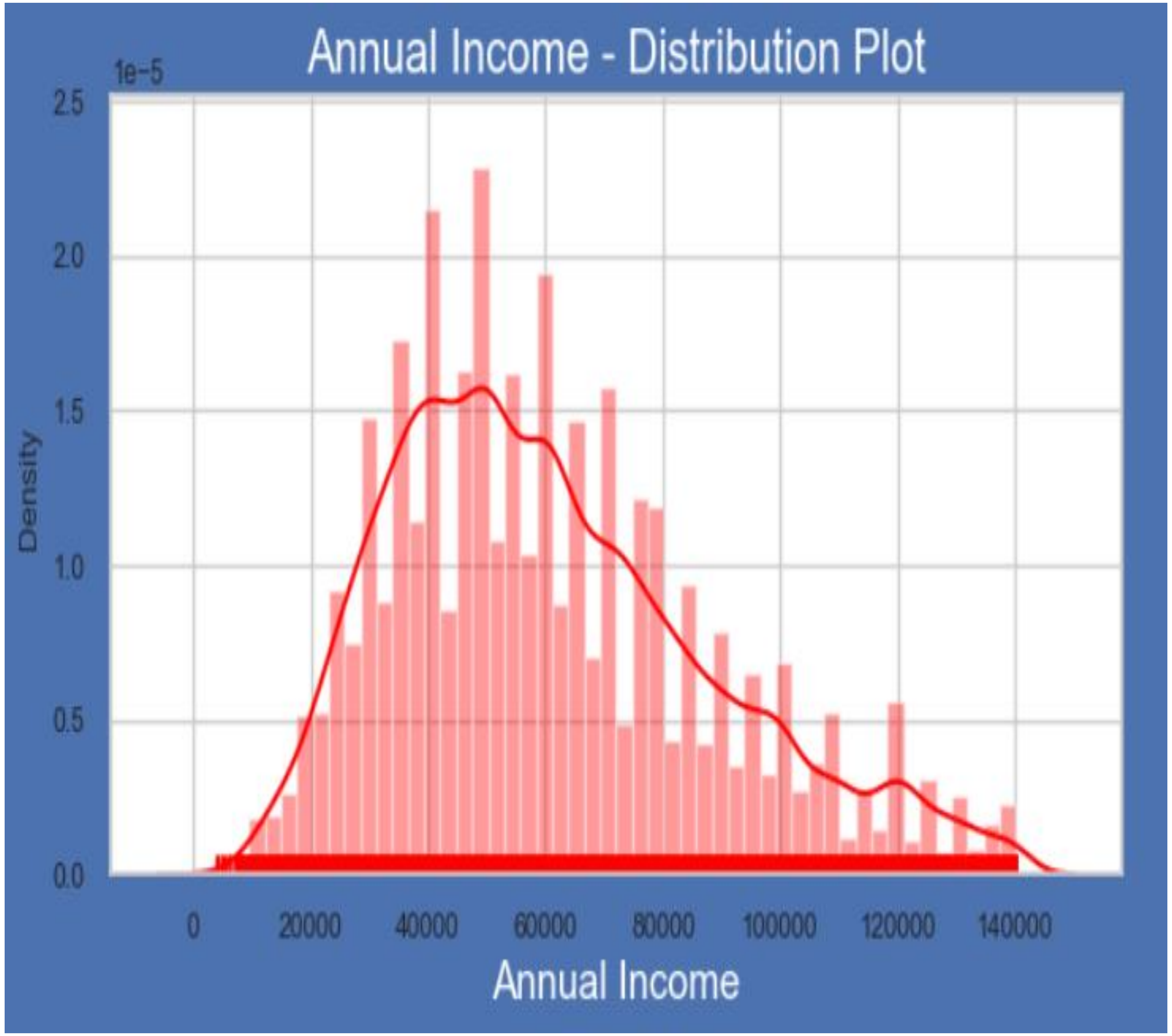




Most of the Interest Rates on loans are in range of 10% - 15%

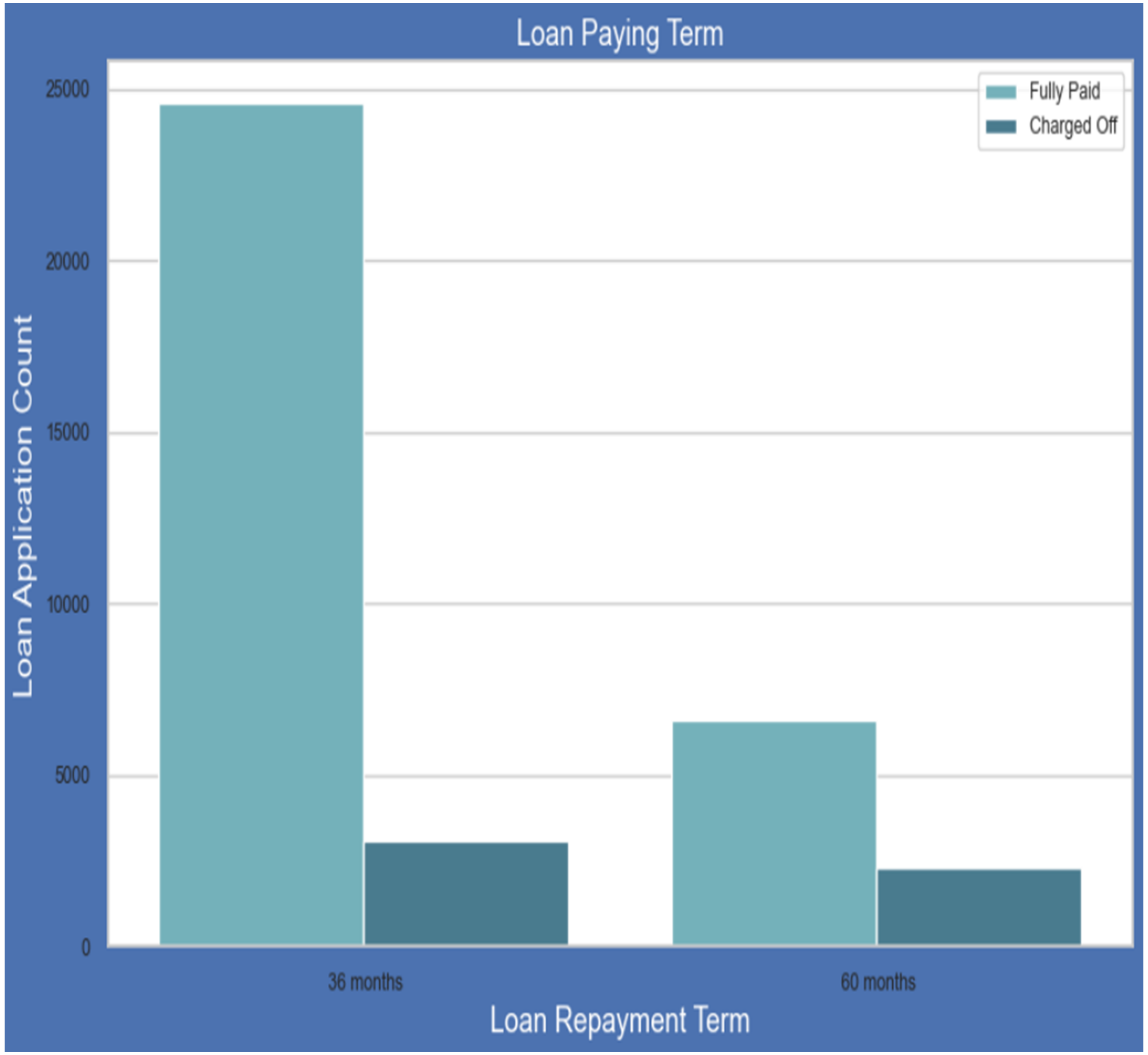
Most of the Loan amounts are in range of 5000 - 15000

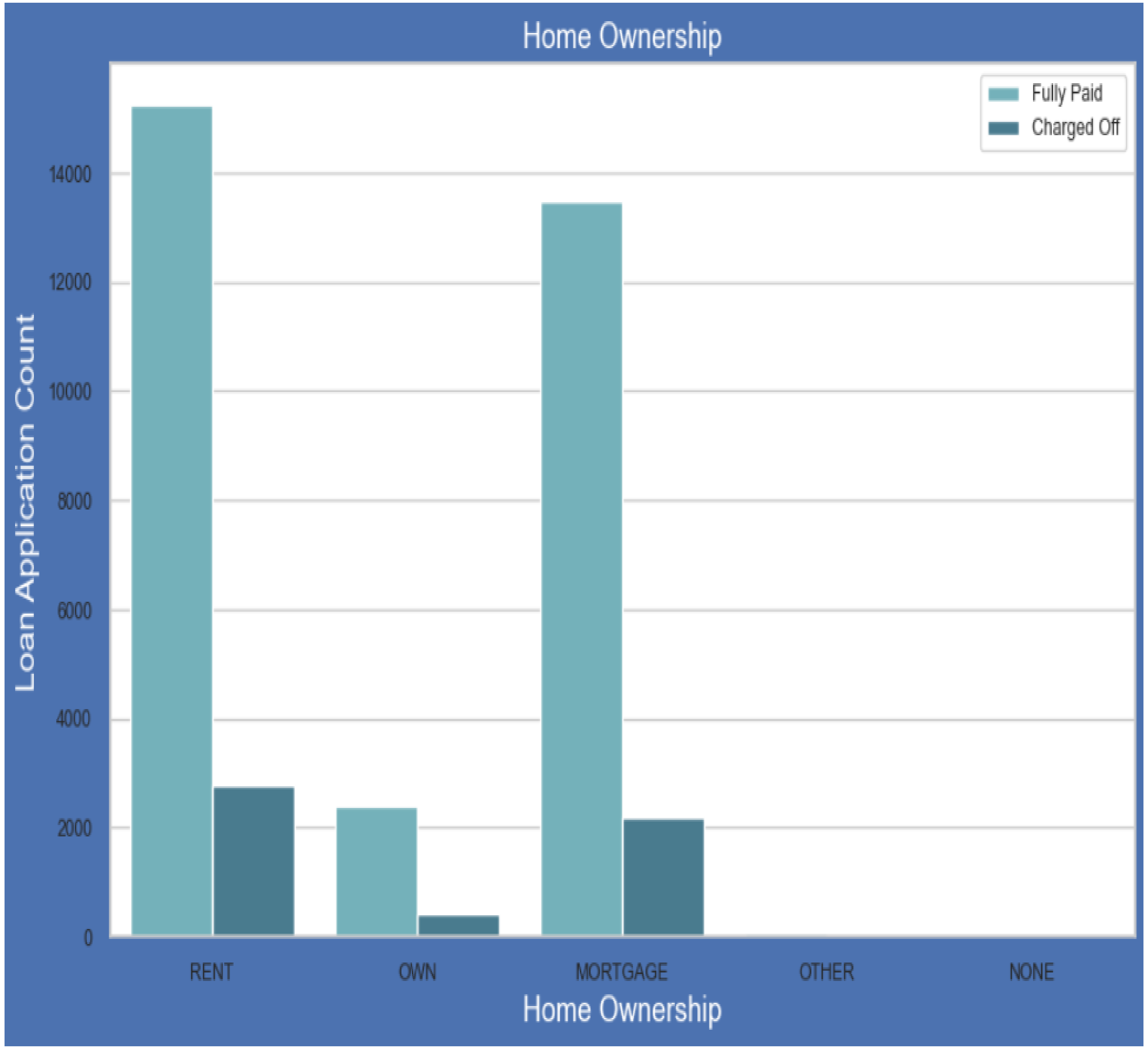




- Income range 80000+ has less chances of charged off.
- Income range 0-20000 has high chances of charged off.
- Increase in annual income charged off proportion decreases

Most of the borrower's Annual incomes are in range of 40000- 80000

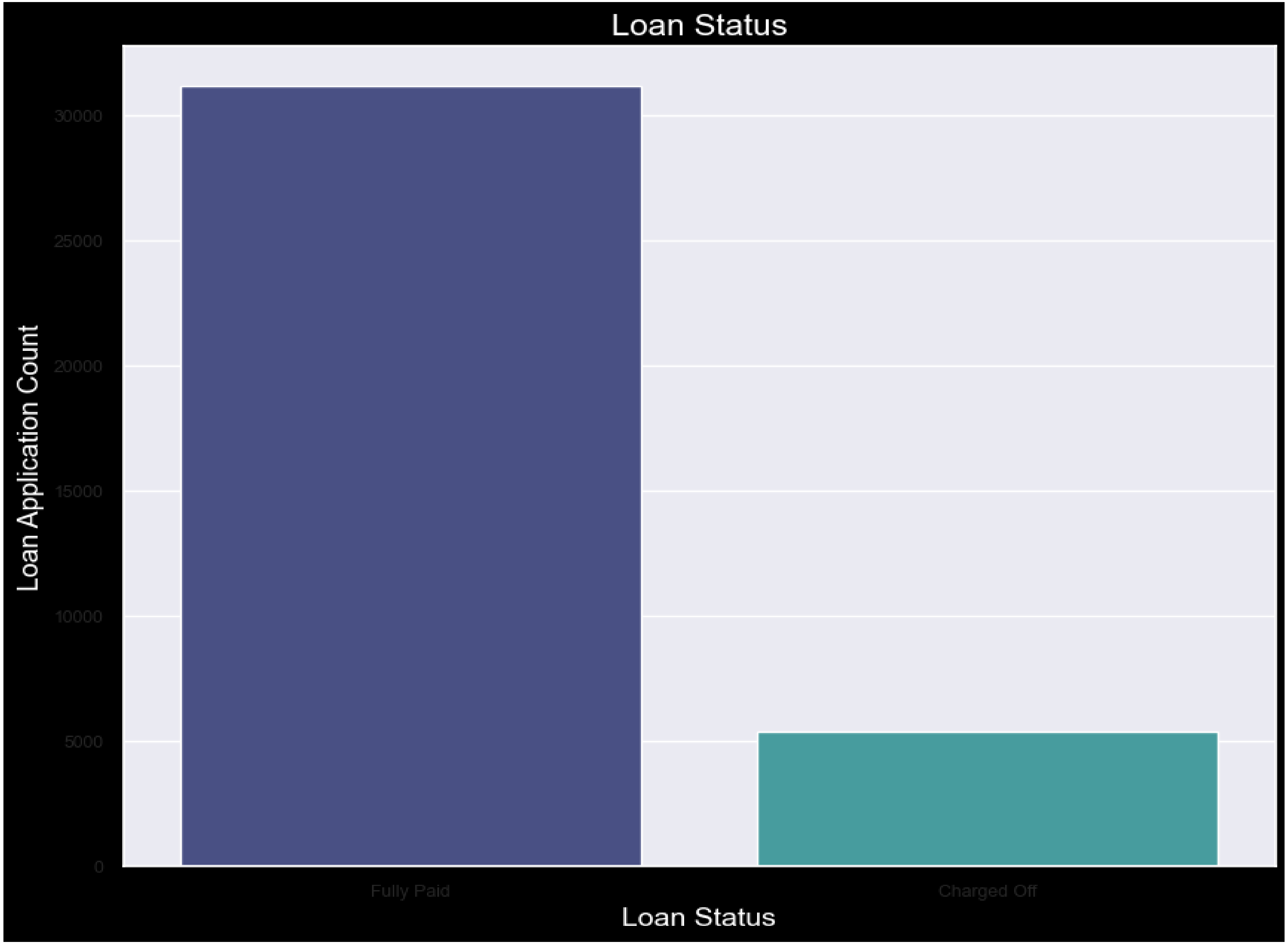


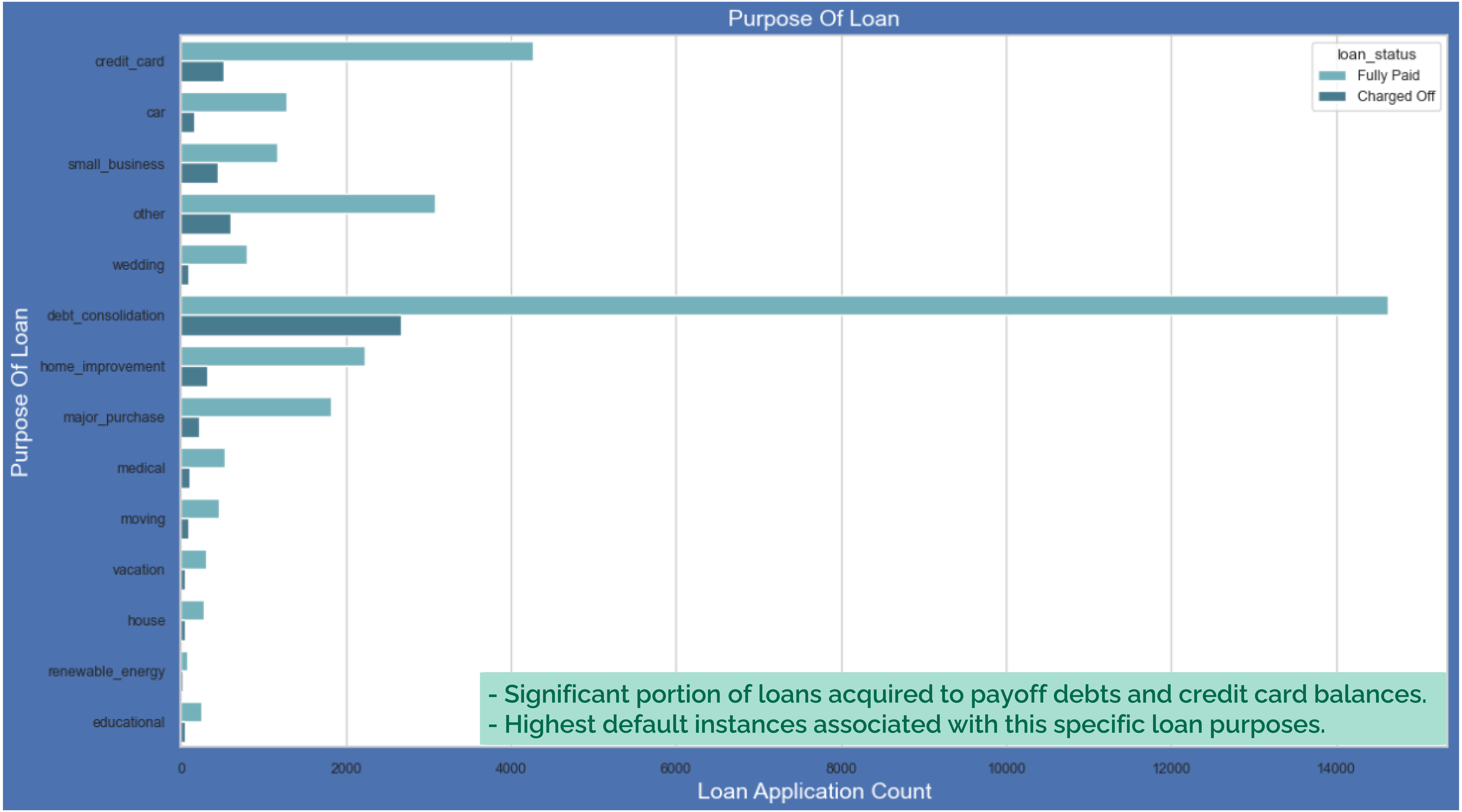


60 months repayment loan applicants had more % of charged off as compared to applicants who had taken loan for 36 months.

- Most of them living in rented home or mortgaged their home.
- Applicant numbers are high from these categories so charged off is high too.

14% loans were charged off out of total loan issued.

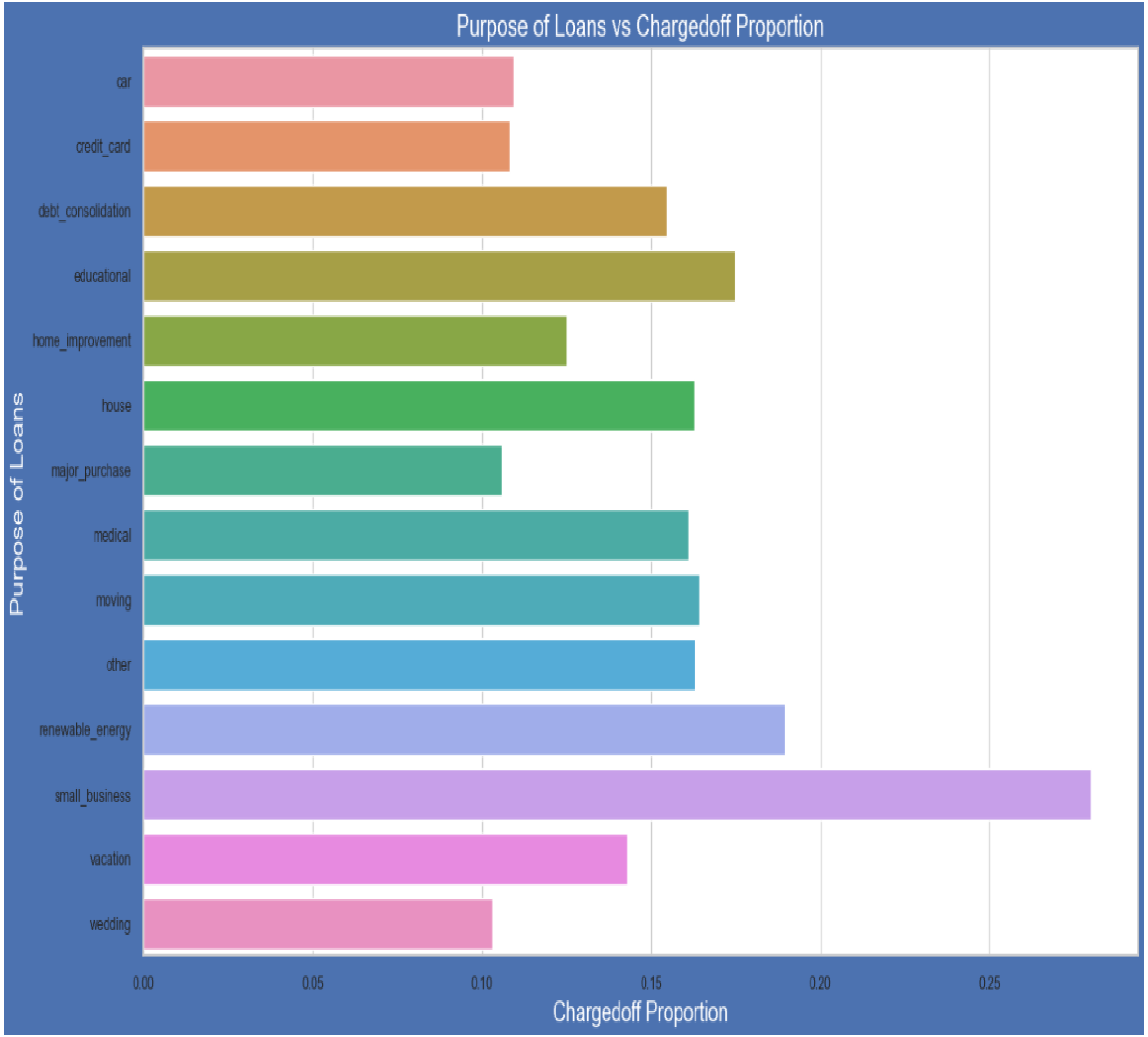



Purpose Of Loan
loan_status
Fully Paid
Charged Off
credit_card
car
small_business
other
wedding
debt_consolidation
home_improvement
major_purchase
medical
moving
vacation
house
renewable_energy
educational
Purpose Of Loan
0
2000
4000
6000
8000
10000
12000
14000
Loan Application Count
- Significant portion of loans acquired to payoff debts and credit card balances.
- Highest default instances associated with this specific loan purposes.

loan_status	purpose	Charged Off	Fully Paid	Total	Chargedoff_Proportion
11	small_business	454	1168	1622	0.279901
10	renewable_energy	18	77	95	0.189474
3	educational	54	255	309	0.174757
8	moving	90	458	548	0.164234
9	other	601	3085	3686	0.163049
5	house	55	283	338	0.162722
7	medical	103	536	639	0.161189
2	debt_consolidation	2672	14621	17293	0.154513
12	vacation	52	312	364	0.142857
4	home_improvement	319	2232	2551	0.125049
0	car	158	1288	1446	0.109267
1	credit_card	518	4264	4782	0.108323
6	major_purchase	216	1825	2041	0.105830
13	wedding	92	800	892	0.103139

- Small business loan applicants exhibit a higher likelihood of loans being charged off.

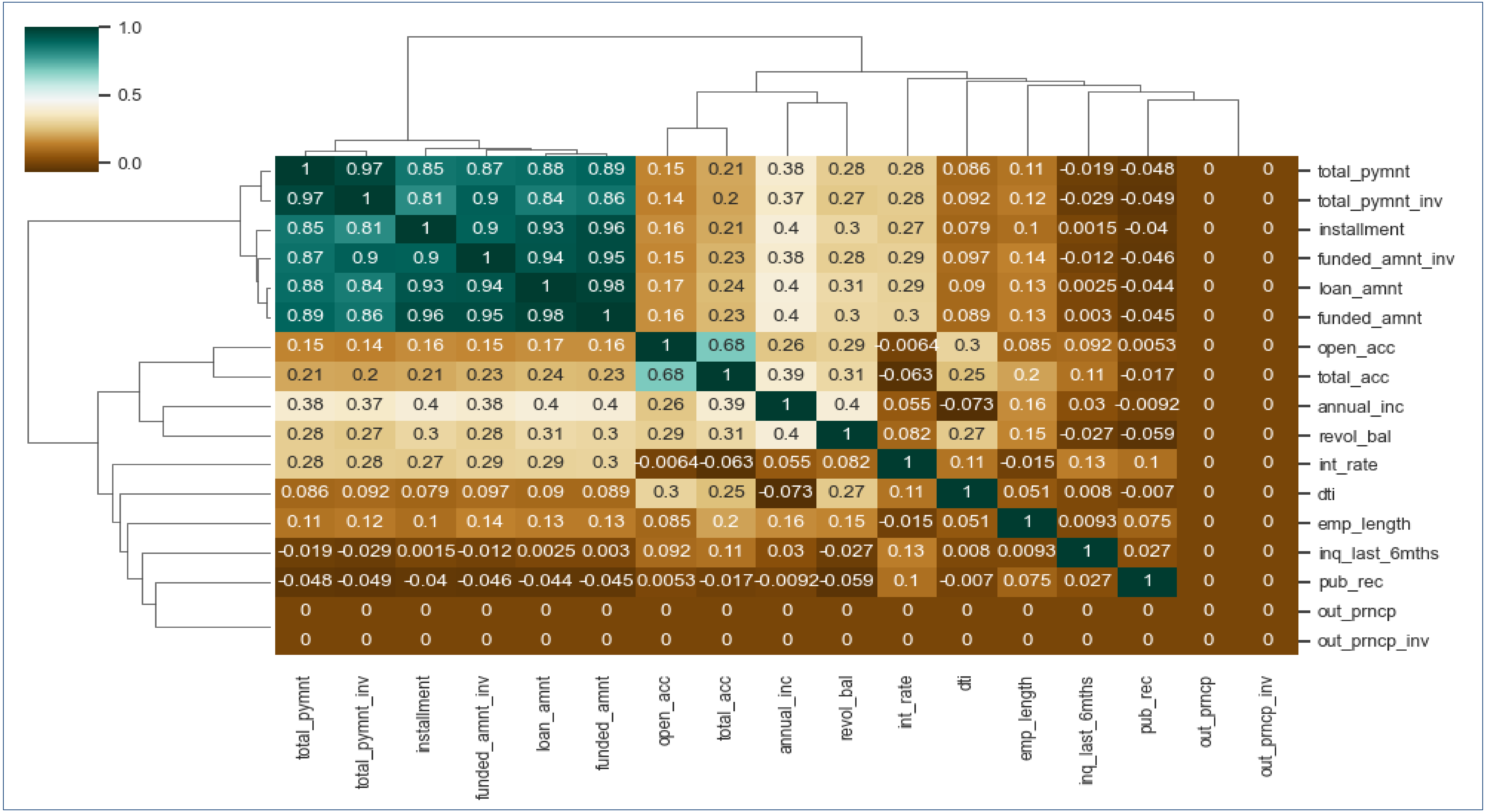
- Loans for weddings have a comparatively lower proportion of charged-off instances compared to other categories.



Main observations

- The median for loan amounts are highest for loans taken for small business purposes compared to all other purposes.
- Debt consolidation ranks second in terms of these loan amount percentiles.
- Loans for credit card payments come in third place for these percentiles.

- It is evident that the average interest rate is higher for loans with a 60-month term.
- Most loans issued for the longer term have higher interest rates for repayment.
- The average interest rate is highest for loans taken for small business purposes. Borrowers taking loans for small business purposes face higher interest rates compared to other loan purposes.
- House loans come in second, with borrowers paying higher interest rates than those for other purposes.
- It's apparent that interest rates tend to rise with increasing loan amounts.
- This trend may be attributed to the likelihood that larger loan amounts are often associated with longer loan terms, as we observed earlier that longer loan terms generally entail higher interest rates.


1.0
0.5
0.0
total_pymnt
total_pymnt_inv
installment
funded_amnt_inv
loan_amnt
funded_amnt
open_acc
total_acc
annual_inc
revol_bal
int_rate
dti
emp_length
inq_last_6mths
pub_rec
out_prncp
out_prncp_inv

Main observations

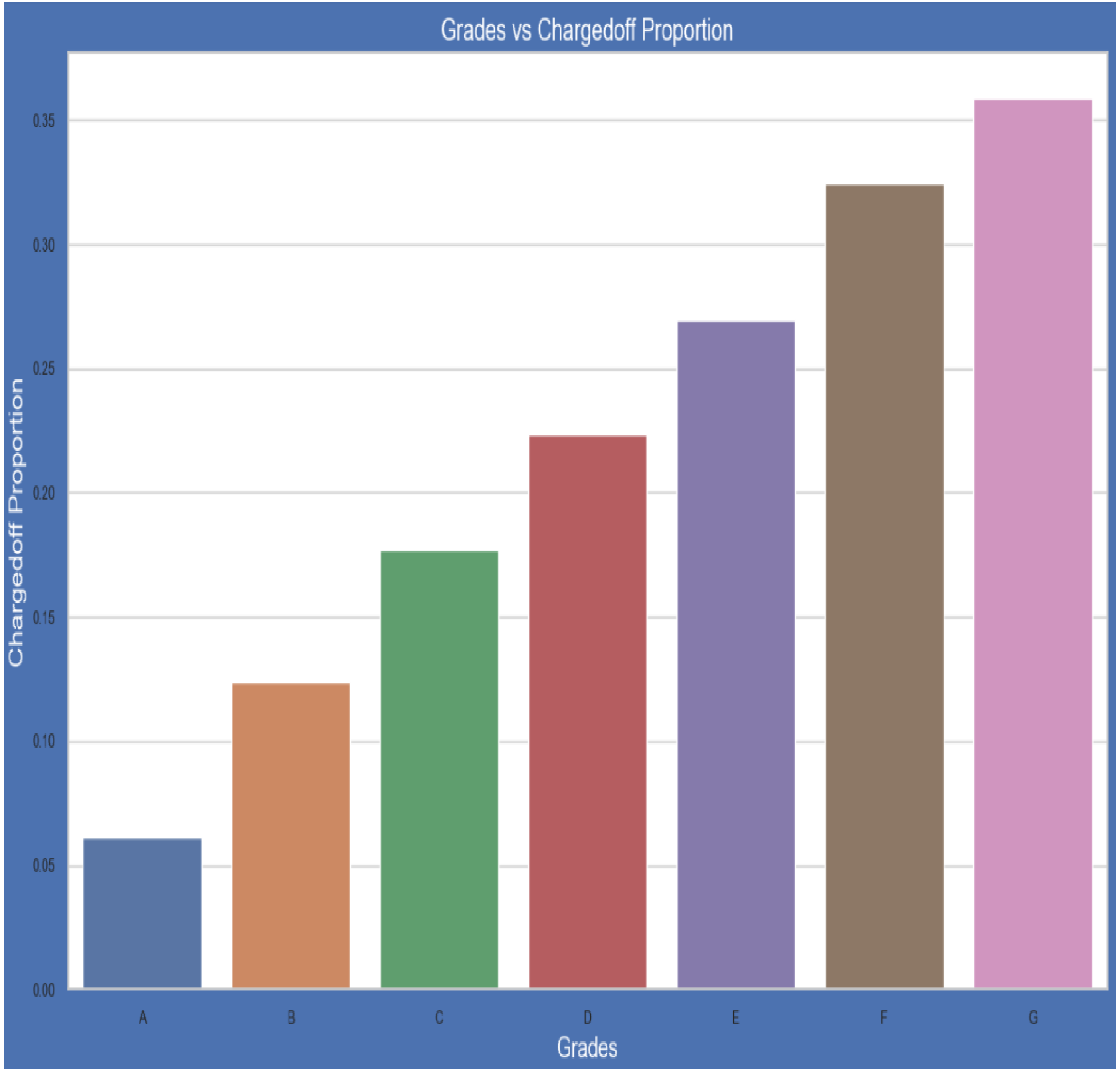
- There is a high correlation between the loan amount, investor amount, and funded amount.
- Annual income and the debt-to-income (DTI) ratio exhibit a negative correlation.
- The DTI ratio represents the proportion of a borrower's monthly gross income allocated to debt payments. Therefore, a lower annual income corresponds to a higher DTI ratio, and vice versa.
- Low Debt-to-Income (DTI) ratio, helps to qualify for a lower interest rate, and an increased interest rates with increasing DTI ratios.
- Annual income and years of employment show a positive correlation.
- This indicates that as work experience increases, so does income.

loan_status	grade	Charged Off	Fully Paid	Total	Chargedoff_Proportion
6	G	93	166	259	0.359073
5	F	286	595	881	0.324631
4	E	656	1781	2437	0.269183
3	D	1077	3743	4820	0.223444
2	C	1321	6146	7467	0.176912
1	B	1376	9720	11096	0.124009
0	A	593	9053	9646	0.061476

- Loans with a Grade "A" have a very low probability of being charged off.

- Loans with Grades "G" and "F" exhibit a very high likelihood of being charged off.

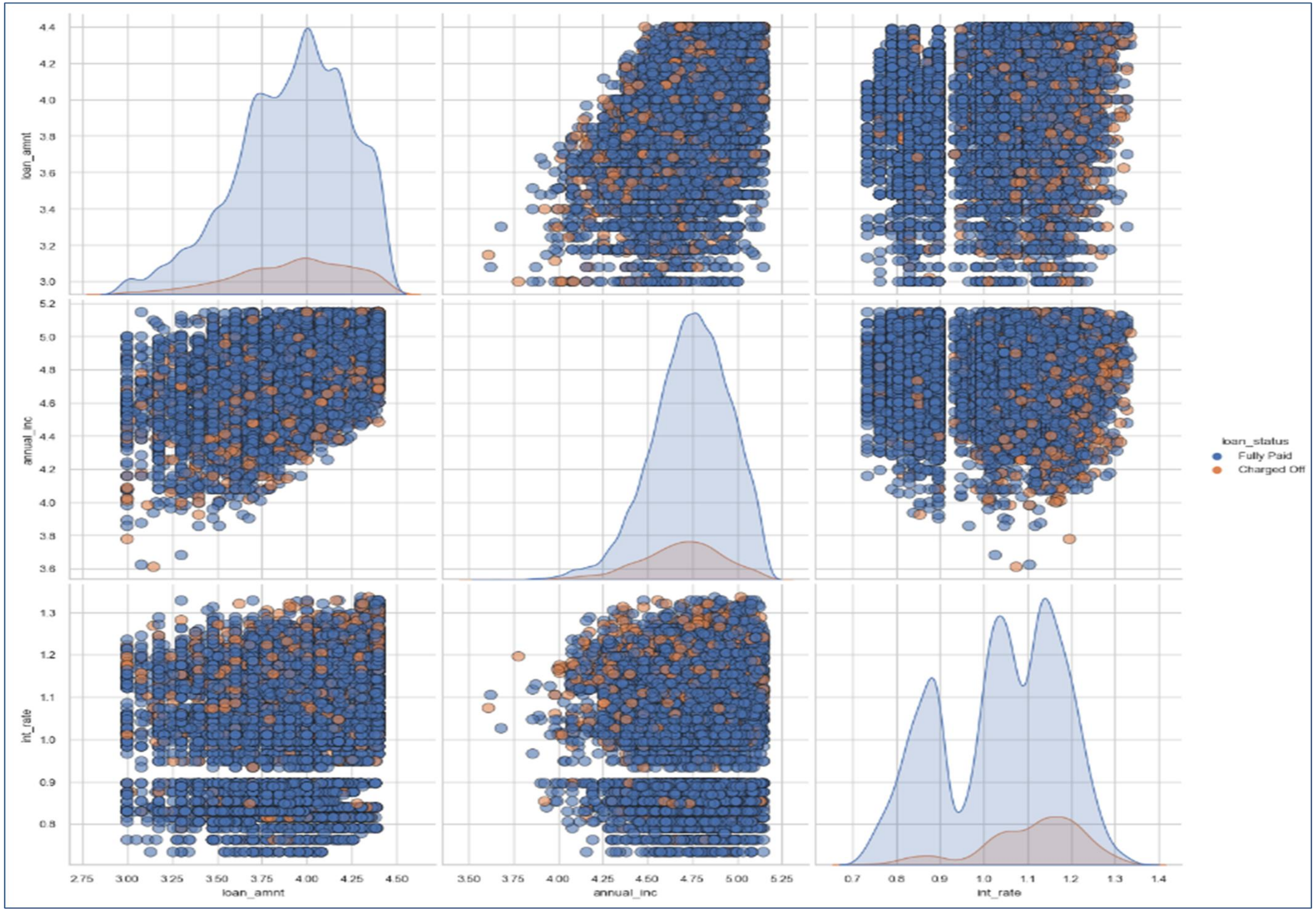
- Likelihood of charge off increases as grade moves from "A" to "G"



- Higher the interest rate higher charged off ratio

- Higher the annual income higher the loan amount

- Interest rate is increasing with loan amount increase this results in high charged off.



Main observations

Interest rates are starting from minimum 5 %. Less than 10%, less chances of charged off, more than 16% has good chances of charged off as compared to other category interest rates. Charged off proportion is increases with higher interest rates.

Unemployed or less than one year of work experience individuals are likely of charge-offs. It is logical since individuals with limited or no work experience often lack a reliable income source. Likelihood of loan charge-offs among applicants with more extensive work experience is consistent, suggesting that employment history plays a pivotal role in loan repayment reliability.

Applicants with a public recorded bankruptcies count of 2 have highest, and 1 with a higher proportion of charged-off instances compared to those with no bankruptcies on record. However, due to the limited sample size, these numbers may not be statistically significant for decision-making.

The "Not known" category represents instances where we lack information about the borrower. This absence of data aligns logically with the concept that individuals who have defaulted previously are more likely to default again in the future.

Driving factors behind loan default

01. Individuals who have been 'charged off' tend to have lower annual incomes compared to those who have 'paid fully', regardless of their credit grade (i.e., within the same interest rate range).

02. An increase in annual income leads to a slight rise in the loan amounts issued, and an increase in loan amounts leads to an increase in interest rates.

03. The interest rate is increasing slowly with increase in year, and consequently, we observe that the number of charged-off loans increased over the years.

04. There is a noticeable trend where higher interest rates correspond to a higher ratio of charged-off loans.

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Thank you very much!