



Lending Club Case Study

Group Members:

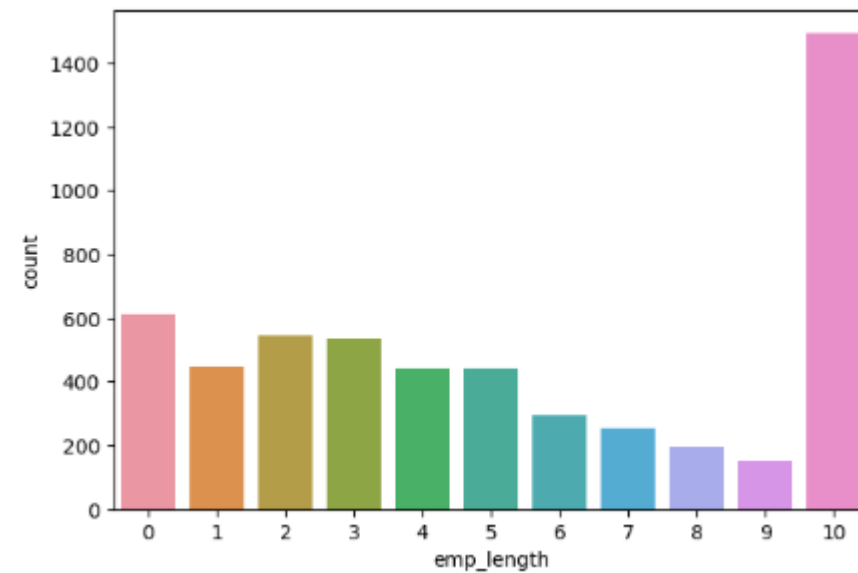
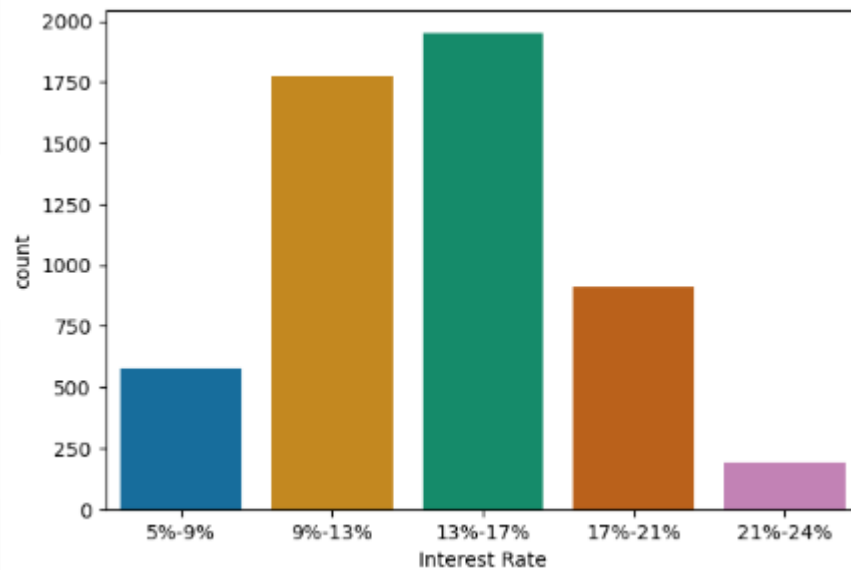
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Abstract

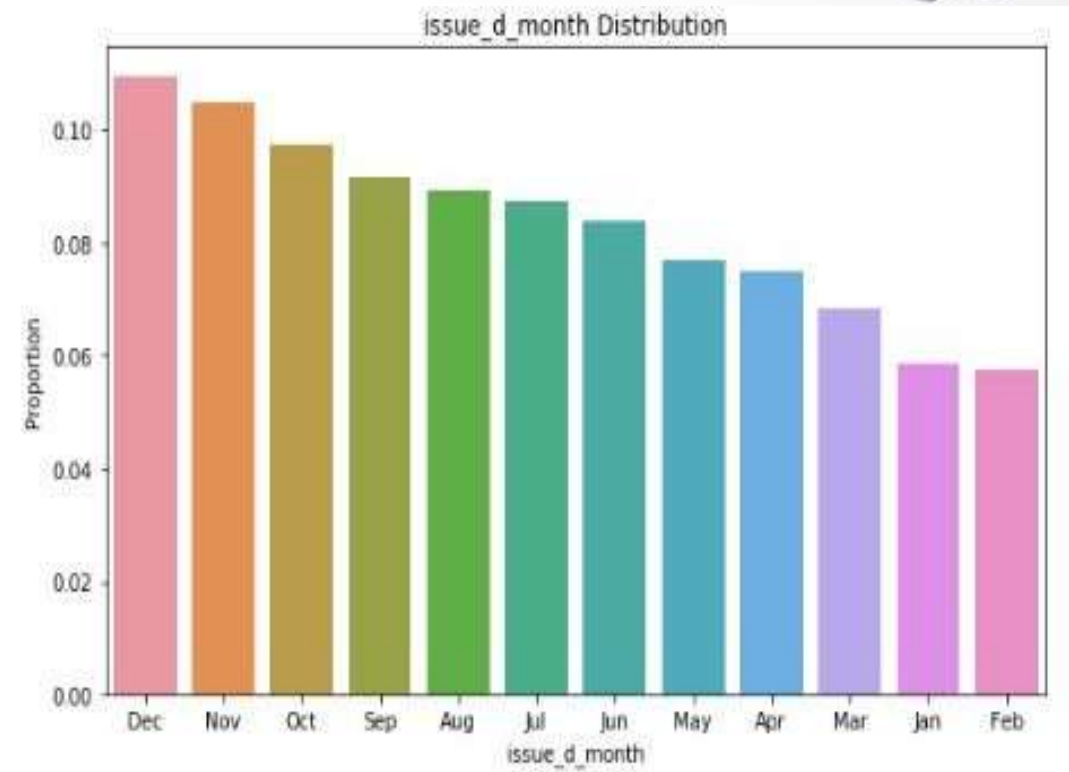
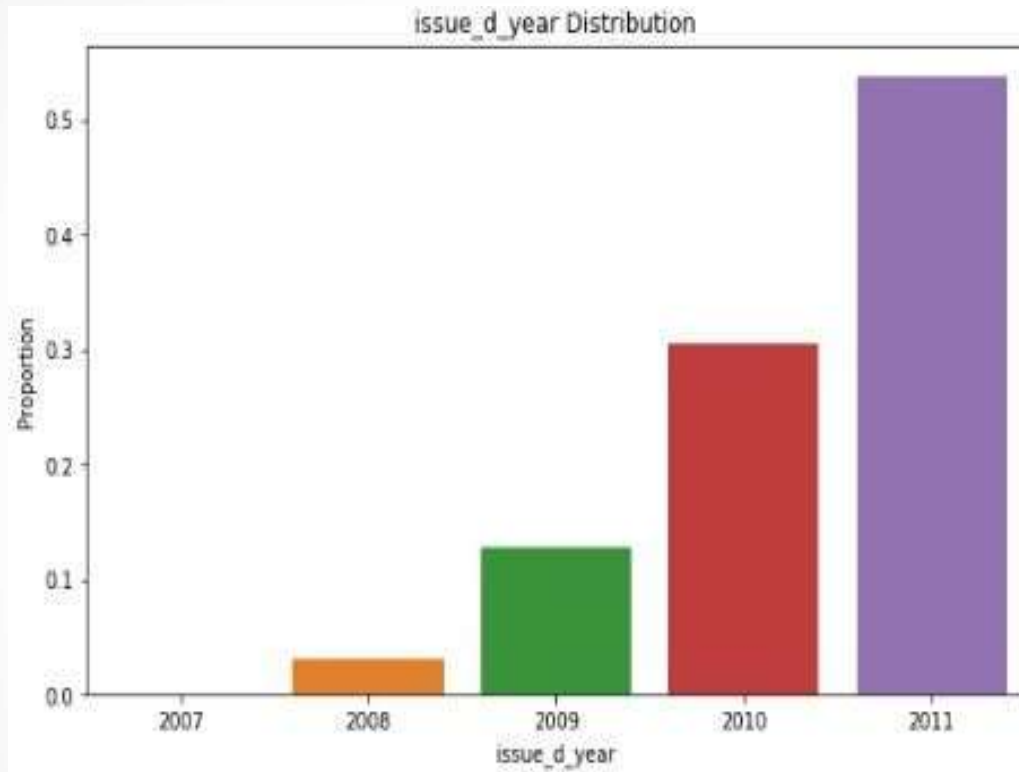


- Lending club is the largest online loan marketplace, facilitating personal loans, business loans, and financing of medical procedures.
- Borrowers can easily access lower interest rate loans through a fast online interface.
- The objective of analysis is to use the information about past loan applicants and find whether they ‘defaulted’ or not.

Interest Rate and Emp_Length

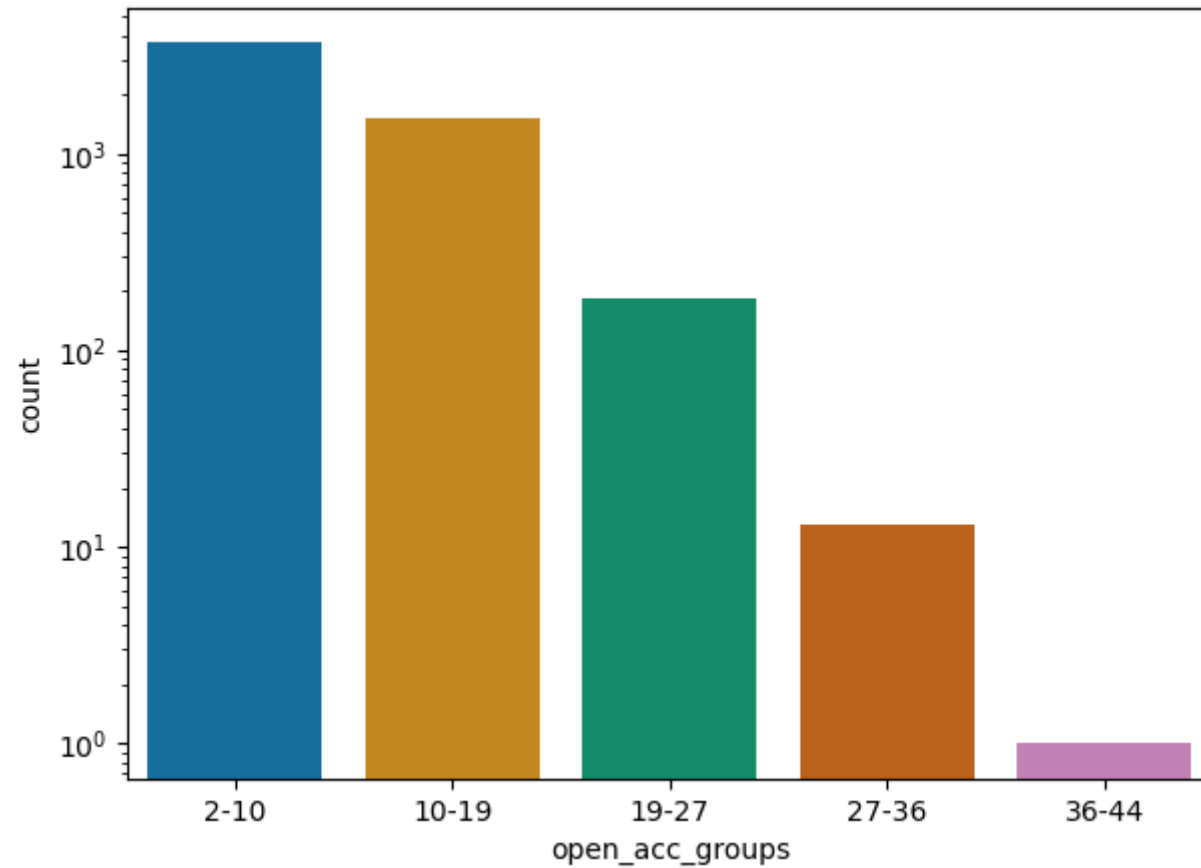


Analysis

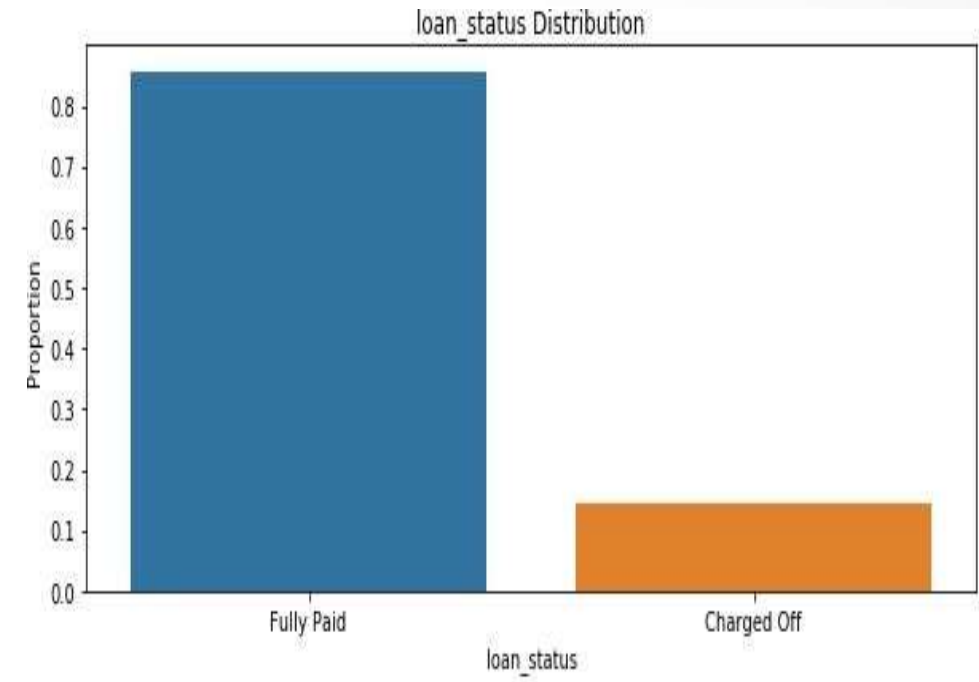
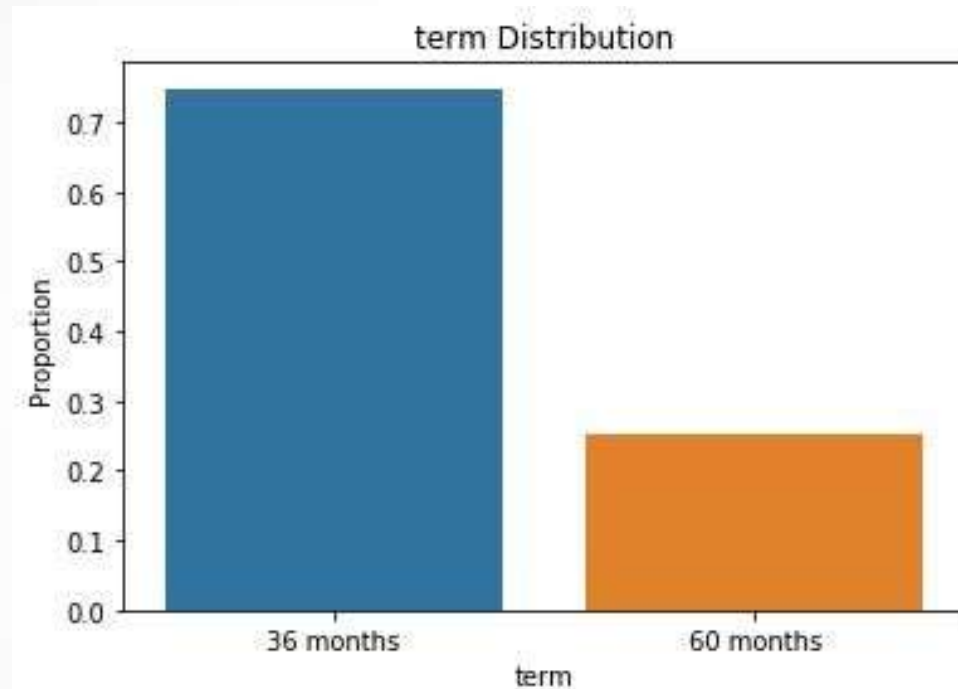


- Lending club has really expanded year by year, the number of loan issued are doubled every year.
- Also the issued month of loans is also increasing from January to December. In the final quarter of year there are more loans issued this could be because of vacation and christmas.

Open account groups

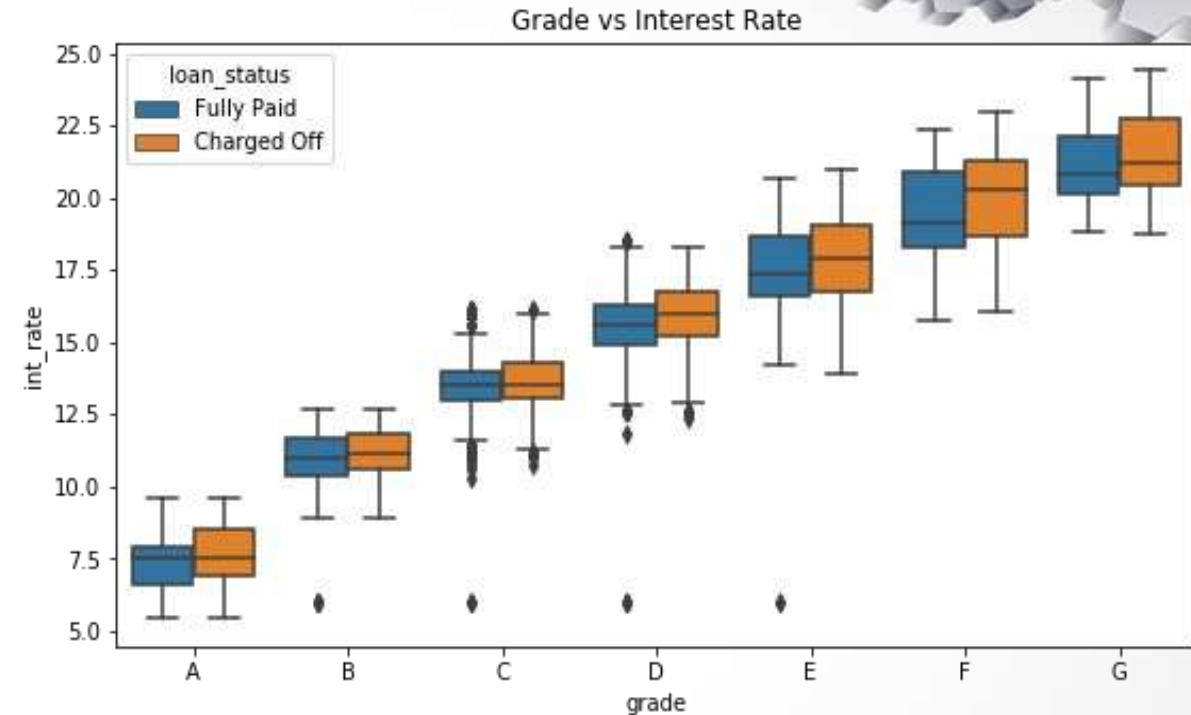
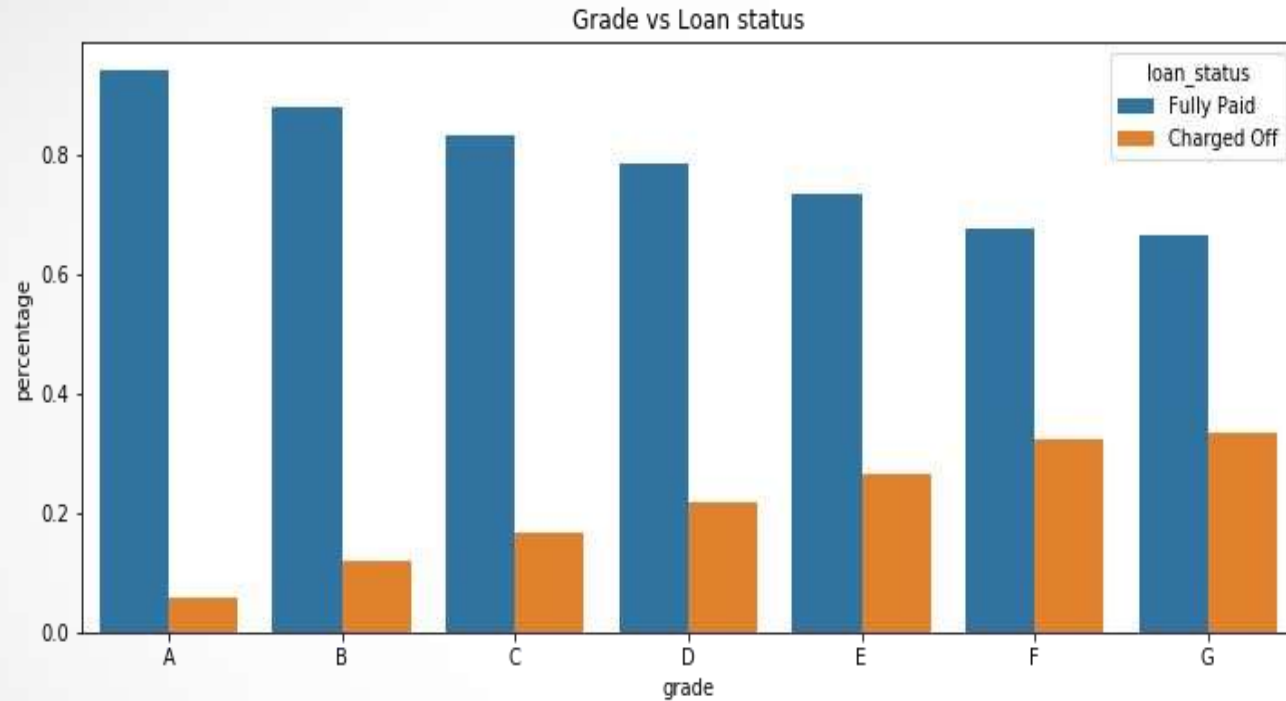


Term and Loan Status Distribution



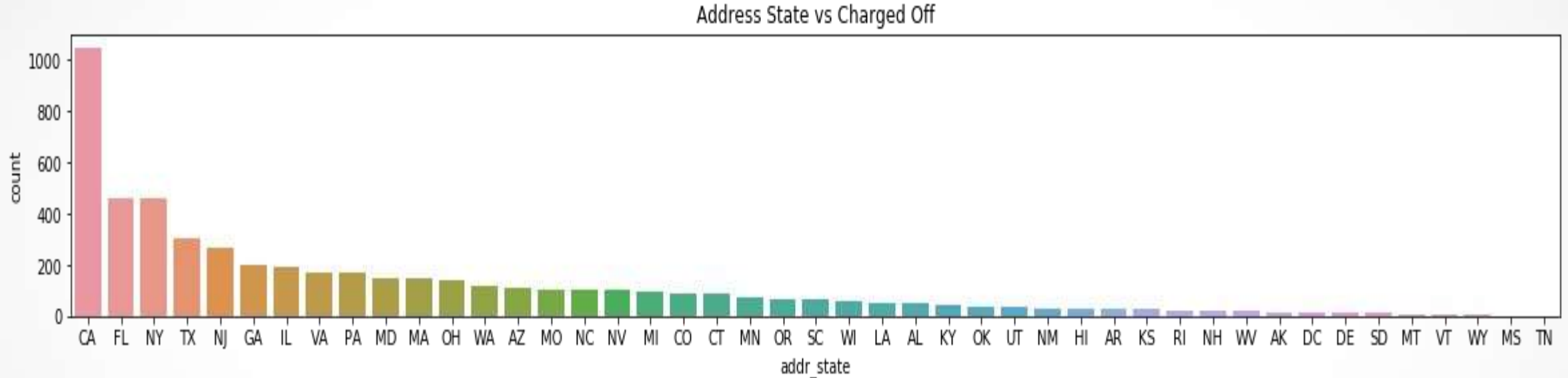
- There are only two loan terms 36 and 60 months. Around 75% borrowers took loans with 36 months term.
- The charged off borrowers are around 15% and fully paid is around 85% in the given data set.

Grade vs Loan Status and Interest Rate



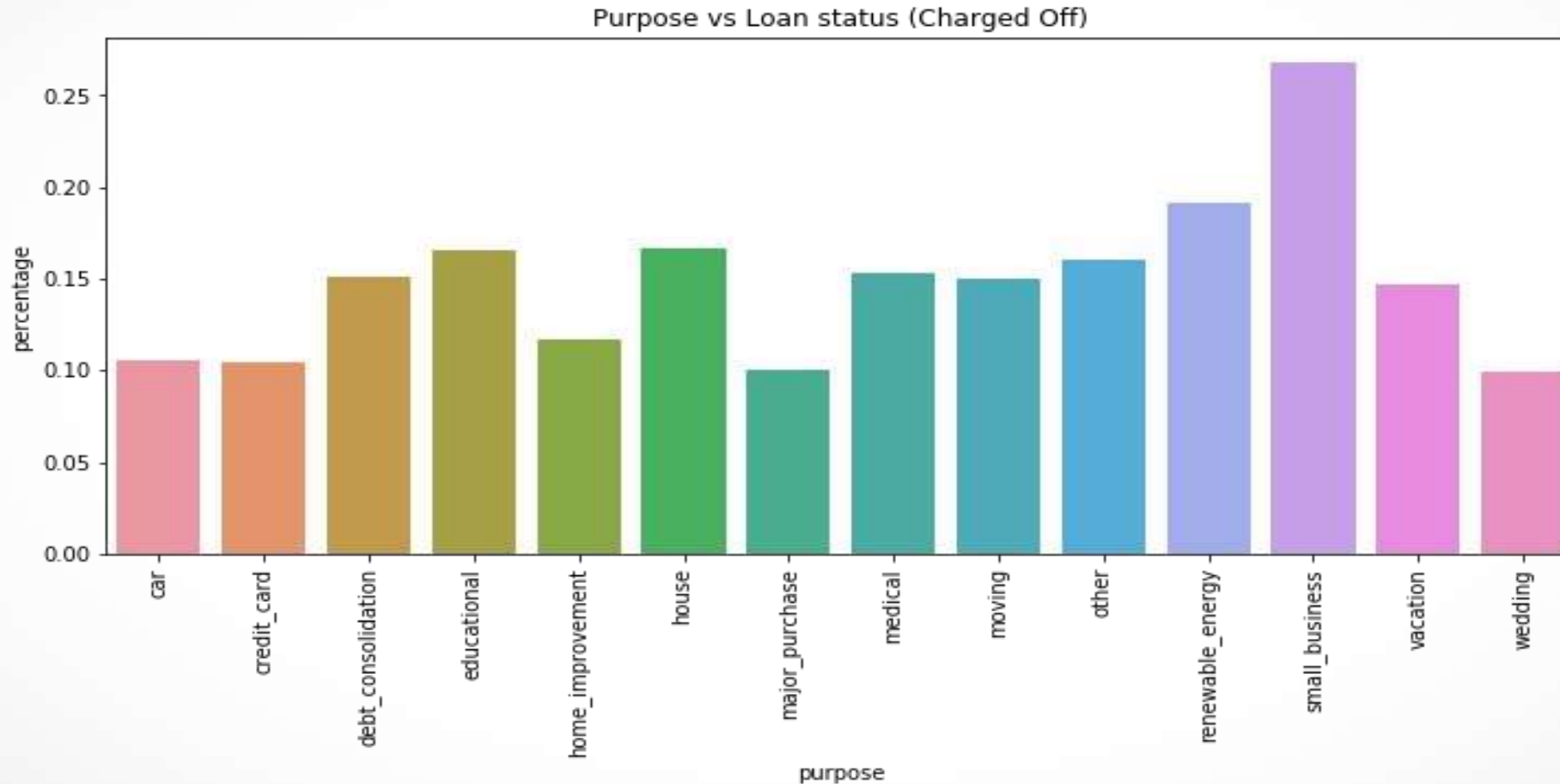
- Grades are very good category to tell the borrower probability of defaulting the loan.
- The Lower grades(E,F,G) have higher chances of defaulting the loan than Higher ones(A,B)
- Also the Lower grades are getting loans for higher interest rates which might be the cause for loan default.

Count of Address State Wise

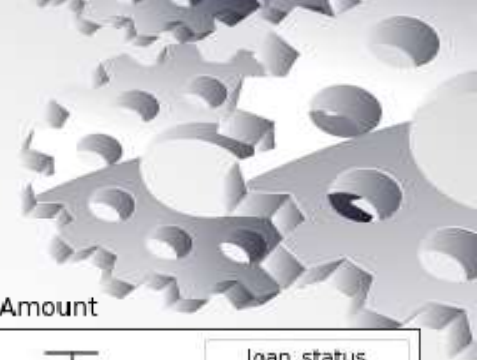


The loans which are given for CA, FL and TX state borrower's are defaulted more than other states.

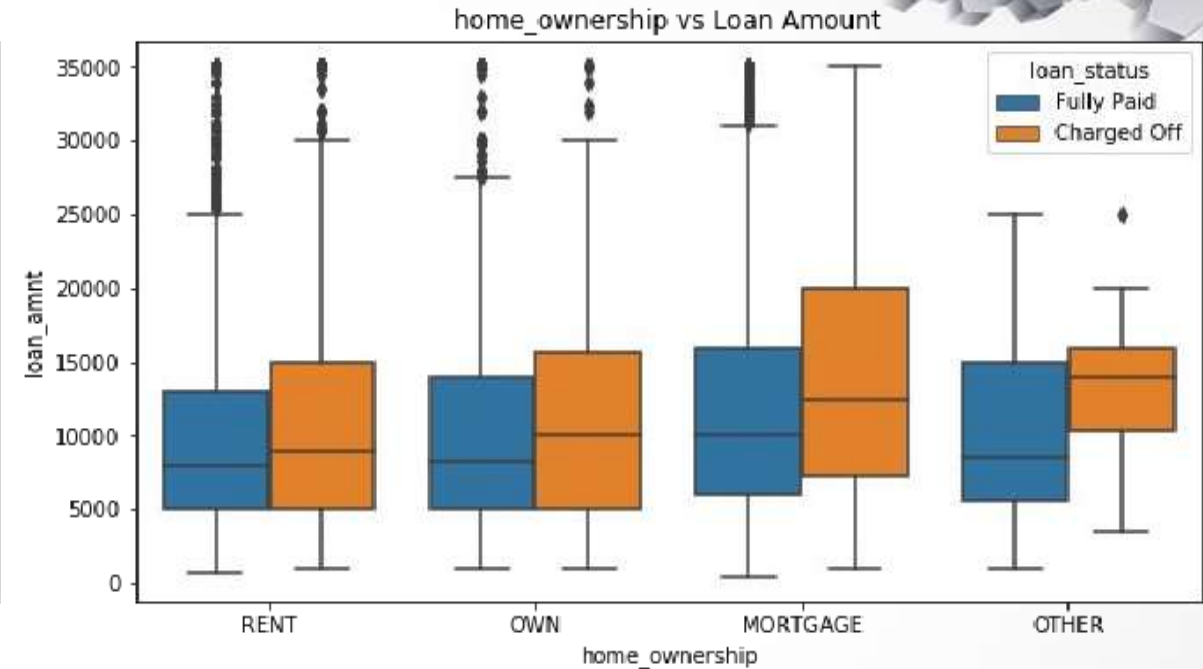
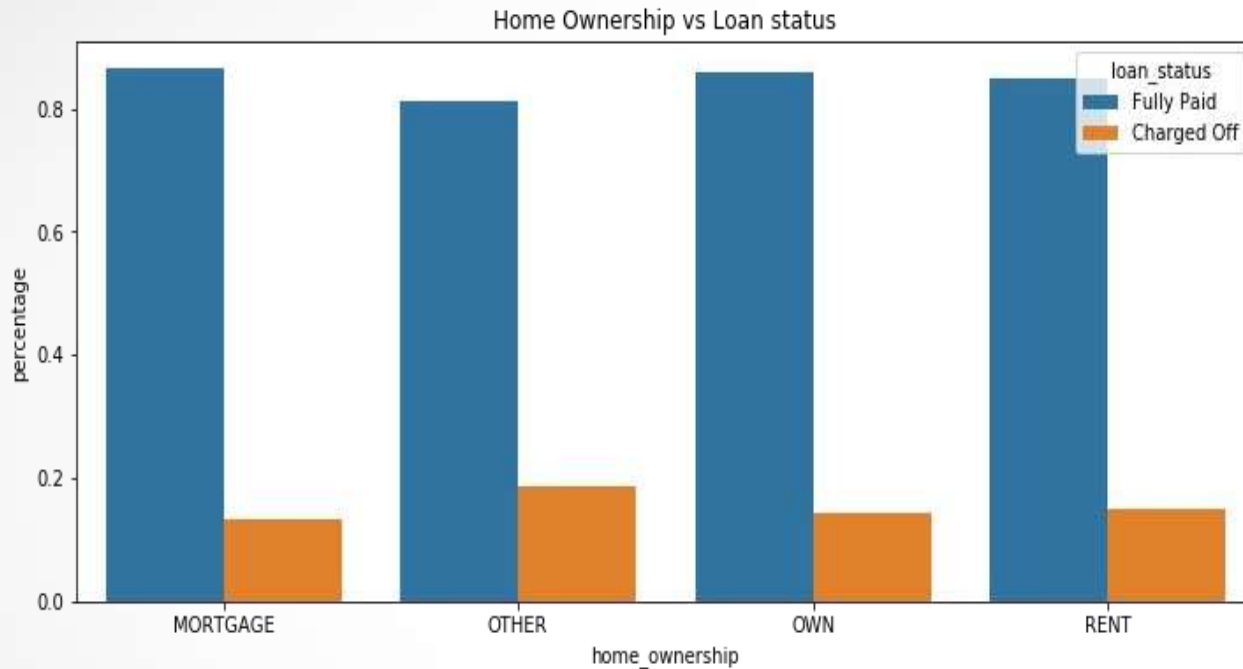
Purpose Vs Loan Status (Charged Off)



Borrower's who took loans for small business purpose have defaulted more.

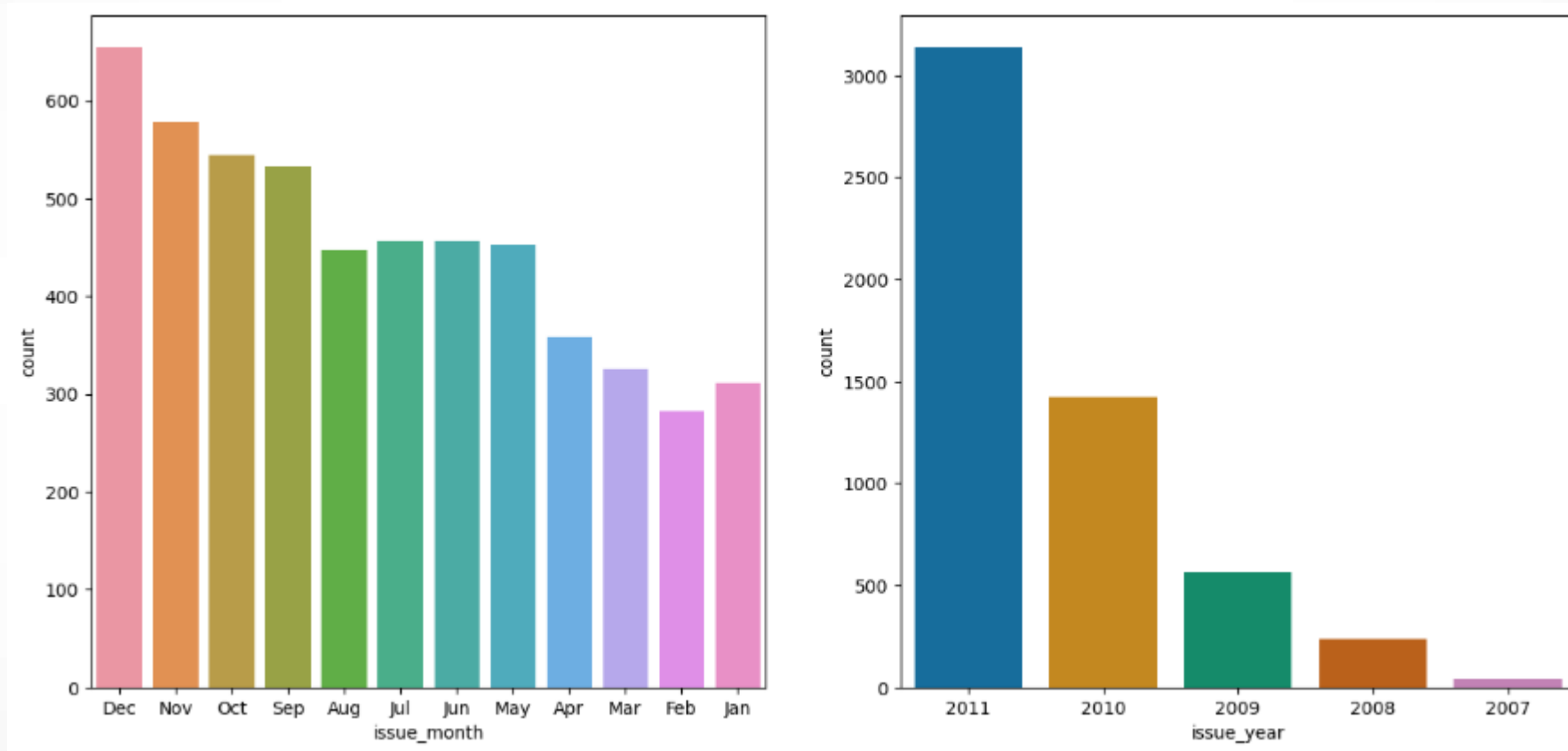


Home Ownership vs Loan Status

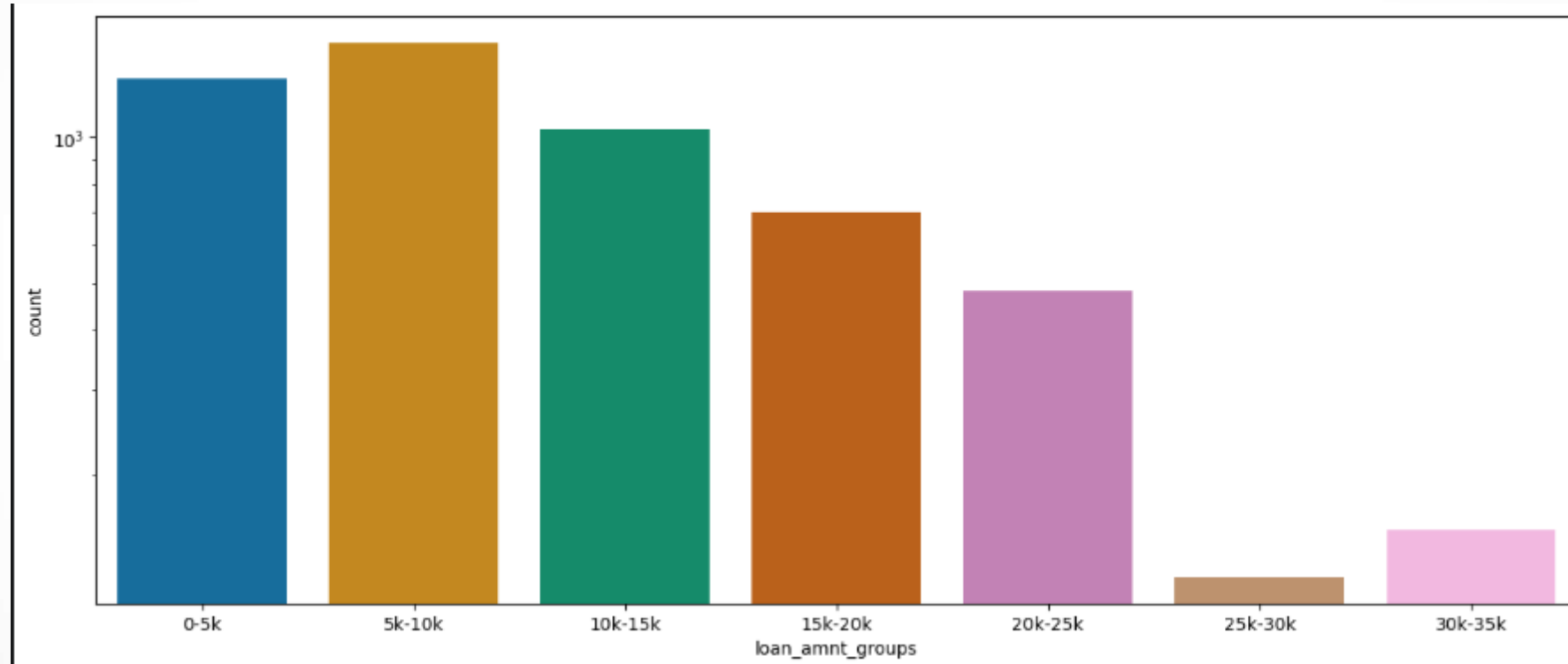


- There is around 20% chance of loan default in each home ownership category.
- From the 2nd plot we can see the people with higher loan amounts in **mortgage** home ownership has high default rate than others.

Issue Month and Year Distribution



Loan amount Groups



Observations:

The above analysis with respect to the charged off loans for each variable suggests the following. There is a more probability of defaulting when :

- Applicants having house_ownership as 'RENT'
- Applicants who use the loan to clear other debts
- Applicants who receive interest at the rate of 13-17%
- Applicants who have an income of range 31201 - 58402
- Applicants who have 20-37 open_acc
- Applicants with employment length of 10
- When funded amount by investor is between 5000-10000
- Loan amount is between 5429 - 10357
- Dti is between 12-18

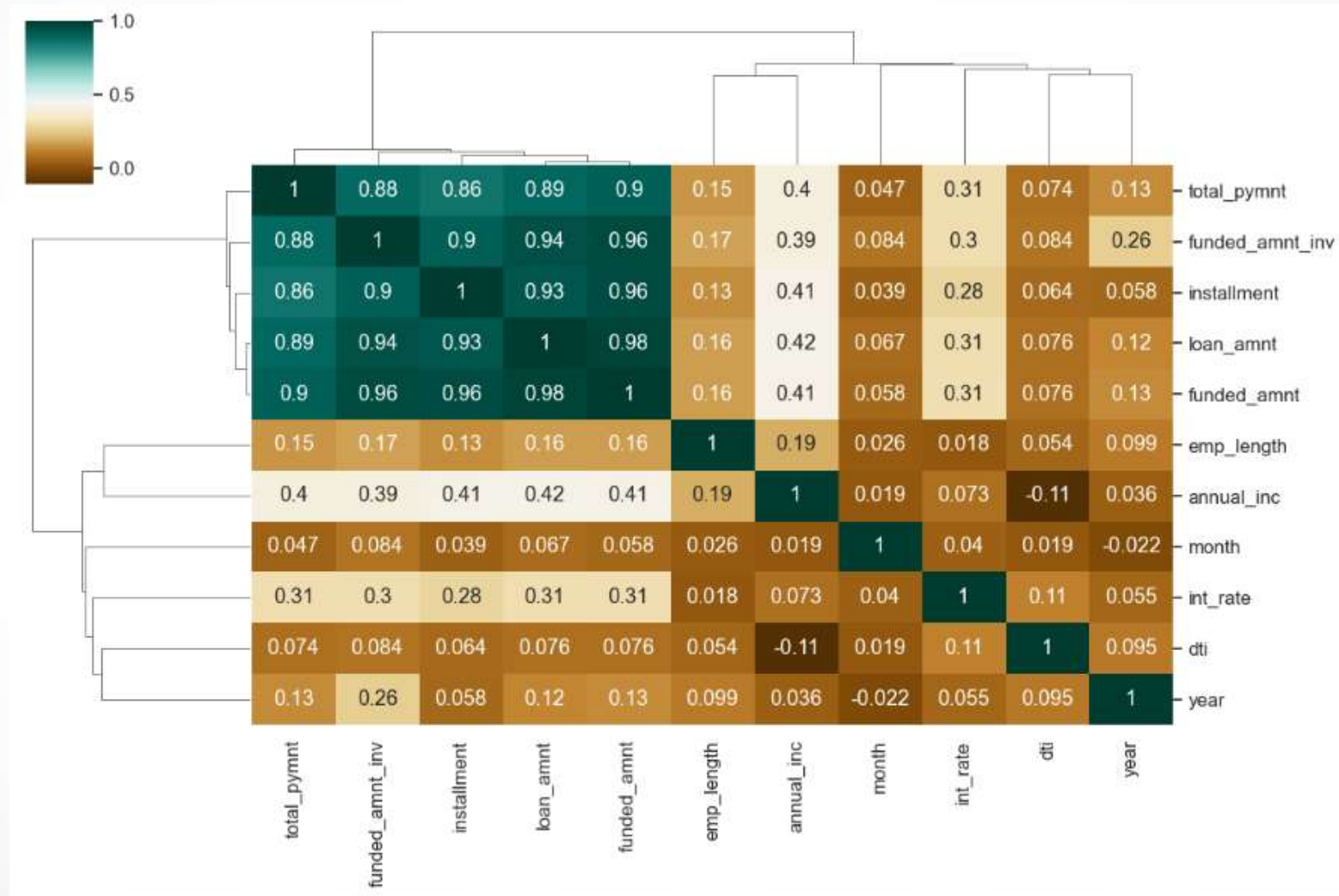




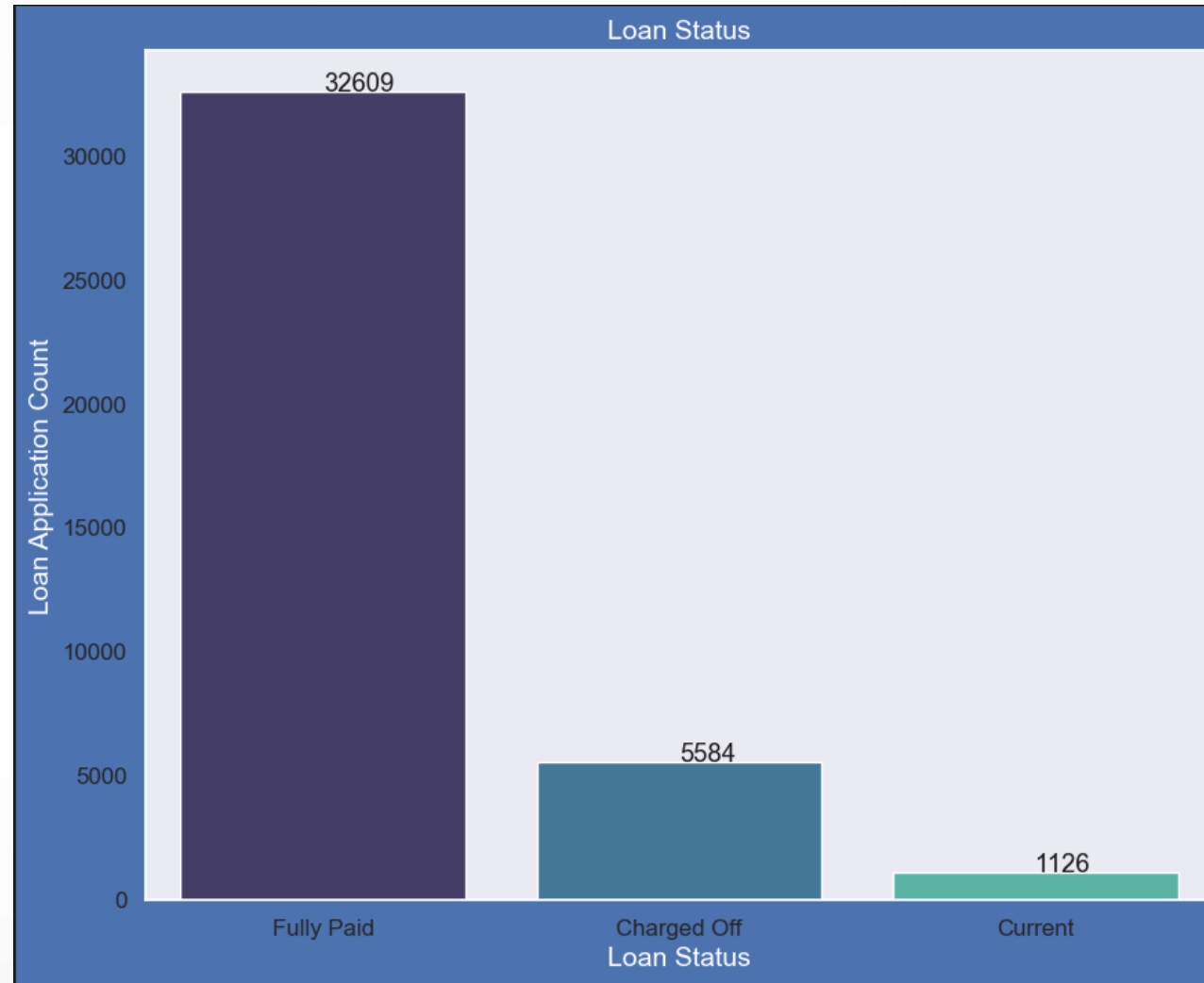
Observations:

- When monthly installments are between 145-274
- Term of 36 months
- When the loan status is Not verified
- When the no of enquiries in last 6 months is 0
- When the number of derogatory public records is 0
- When the purpose is 'debt_consolidation'
- Grade is 'B'
- And a total grade of 'B5' level.

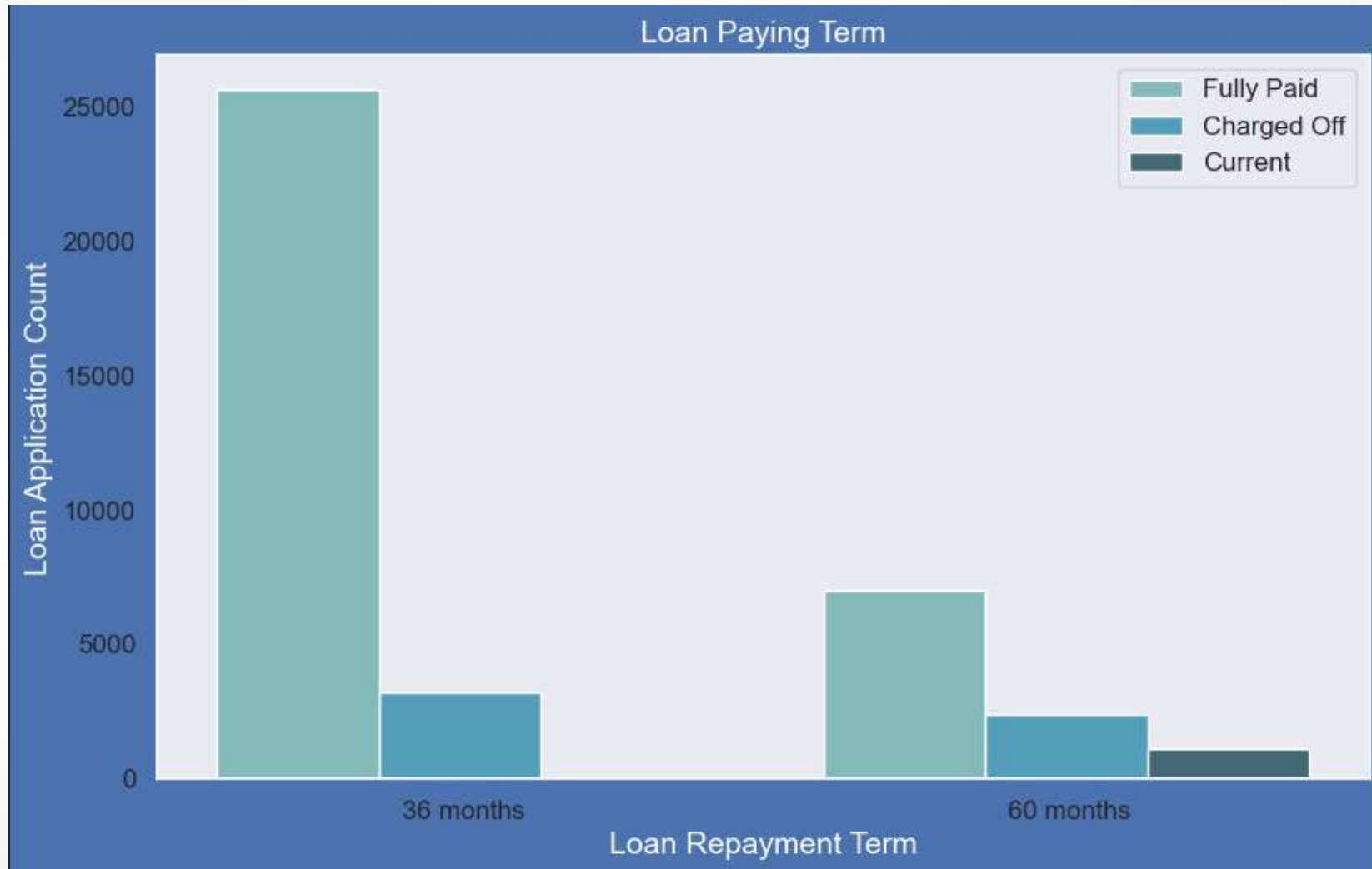
Cluster Map



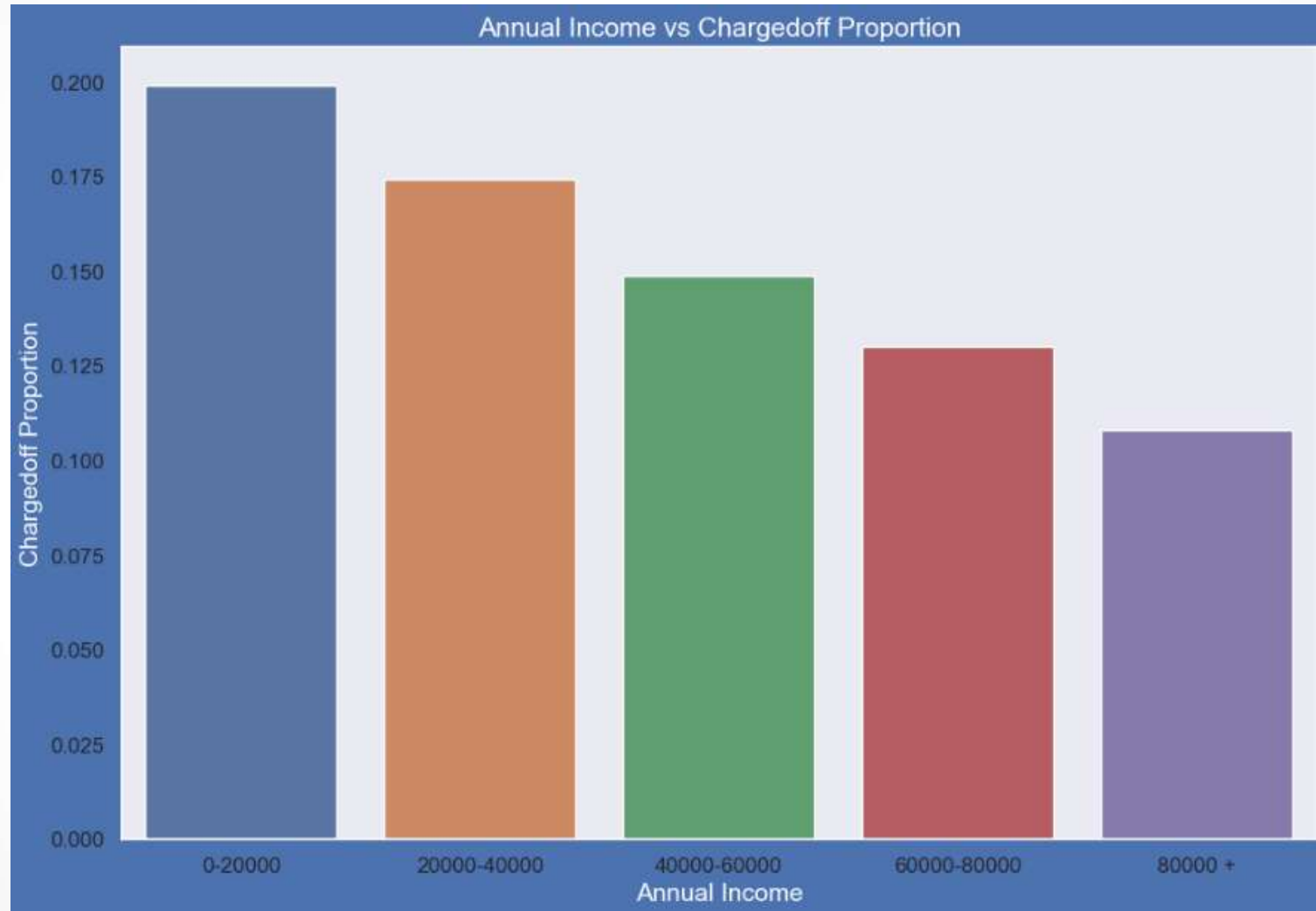
Application Count vs Loan Status



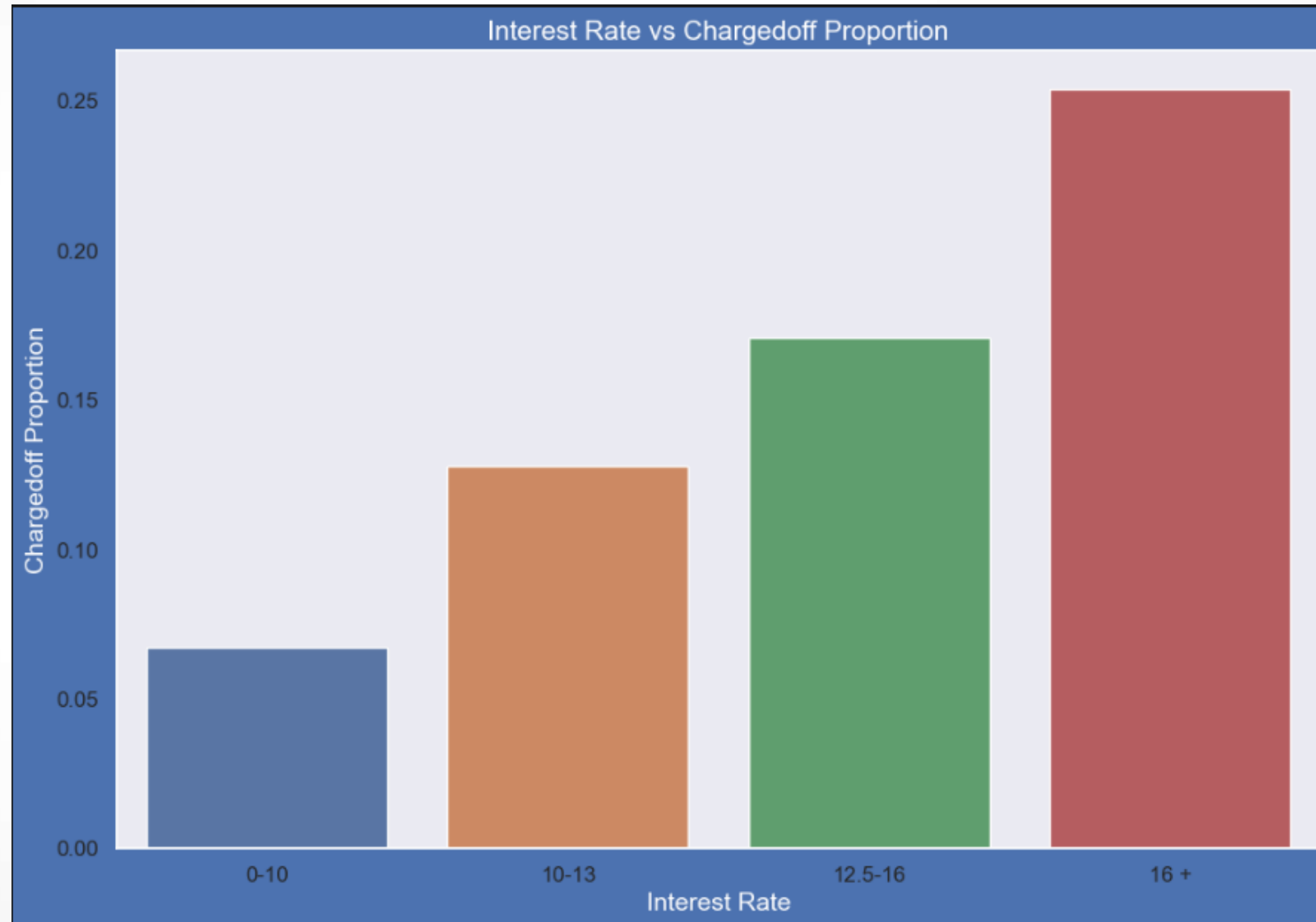
Application Count vs Loan Repayment



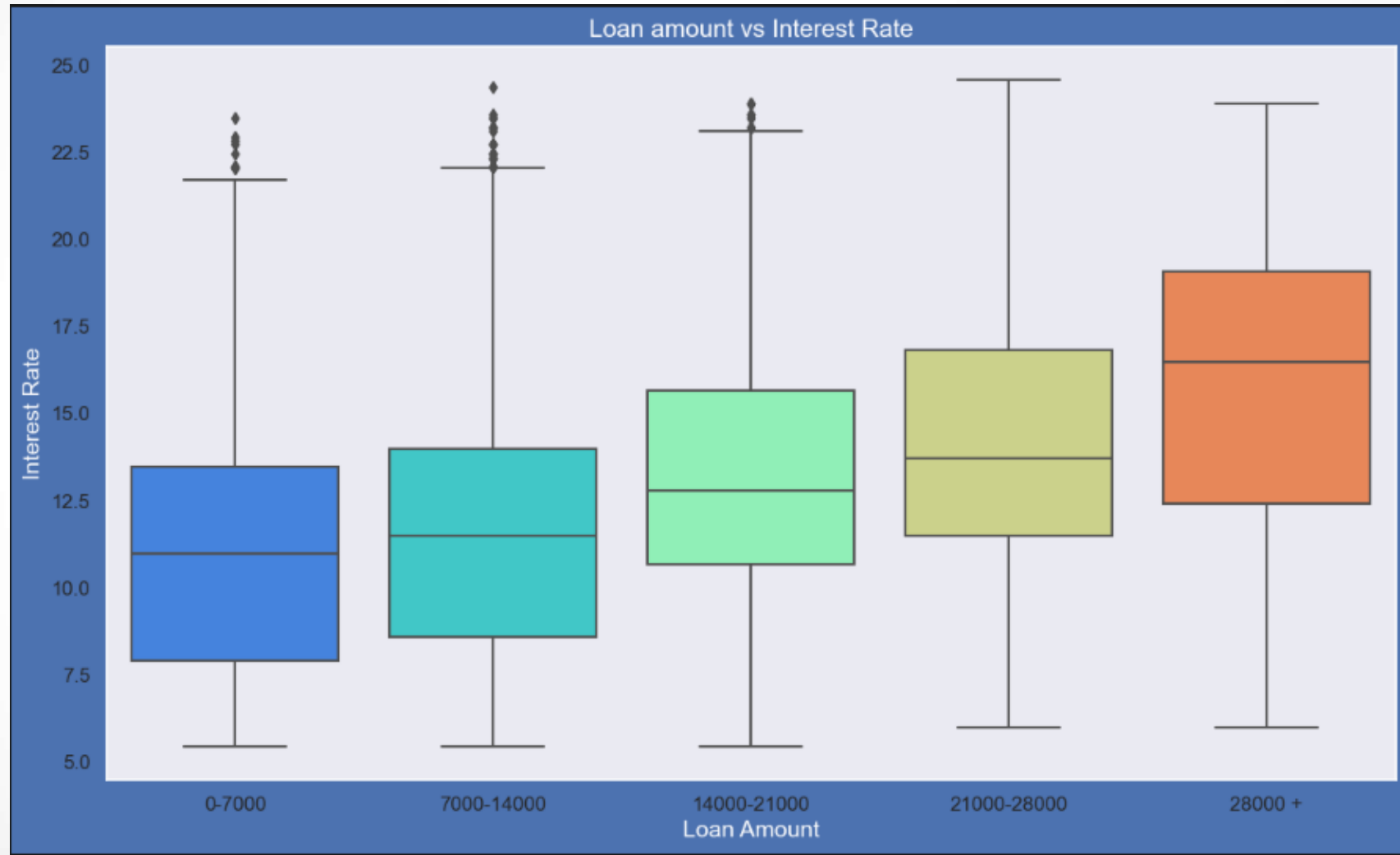
Charged Off Proportion vs Annual Income



Charged Off Proportion vs Interest Rate



Loan Amount vs Interest Rate

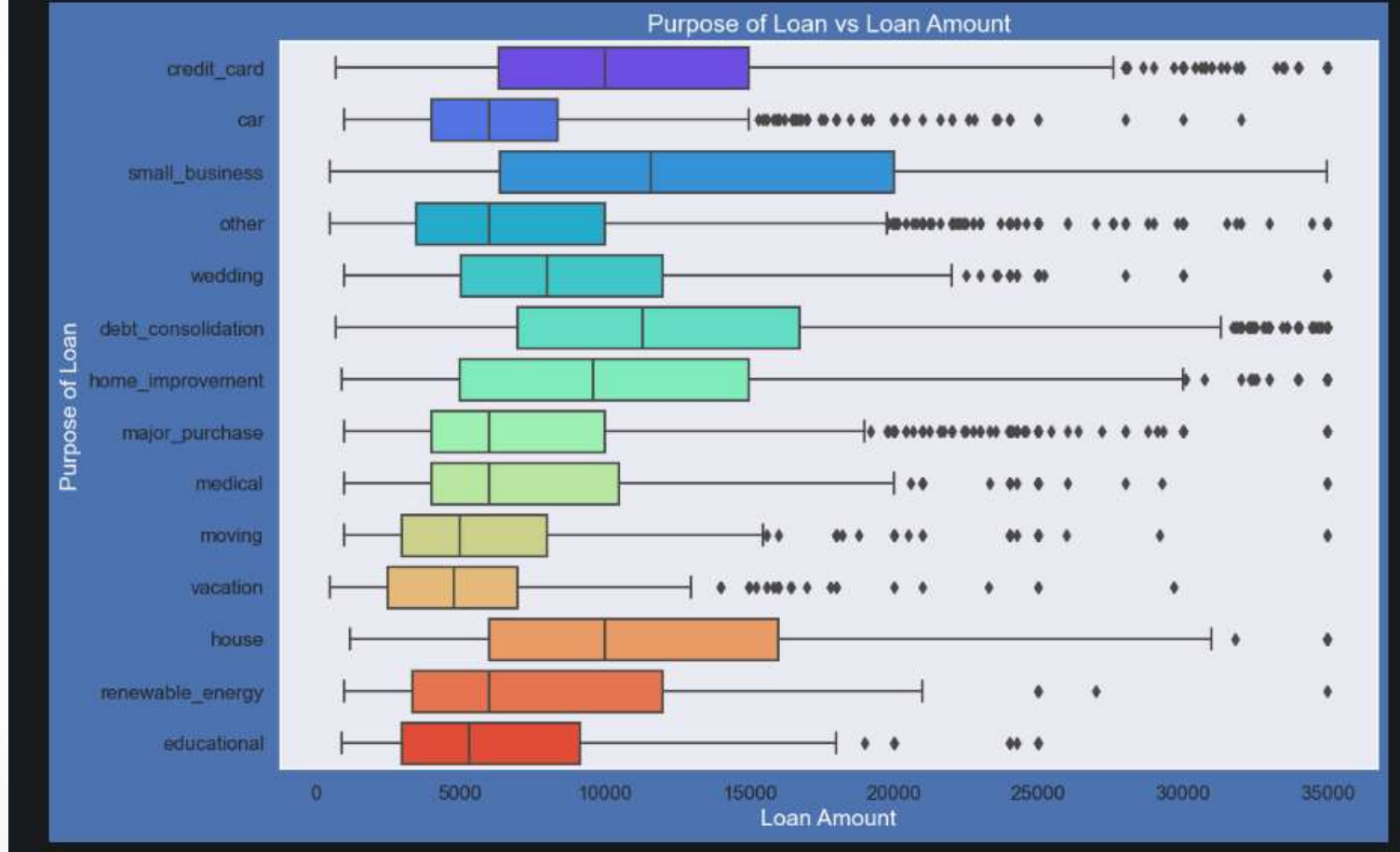


Purpose of Loan vs Amount

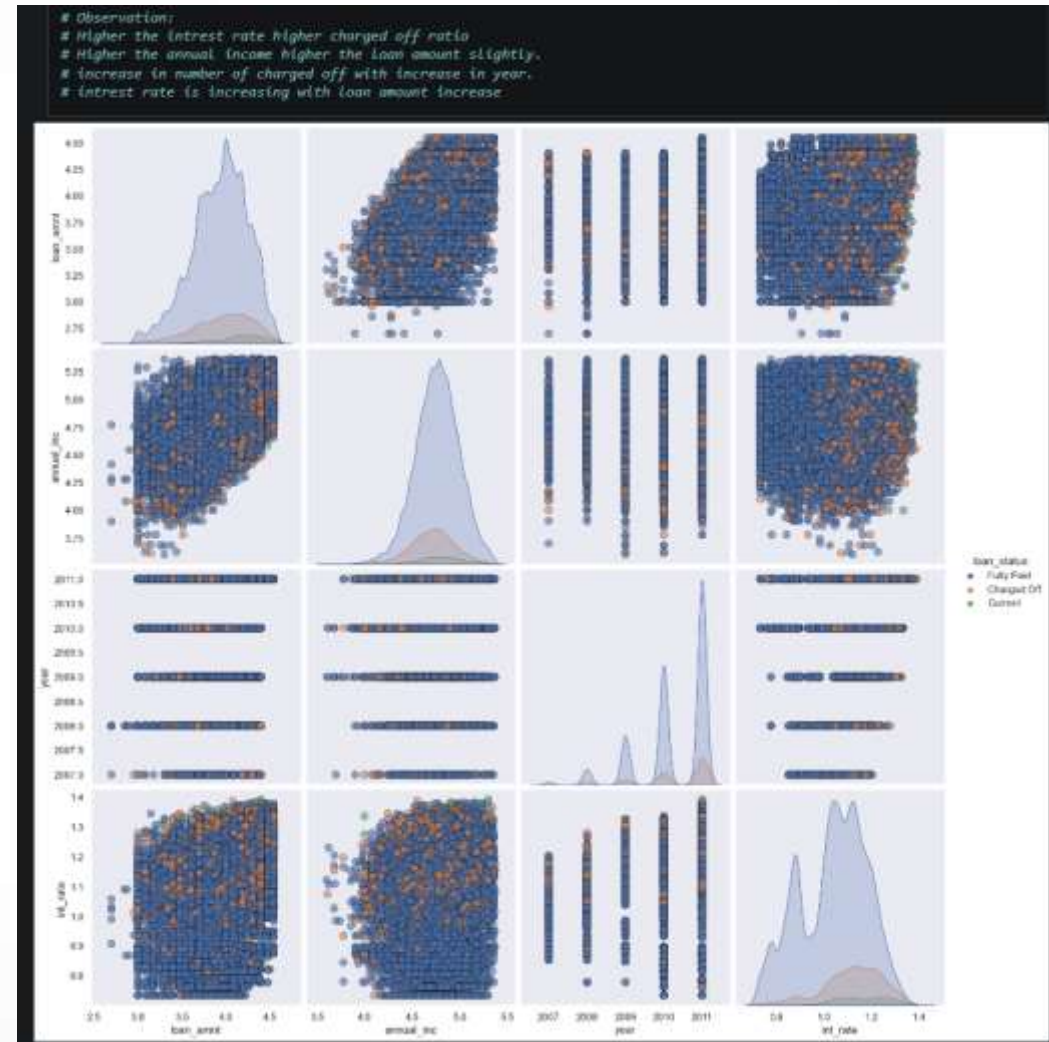
Observations:

Median, 95th percentile, 75th percentile of Loan amount is highest for loan taken for small business purpose among all pu

Debt consolidation is second and Credit card comes 3rd.



Interest Rate Pairplot Distribution



Observations:

There is a more probability of defaulting when :

- Applicants taking loan for 'home improvement' and have income of 60k -70k
- Applicants whose home ownership is 'MORTGAGE' and have income of 60-70k
- Applicants who receive interest at the rate of 21-24% and have an income of 70k-80k
- Applicants who have taken a loan in the range 30k - 35k and are charged interest rate of 15-17.5 %
- Applicants who have taken a loan for small business and the loan amount is greater than 14k
- Applicants whose home ownership is 'MORTGAGE' and have loan of 14-16k
- When grade is F and loan amount is between 15k-20k
- When employment length is 10yrs and loan amount is 12k-14k
- When the loan is verified and loan amount is above 16k
- For grade G and interest rate above 20%



Observations



Strong Correlations:

- Loan amount, investor amount, and funding amount are strongly correlated.
- Annual income is negatively correlated with the debt-to-income ratio (DTI).

Income and DTI:

- Lower annual income is associated with higher DTI, indicating a financial strain.

Income and Employment:

- There is a positive correlation between annual income and employment years, suggesting that income tends to increase with work experience.

Loan Amounts and Interest Rates:

- Most loan amounts fall in the range of \$5,000 to \$15,000.
- Most interest rates are in the range of 10% to 15%.

Annual Income Distribution:

- Borrowers' annual incomes are primarily in the range of \$40,000 to \$80,000.

Observations



Loan Status:

- Approximately 14% of loans were charged off.

Loan Purposes:

- Debt consolidation and paying credit card bills are the most common loan purposes.
- These purposes also have a relatively high number of charged-off loans.

Home Ownership:

- Most borrowers either rent or have mortgaged their homes.
- These categories also have a relatively high number of charged-off loans.

Loan Application Trends:

- The number of loan applications has been increasing over the years.
- The increase in loan applications has led to a higher number of charged-off applications.

Economic Downturn Impact:

- There is a dip in the number of loans issued in 2008, which may be related to the economic recession.

Observations



Loan Term:

- Loans with a 60-month term have a higher percentage of applicants charged off compared to 36-month loans.

Income and Default Risk:

- Higher income ranges, especially \$80,000 and above, have lower chances of loan default.

Loan Purpose and Default Risk:

- Small business applicants have a higher likelihood of loan default.
- Renewable energy loans have a comparatively lower default rate.

Grade and Default Risk:

- Loan grades "A" have lower chances of default, while grades "F" and "G" have higher chances.

Interest Rate and Default Risk:

- Higher interest rates are associated with a higher likelihood of loan default.

Observations



Employment and Default Risk:

- Borrowers with no work experience or less than 1 year of experience have a higher chance of default

Geographic Impact:

- Some states, like NE, NV, CA, and FL, have higher default rates.
- Public records (Derogatory Public Record) and previous bankruptcies increase default risk.

Loan Purpose and Loan Amount:

- Loans for small business purposes tend to have higher median, 75th percentile, and 95th percentile loan amounts.

Loan Term and Interest Rate:

- Loans with longer terms (e.g., 60 months) generally have higher interest rates.

Income and Recovery Percentage:

- Higher annual income is associated with a higher percentage of loan amount recovered.

Conclusions



- Lending club should reduce the high interest loans for 60 months tenure, they are prone to loan default.
- Grades are good metric for detecting defaulters. Lending club should examine more information from borrowers before issuing loans to Low grade (G to A).
- Lending Club should control their number of loan issues to borrowers who are from CA, FL and NY to make profits.
- Small business loans are defaulted more. Lending club should stop/reduce issuing the loans to them.
- Borrowers with mortgage home ownership are taking higher loans and defaulting the approved loans. Lending club should stop giving loans to this category when loan amount requested is more than 12000.
- People with more number of public derogatory records are having more chance of filing a bankruptcy. Lending club should make sure there are no public derogatory records for borrower.

Conclusions



Correlations and Relationships:

- Strong correlations exist between loan amount, investor amount, and funding amount.
- Annual income is inversely related to the debt-to-income ratio (DTI).

Income and Employment:

- Annual income tends to increase with years of employment, suggesting a positive correlation between income and experience.

Loan Characteristics:

- Most loans fall within the \$5,000 to \$15,000 range.
- Interest rates are concentrated between 10% and 15%.

Borrower Demographics:

- Borrowers' annual incomes primarily range from \$40,000 to \$80,000.
- Homeownership is common among borrowers, with renting and mortgaging being prevalent.

Conclusions



Loan Status and Trends:

- Approximately 14% of loans were charged off.
- The number of loan applications has been steadily increasing over time.

Economic Impact:

- A dip in loan issuance in 2008 may be attributed to the economic recession.

Risk Factors:

- Loan term impacts default rates, with longer-term loans having higher default rates.
- Higher income ranges are associated with lower default risk.
- Loan purpose, grade, interest rate, and employment history significantly affect default risk.

Geographic Variation:

- Some states exhibit higher default rates, suggesting regional risk factors.
- Public records and previous bankruptcies are linked to increased default risk.