LENDING CLUB CASE STUDY

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Problem Statement

Lending Club is a Online Loan Marketplace which specialises in lending various types of loans. When the company receives a loan application, the company has to make a decision for loan approval based on the applicant's profile.

If Customer is genuine and likely to pay:

Not Sanctioning Loan will result in business loss.

If Customer is NOT genuine and likely to default:

Sanctioning Loan will result in financial loss.

So, background check and appropriate decision to be taken after thorough study.

If Loan is Sanctioned & Disbursed → 3 Possible Scenarios :

1. Full Payment done (Total Principal & Interest)
2. Current (In Progress – Paying in Installments)
3. Charged off – Defaulter (No Payments for long time)

If Loan is NOT Sanctioned/Rejected → Application will be discarded.
Data will not be maintained in dataset.

High Level Diagram – Approach Leveraged

Data Cleaning & Imputation

- Removed the Columns with Significant Null Values.
- Removed the Columns with Vague data that does not aid analysis
- Removed the Columns that contain one categorical value of data
- Removed certain behavioural columns
- Remove Rows that belongs to the category of loan status with current
- Imputed the Required Values
- Removed the Outliers

Univariate Analysis

- To Understand & Treat the Outliers across each Numerical Categorical Column using Box Plots
- To Understand the Spread of data across each Numerical Categorical Column using Histogram Plots

Segmented Univariate Analysis

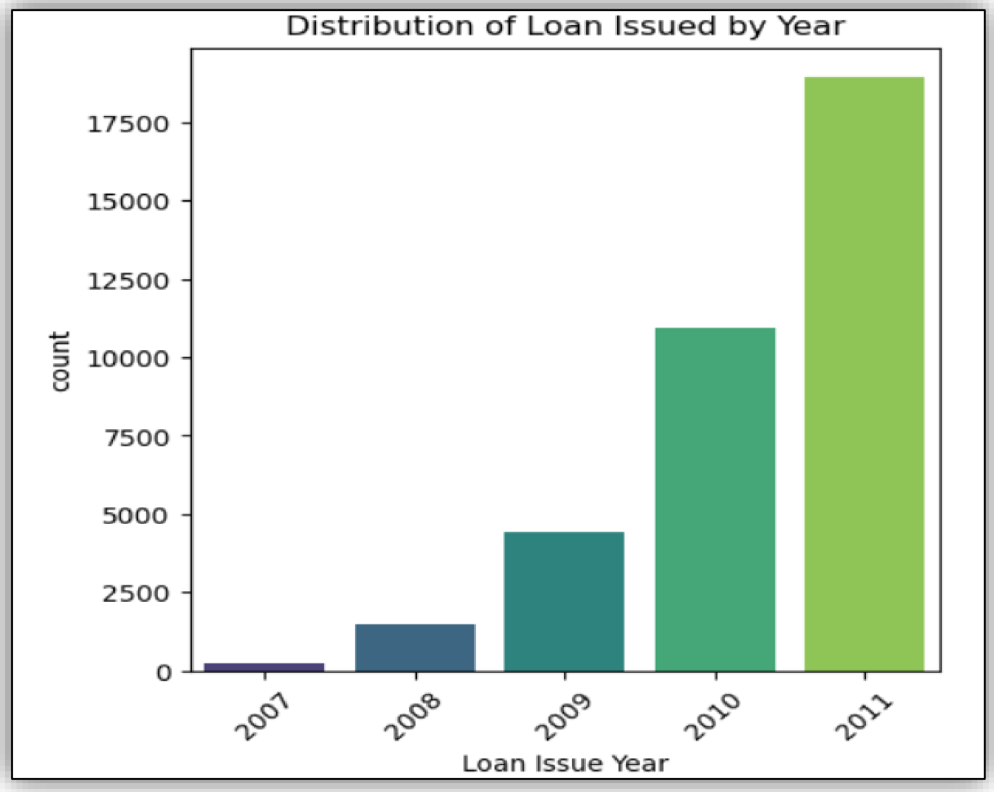
- To Understand Categorical Count for Charged off Customers across Multiple Drivers using Count Plot

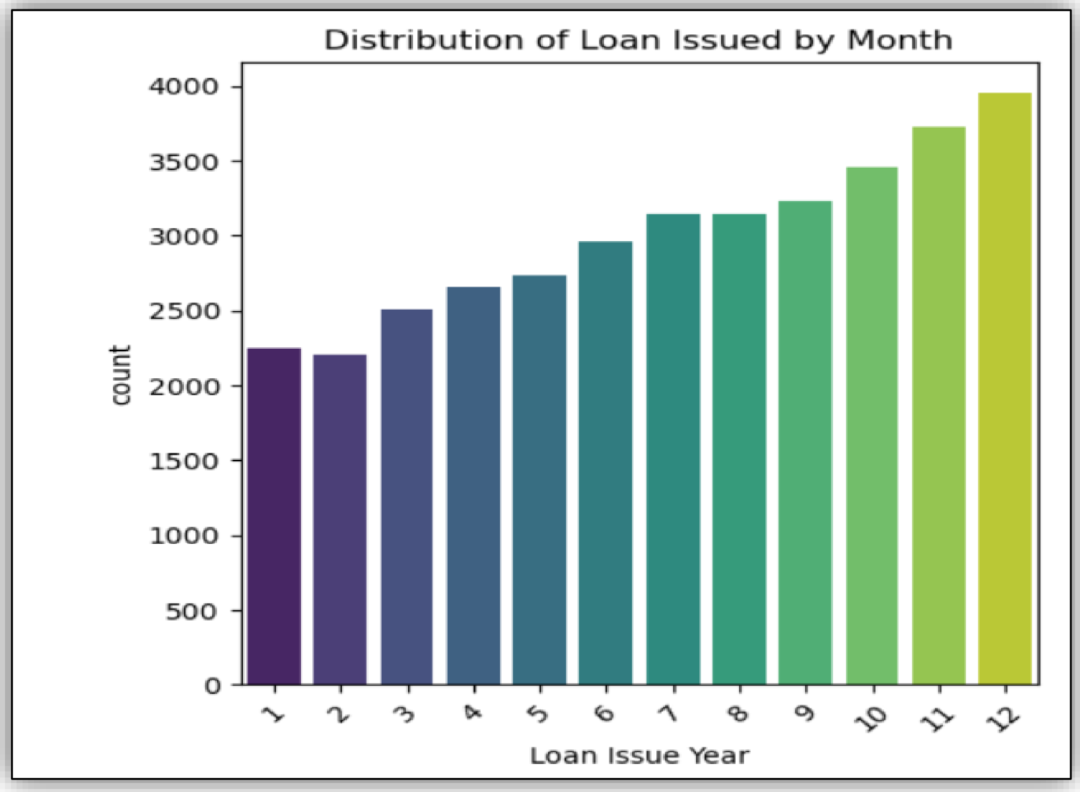
Bi/Multi Variate Analysis

- To Understand driving factors by plotting across multiple parameters especially for Charged Off borrowers using scatter plot etc.,

Recommendations

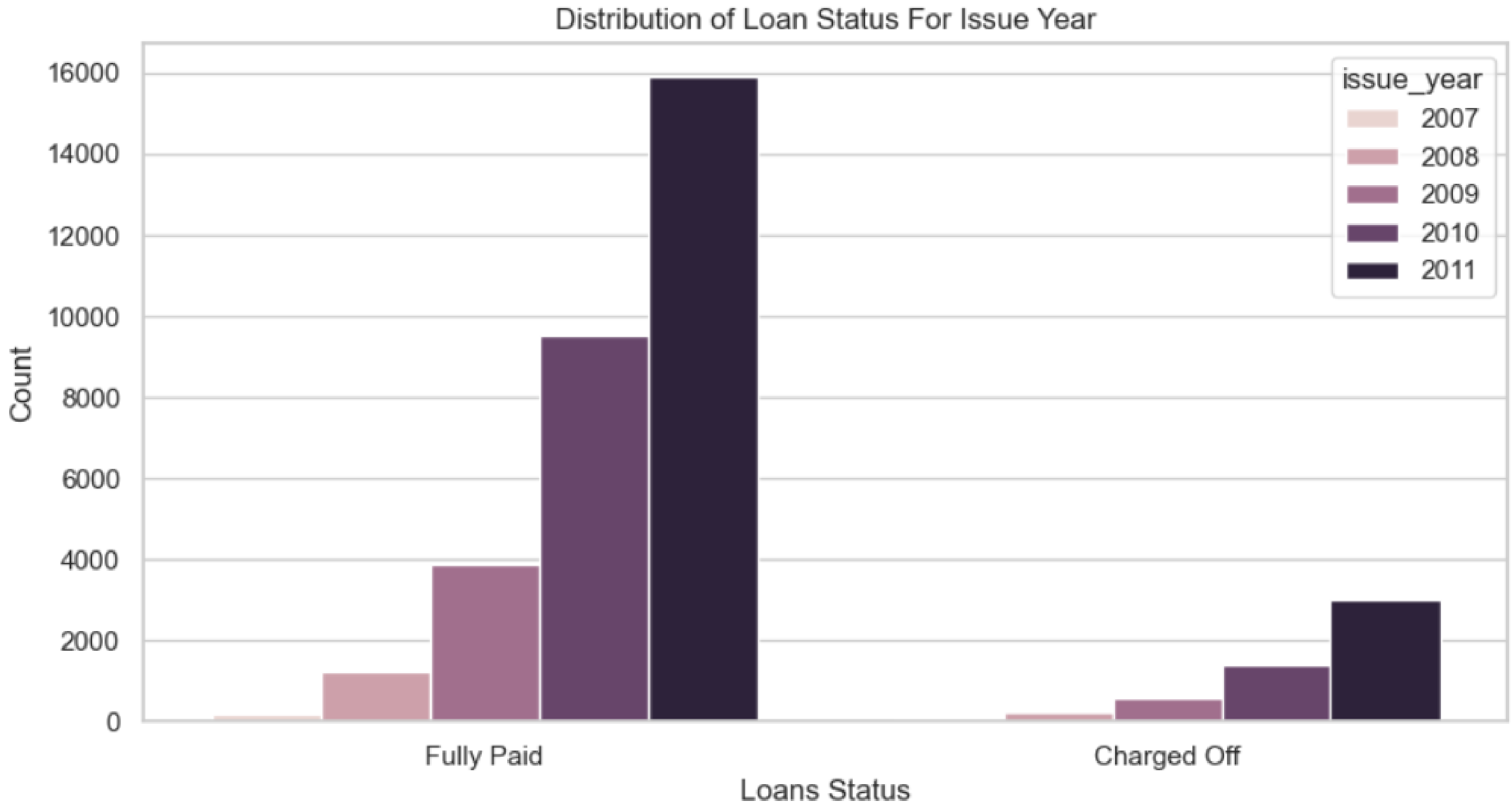
Analysis - I





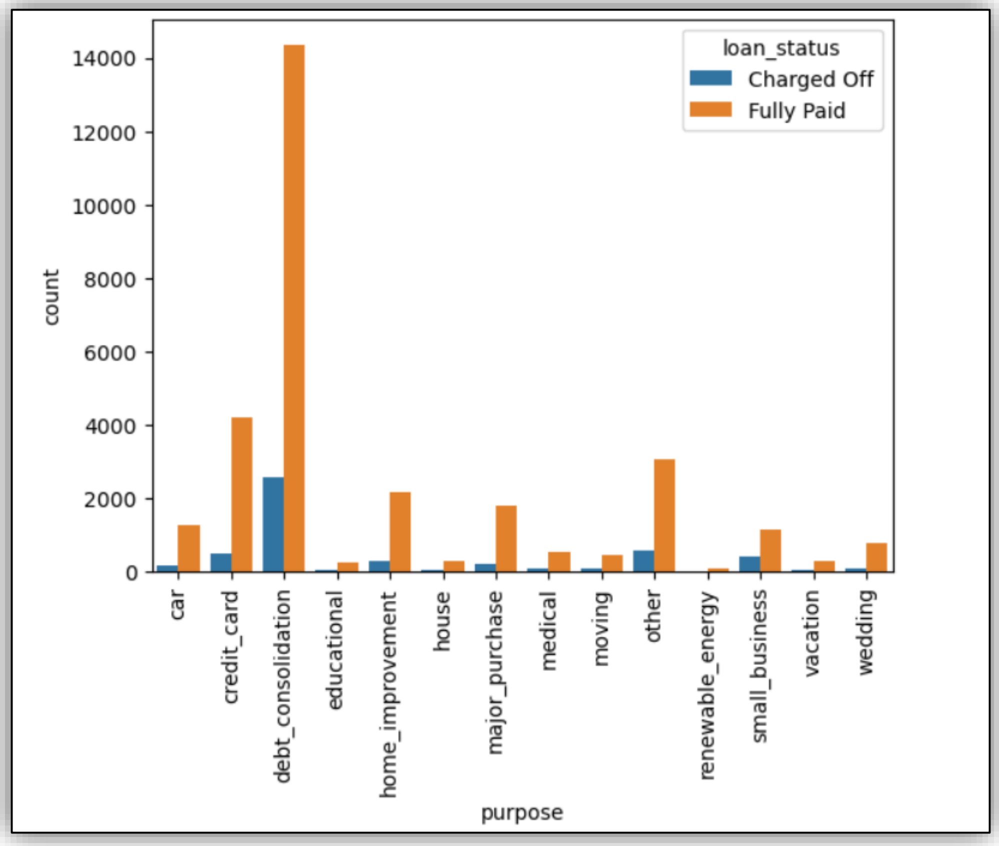
- Noticed a positive growth in terms of loans provided by the company on yearly basis
- Noticed a increased trend in terms of loans provided by the company from January to December.

Analysis - II



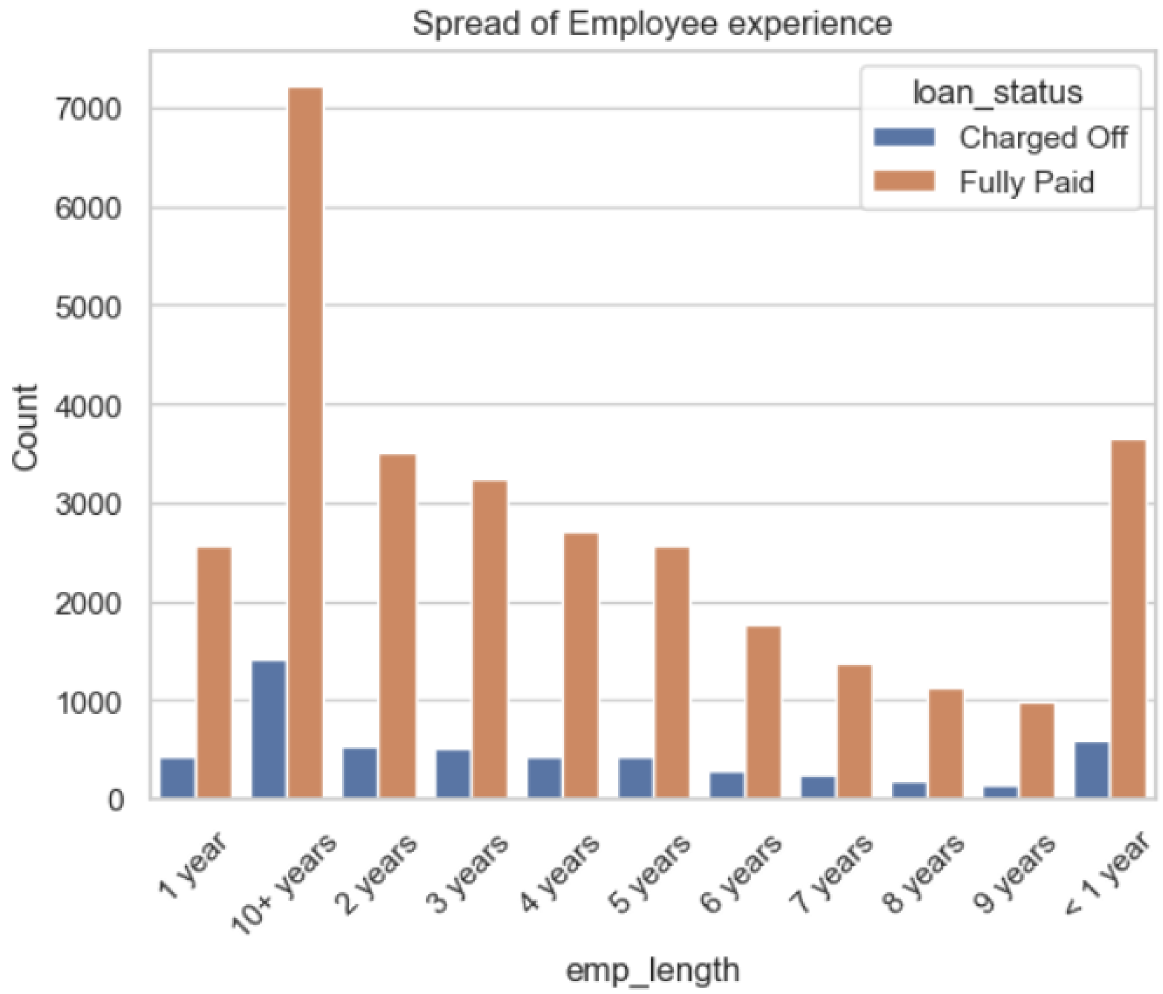
- Noticed a positive growth in terms of fully loans provided by the company on yearly basis
- Noticed a increased trend in terms of charged off loans provided by the company on yearly basis

Analysis - III



- Majority of Loans are Provided for the Category 'Debt Consolidation' and Noticed more Charged Off customers in the Same Category.

Analysis - IV



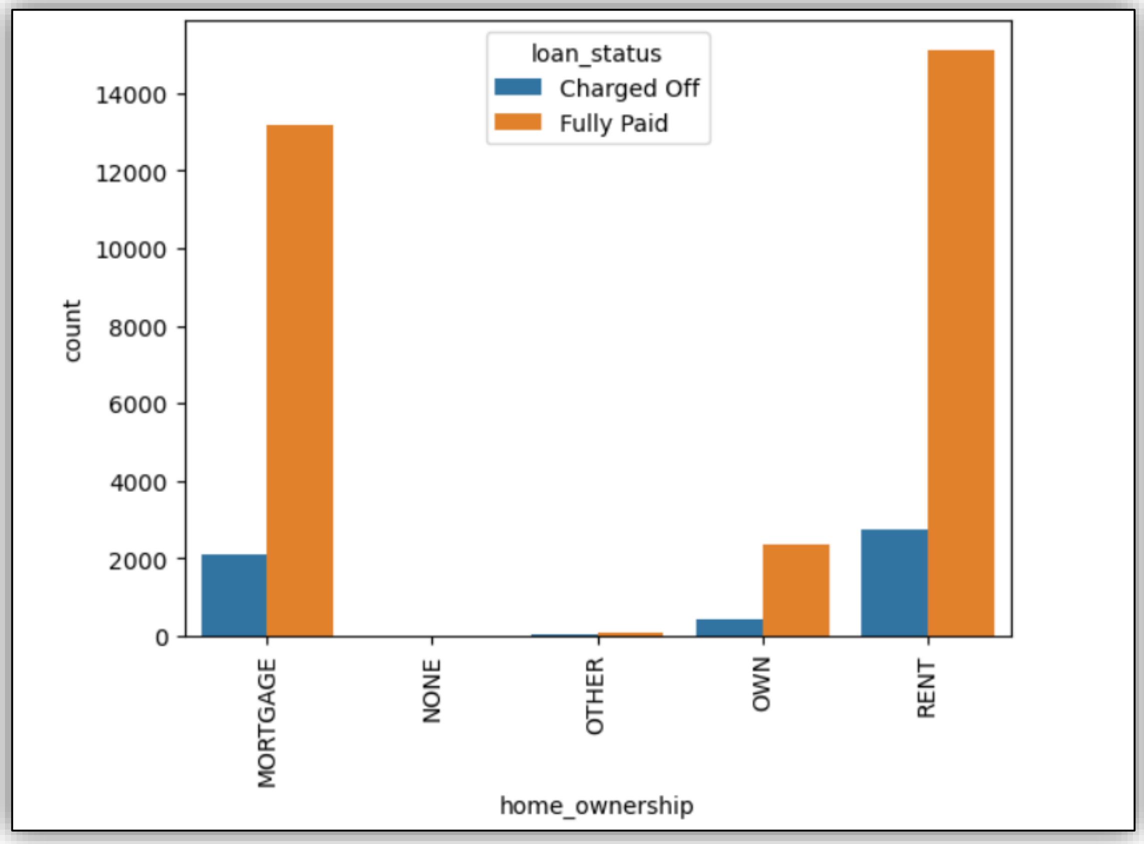
Shorter Tenure, Higher Default Rates:

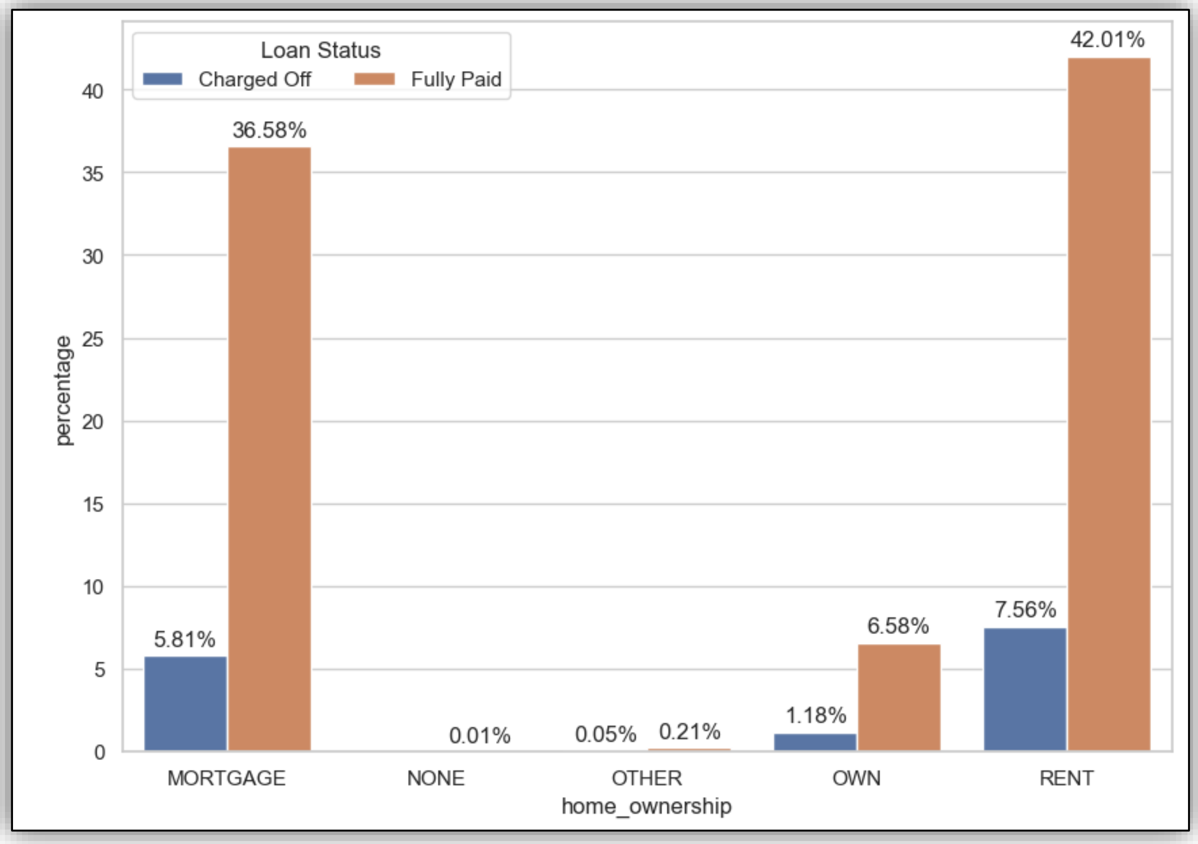
- < 1 year: Employees with less than 1 year of tenure have a significantly higher percentage of charged-off loans compared to those with longer tenures.
- 1-3 years: Borrowers with 1 to 3 years of tenure also exhibit relatively high default rates.

Longer tenure, lower risk:

- As employee tenure increases, the proportion of charged-off loans generally decreases, suggesting that longer-tenured employees might be perceived as more stable and financially responsible.
- Longer tenure may suggest a more stable financial situation, increasing the chances of loan repayment.

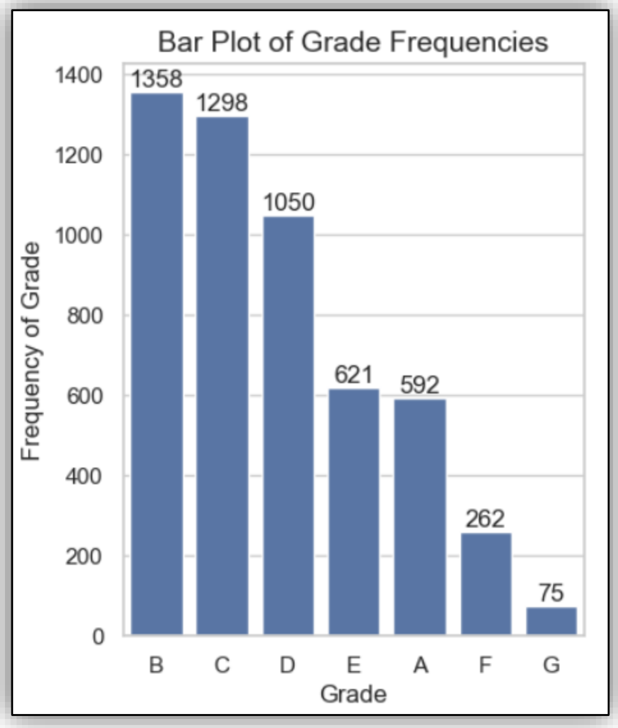
Analysis - V

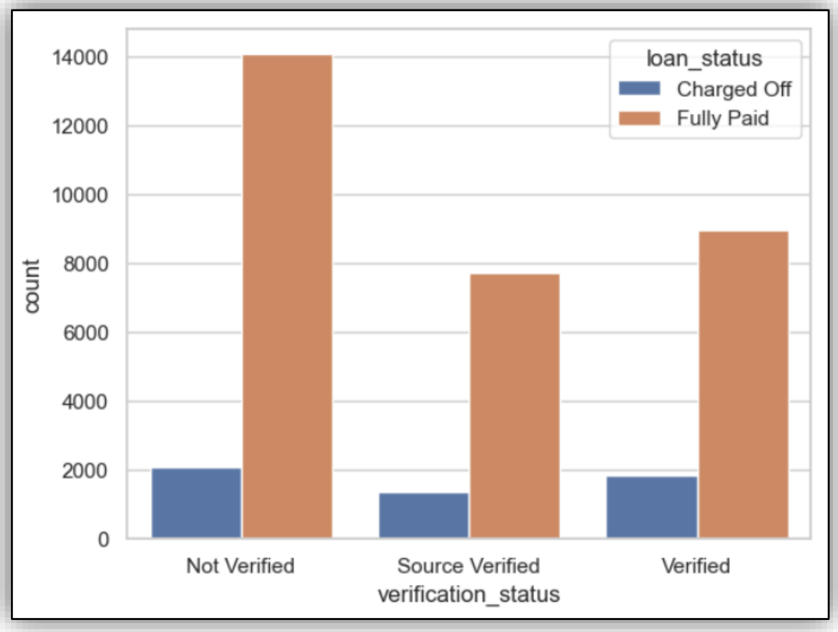


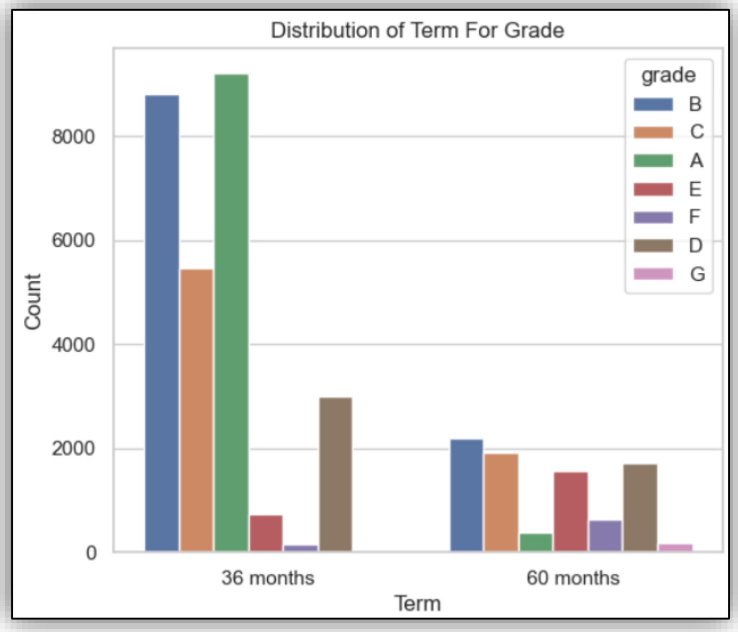


- Majority of loans are provided to the borrowers whose home ownership status is either Rented or Mortgage and same trend can be observed in Charged Off Customers
- Renters have the highest percentage of charged-off loans, indicating `**potential financial instability**` or risk factors associated with renting, followed by Mortgage category

Analysis - VI

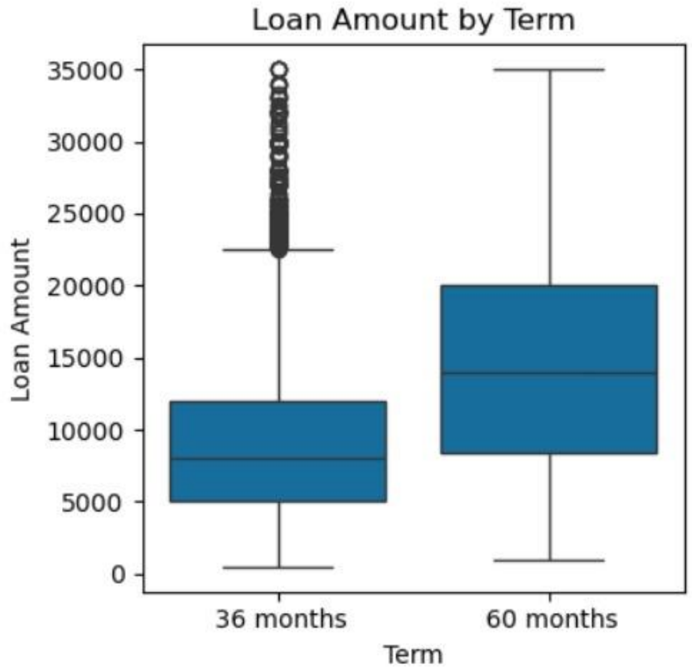


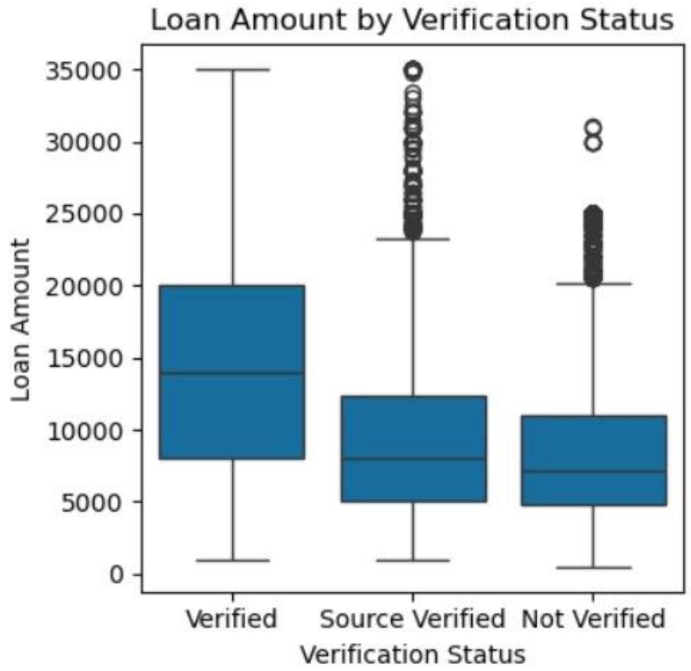


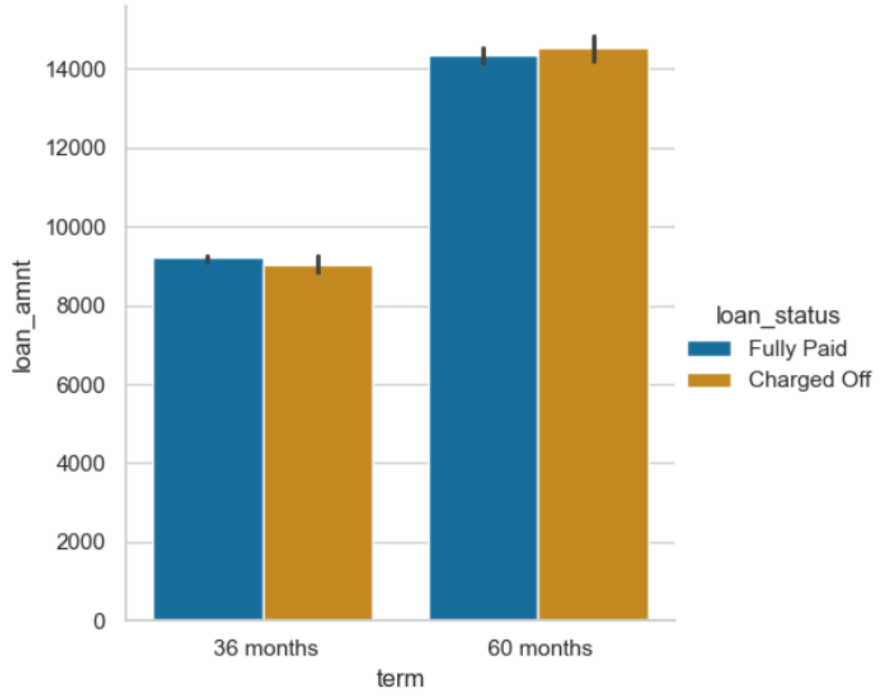


- Noticed more Charged Off customers in the Same Category where the Verification Status is not verified.
- Majority of Charged Off customers are noticed in Grade B, C followed by other grades.
- The loans in 36 month term majorly consist of grade A and B loans whereas the loans in 60 month term mostly consist of grade B, C and D loans.

Analysis - VII

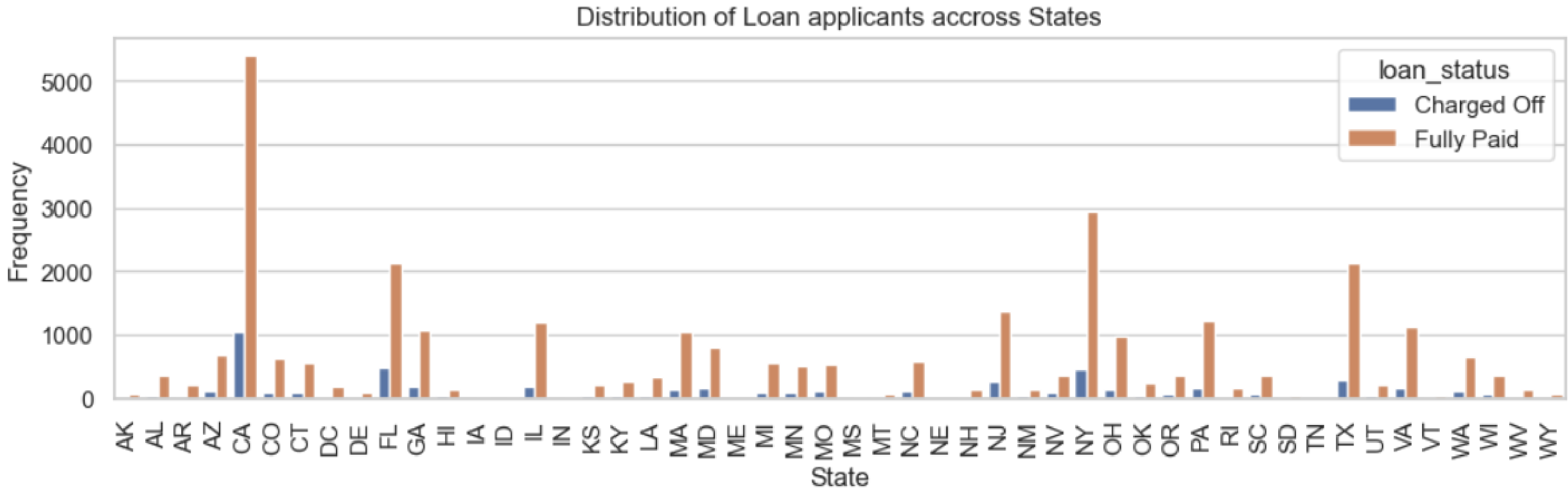






- The borrower who takes higher loan amount tends to choose the loan term 60 months.
- Mostly verified borrower’s are getting higher loan amount due to security reasons.

Analysis - VIII

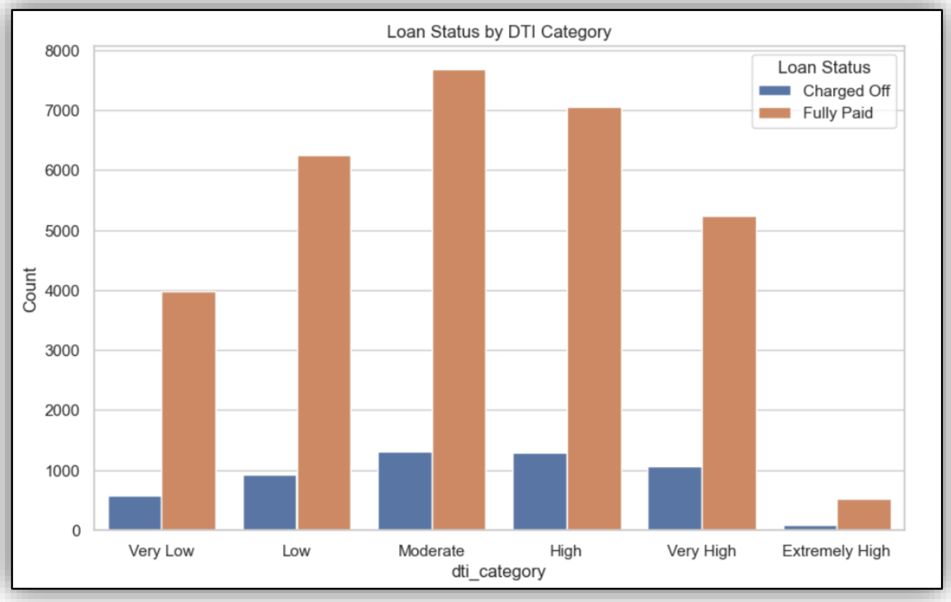


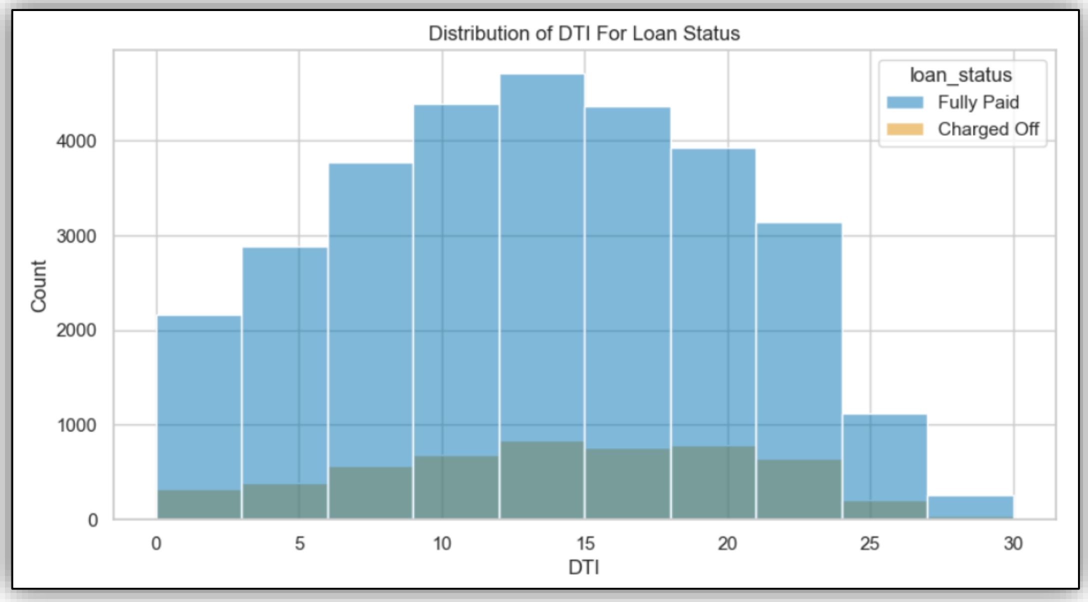
- **CA** has the highest number of both fully paid and Charged Off loans, suggesting a significant presence in the lending market.
- **ID** has the least number of Charged Off **(1)** and **NE** has the least number of Fully Paid **(2)**

- **State with highest Fully Paid loans: CA** with **5415** loans (15.05% of total)
- **State with highest Charged Off loans: CA** with **1047** loans (2.91% of total)

- The fact that Canada also has the highest number of charged-off loans might indicate a potentially higher risk profile for borrowers in that region.

Analysis - IX

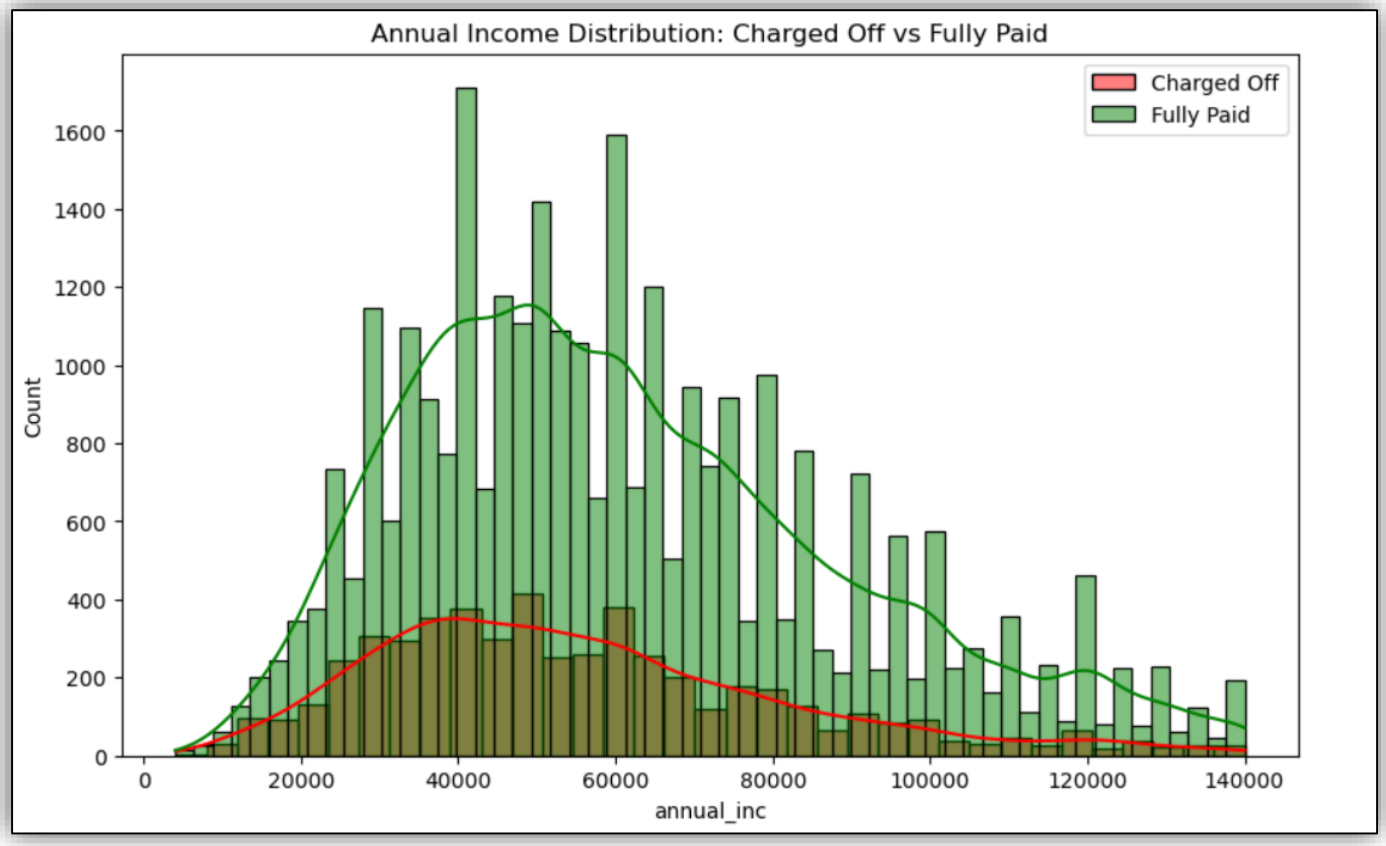




- “Moderate” Category has more number of Fully Paid and Charged Off counts followed by “High”
- High DTI Value having High Risk of defaults & Low DTI Values having Low Risk of defaults

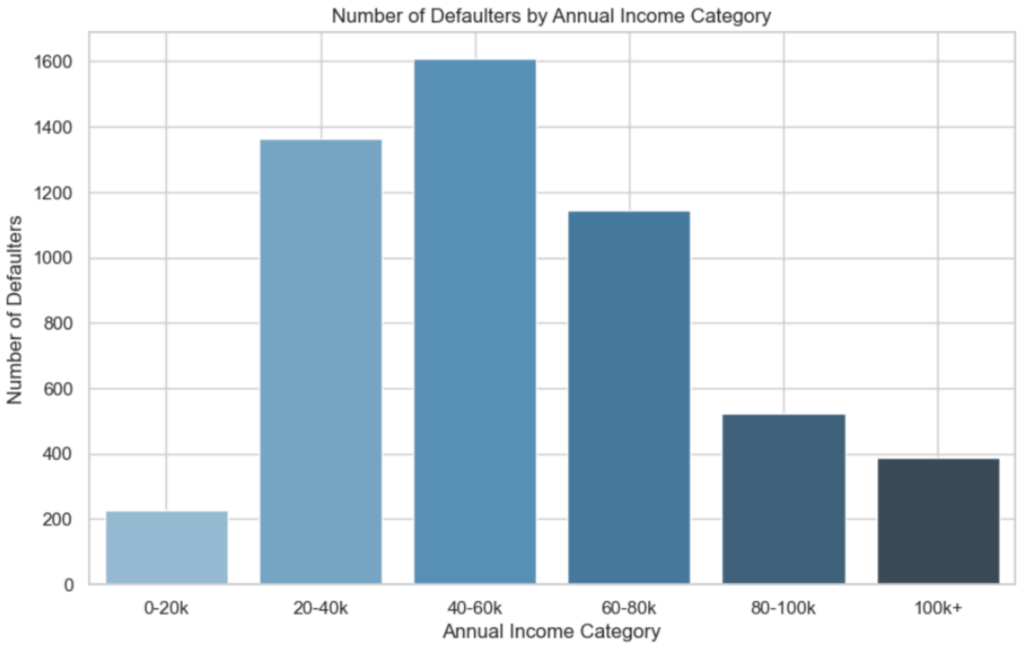
- The Loan Status varies with DTI ratio, we can see that the loans in DTI ratio 10-15 have higher number of defaulted loan but higher DTI has higher chance of defaulting.

Analysis - X



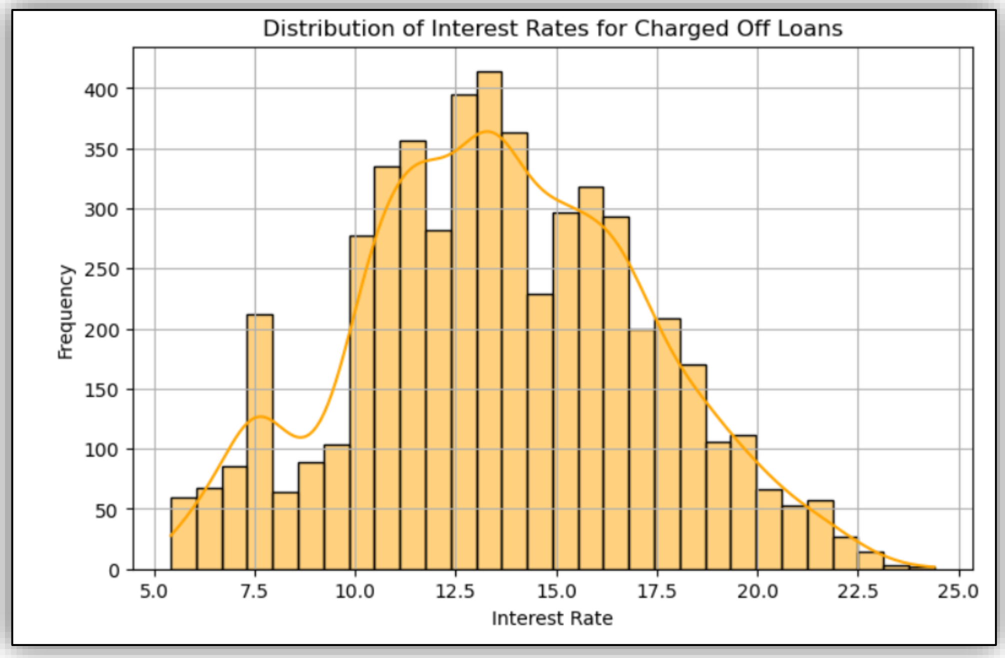
- The **Fully Paid** group has an average annual income of approximately **$61,222**.
- The **Charged Off** group has an average annual income of approximately **$55,574**.

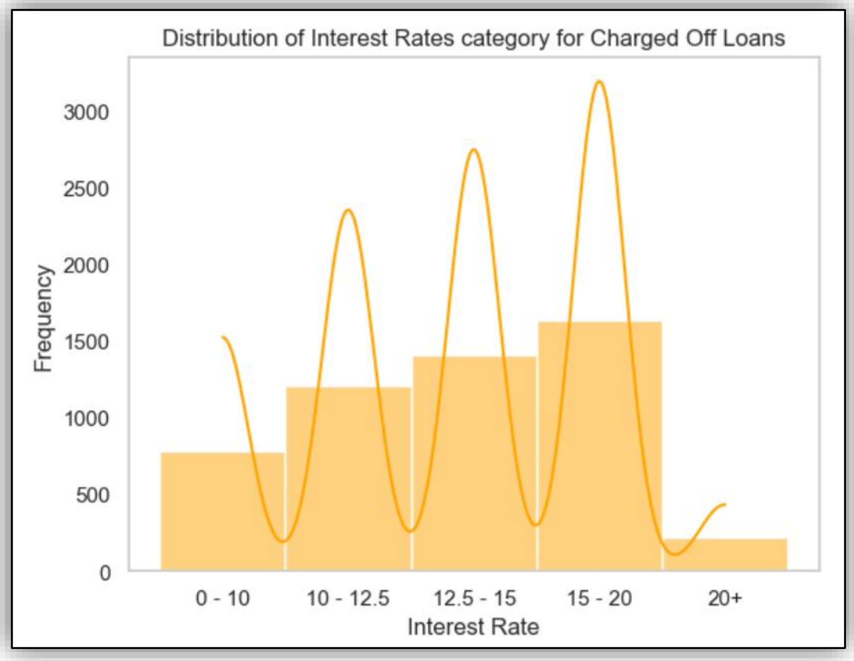
Analysis - XI



- The income category with the highest number of defaulters is the **40k-60k** range.
- The **0-20k** income category has the **lowest number of defaulters**.
- Starting from **40k**, as annual income **increases**, the number of defaulters **decreases** steadily.
- The plot suggests a **negative relationship** between annual income and the people that are likely to default
- **Individuals with higher incomes** are **less likely to default** on their loans, while mid-income groups show higher default rates.

Analysis - XII

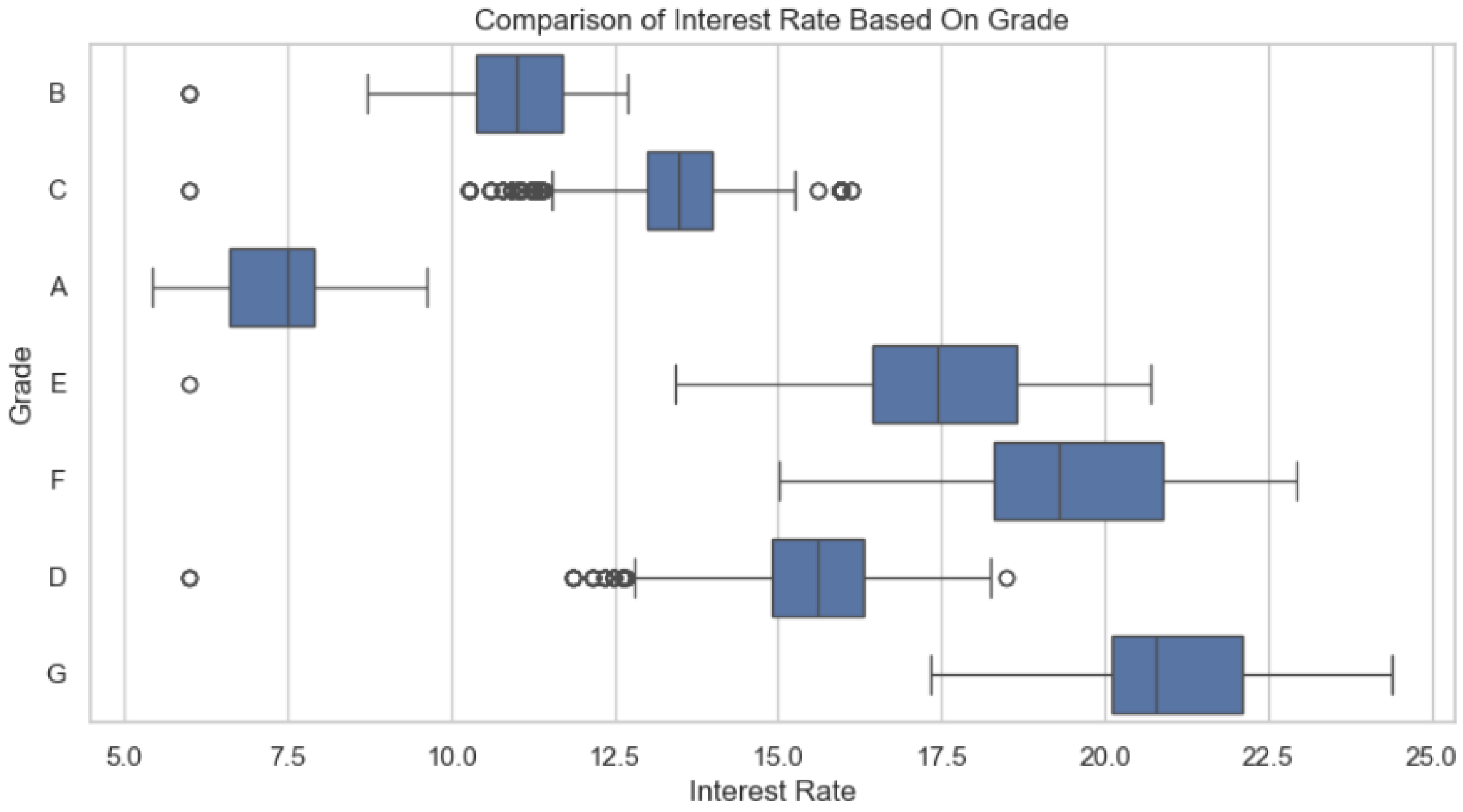




- The most frequent interest rate for charged-off loans is around **12.5%**.
- A significant portion of borrowers with charged-off loans have interest rates between **10% and 17.5%**, suggesting that these interest rates are particularly risky..

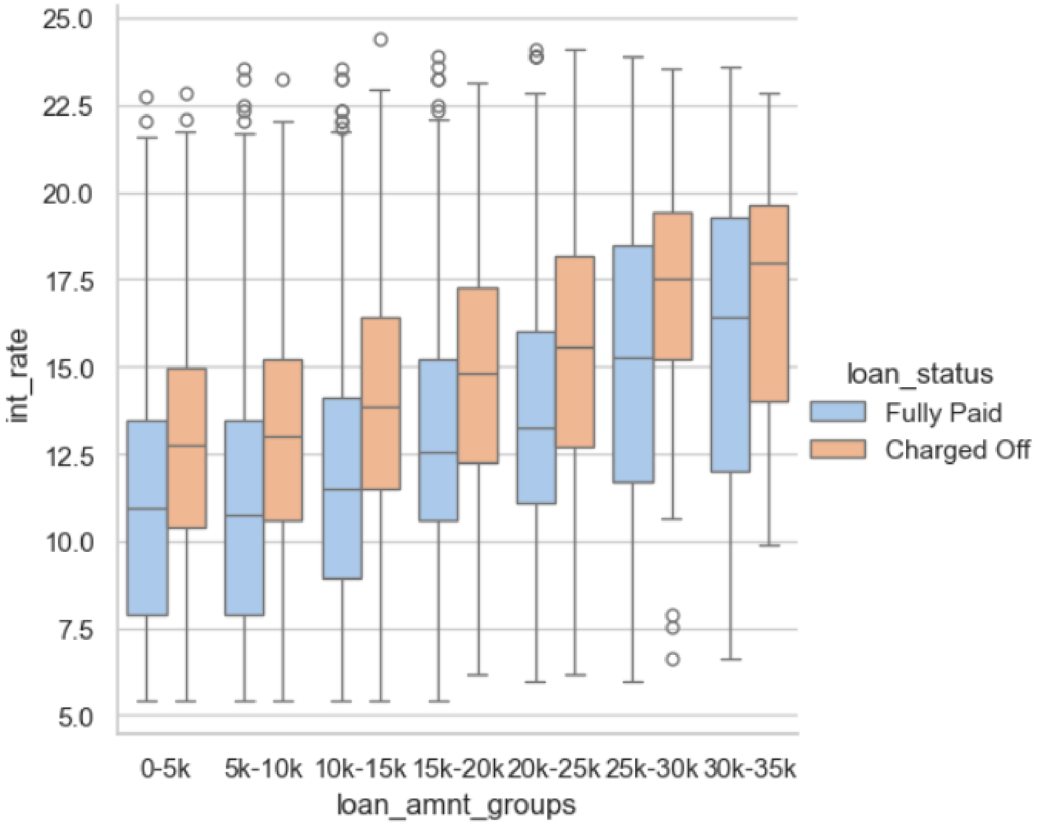
- A significant portion of charged-off loans fall within the medium-to-high interest rate ranges (10% and above).

Analysis - XIII



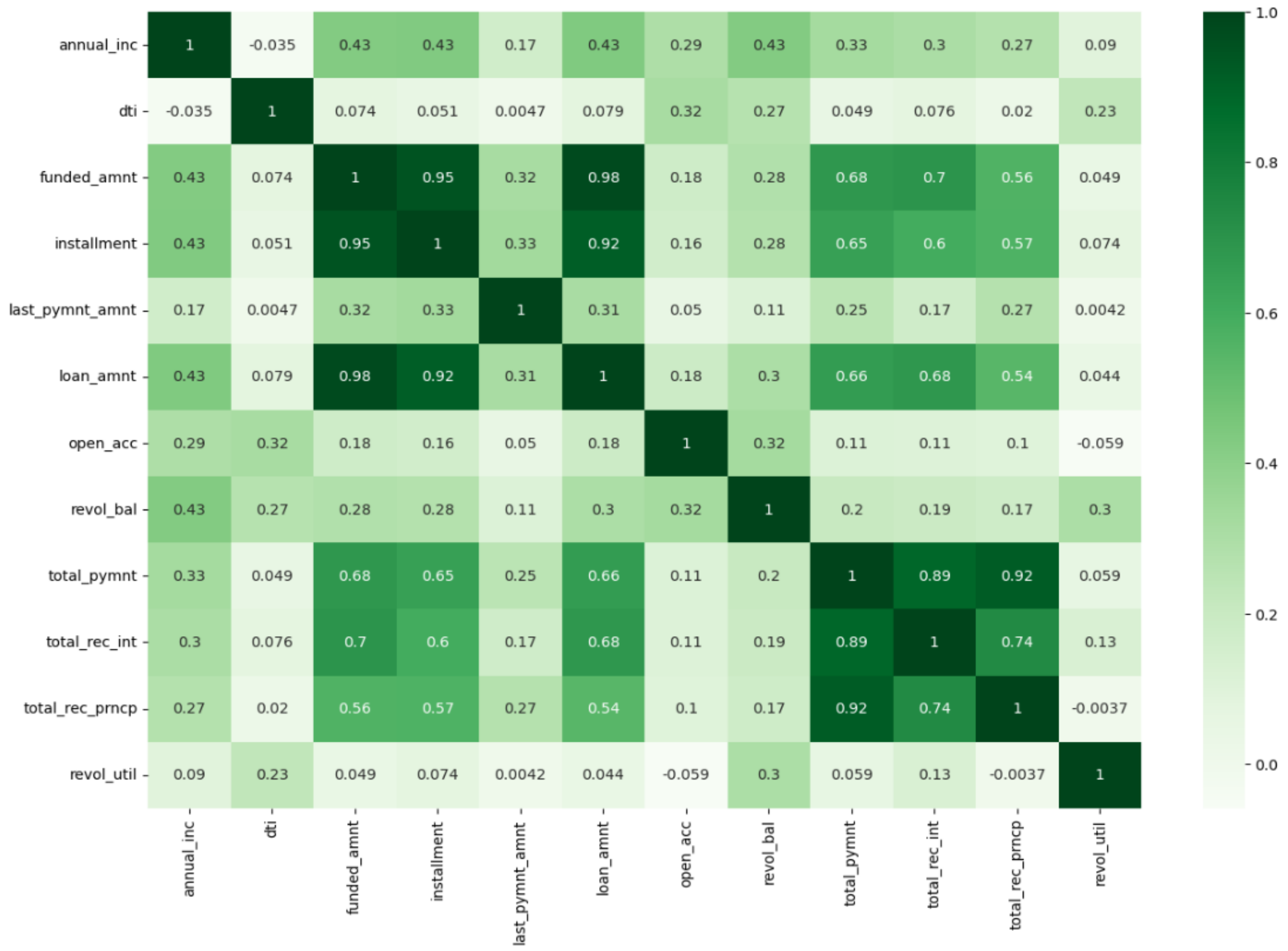
- Grade represent risk factor thus we can say interest rate increases with the risk.

Analysis - XIV



- The interest rate for charged off loans is pretty high than that of fully paid loans in all the loan_amount groups.
- This can be a pretty strong driving factor for loan defaulting.

Analysis - XV



Annual Income is Negatively Correlated with DTI

Insights

- Most loans have a 36-month term compared to 60 months.
- Interest rates are mainly clustered between 10% and 15%.
- Many loans are given to borrowers with grades 'A' and 'B', indicating that most loans are of high quality.
- Most borrowers have more than 10 years of work experience.
- Most borrowers do not own property; they either have a mortgage or rent.
- Around 50% of borrowers are verified either by the company or through a verified source.
- The annual income distribution is skewed, showing that many borrowers have lower incomes compared to others.
- A significant number of loans are taken out for debt consolidation, followed by credit card debt.
- Many borrowers come from large urban areas like California, New York, Florida, and Texas.
- Most borrowers have a high debt-to-income ratio (DTI), mainly between 10 and 15.
- More loans are approved in the last quarter of the year.
- The number of approved loans is growing rapidly over time, suggesting that loan approvals are increasing.
- Debt consolidation is the most common reason for loans and has the highest number of fully paid and defaulted loans.
- Loans with a 60-month term are more likely to default, while 36-month term loans are more likely to be fully repaid.
- 36-month loans are primarily grade A and B, while 60-month loans are more often grade B, C, and D.
- Loan status is affected by the DTI ratio, with loans having a 10-15 DTI ratio showing more defaults, but higher DTI ratios are even more likely to default.
- Borrowers who own property have fewer defaulted loans compared to those with a mortgage or rent.
- Borrowers with an annual income below $50,000 are more likely to default, while those with higher incomes are less likely to.
- Defaulted loans tend to increase with interest rates but drop after 17.5%.
- Employees with over 10 years of experience are both more likely to default and more likely to fully pay off their loans.
- The loan grade reflects the risk level, with interest rates increasing as the risk increases.
- Grade A loans, which carry the lowest risk, also tend to have the lowest DTI ratio, meaning that higher-grade loans have fewer defaults.

Recommendations :

Key factors to predict default risk and avoid credit loss:

1.Debt-to-income ratio (DTI)
2.Loan grade
3.Verification status
4.Annual income

Additional considerations for defaults:

1.Borrowers from areas outside large urban cities like California, New York, Texas, and Florida.
2.Borrowers with annual incomes between $50,000 and $100,000.
3.Borrowers with lower grades (E, F, G), indicating higher risk.
4.Borrowers with very high DTI ratios.
5.Borrowers with over 10 years of work experience.