



LENDING CLUB CASE STUDY

PRESENTATION

BY.

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(ML C42)

THE PROBLEM

COMPANY

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.

CONTEXT

Lending Club wants to understand the driving factors behind loan default, i.e. the driver variables which are strong indicators of default.

The company can utilise this knowledge for its portfolio and risk assessment.

PROBLEM STATEMENT

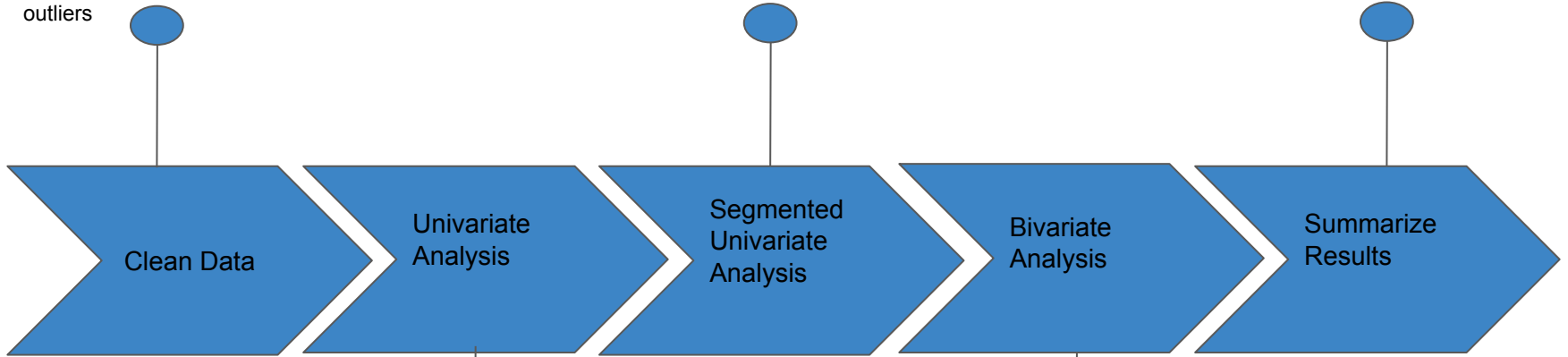
As a data scientist working for Lending Club analyze the dataset containing information about past loan applicants using EDA to understand how consumer attributes and loan attributes influence the tendency of default.

ANALYSIS APPROACH

Identify the null values, Single value columns, Missing values, Duplicates, summary info, footer and remove them from the analysis. Impute some values for missing data and handle the outliers

Analyze variables against segments of the other variables

Identify Insights and publish conclusion and recommendations

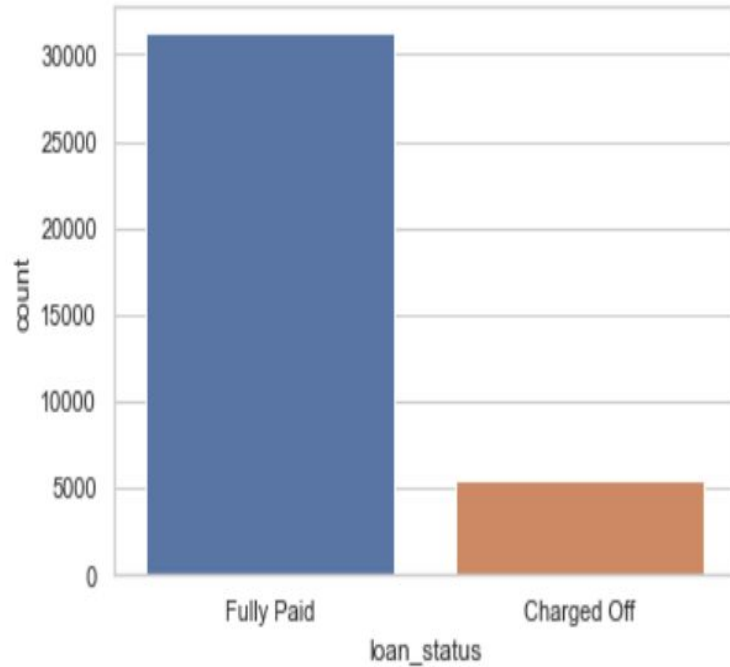


Check the distributions and frequencies of various numerical and categorical variables. And Create derived variables.

Do correlation analysis
Check how two variables affect each other or a third variable.

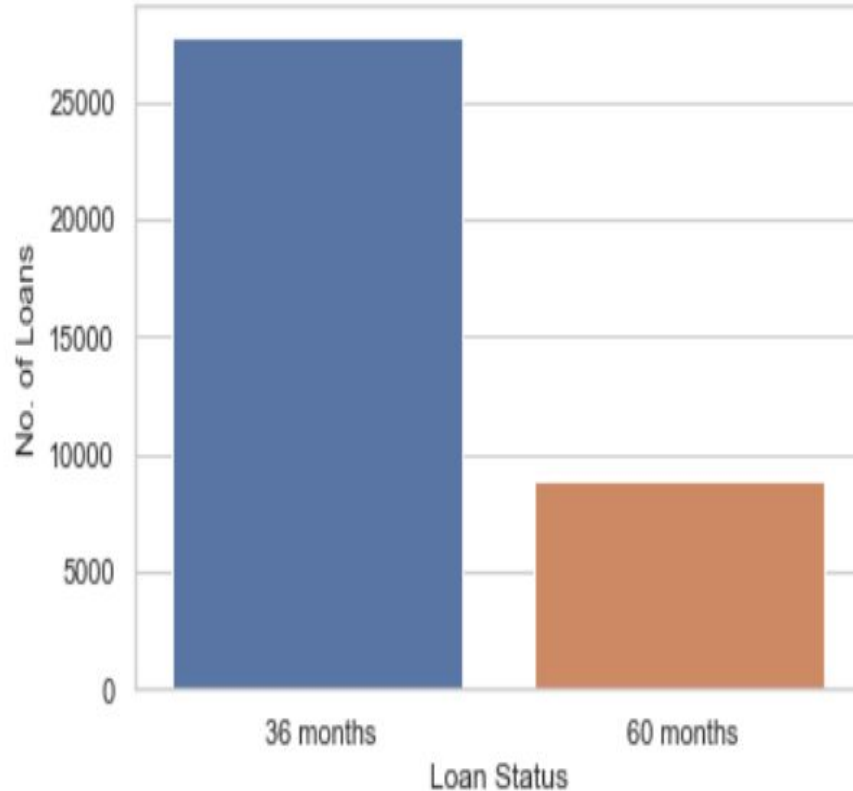
UNIVARIATE AND SEGMENTED ANALYSIS

Loan Status - Analysis



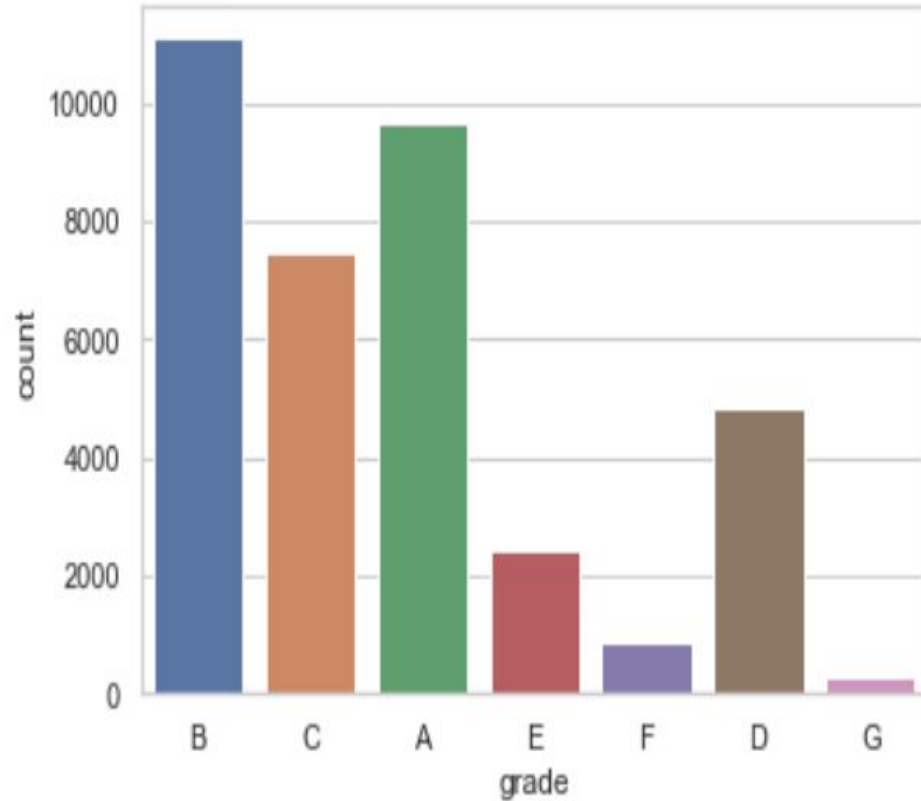
Insights : Majority of loans are Fully paid and charged off loans are about 14.3% of the total loans

Loan Term- Analysis



Insights : Number of loans borrowed for the term of 36 months is more as compared to the Number of loans borrowed for the term of 60 months

Loan grade - Analysis



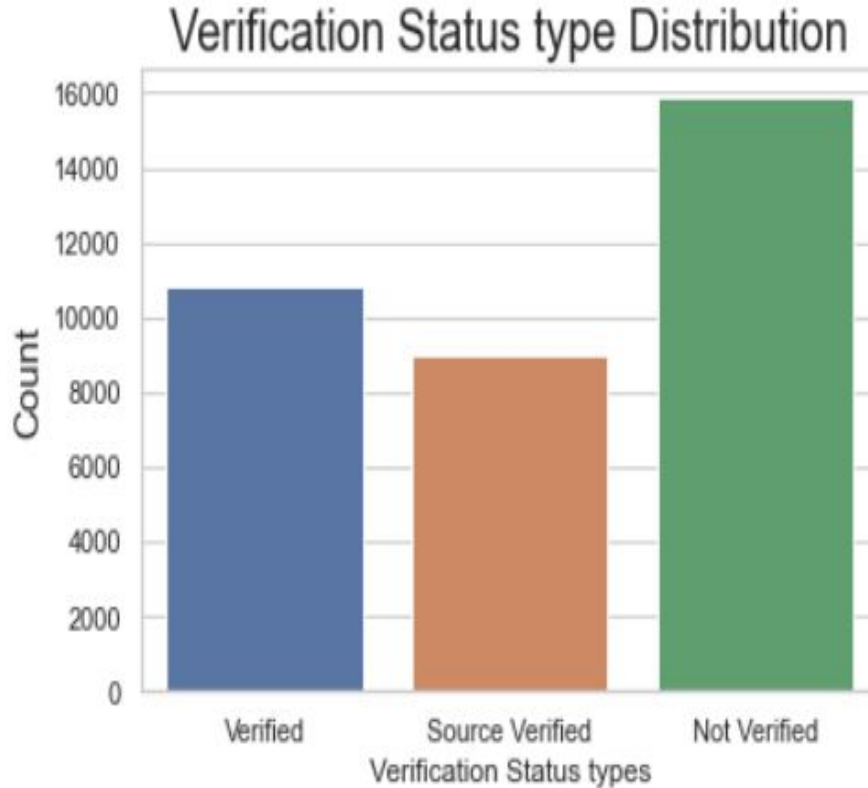
Insights : Maximum loans are given to A, B and C grade applicants

Loan Home Ownership - Analysis



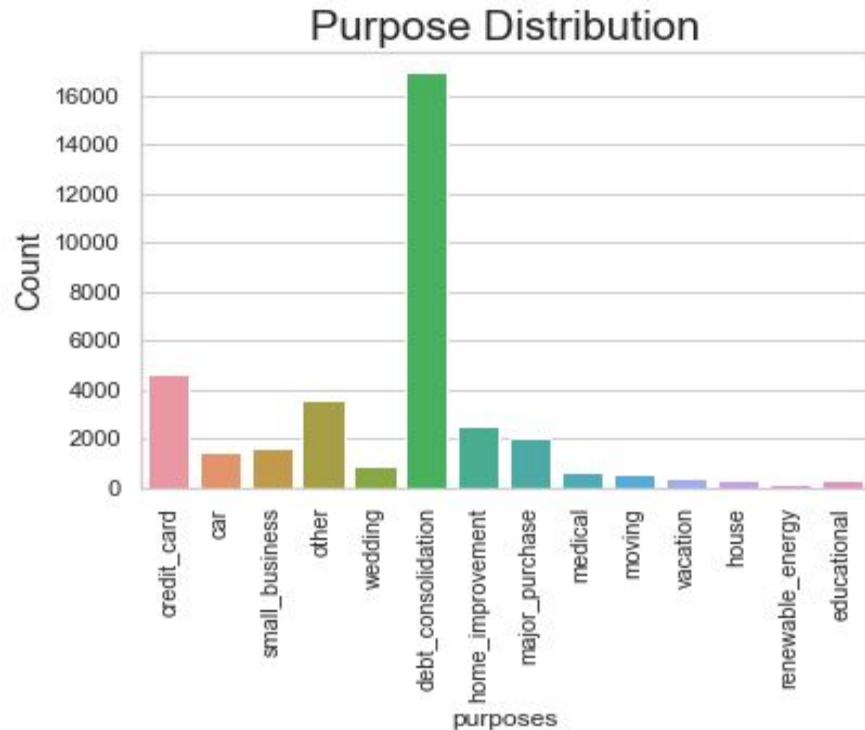
Insights: Majority of the borrowers are living in the Rented house and 2nd majority of the borrowers are with the mortgaged homes.

Verification Status - Analysis



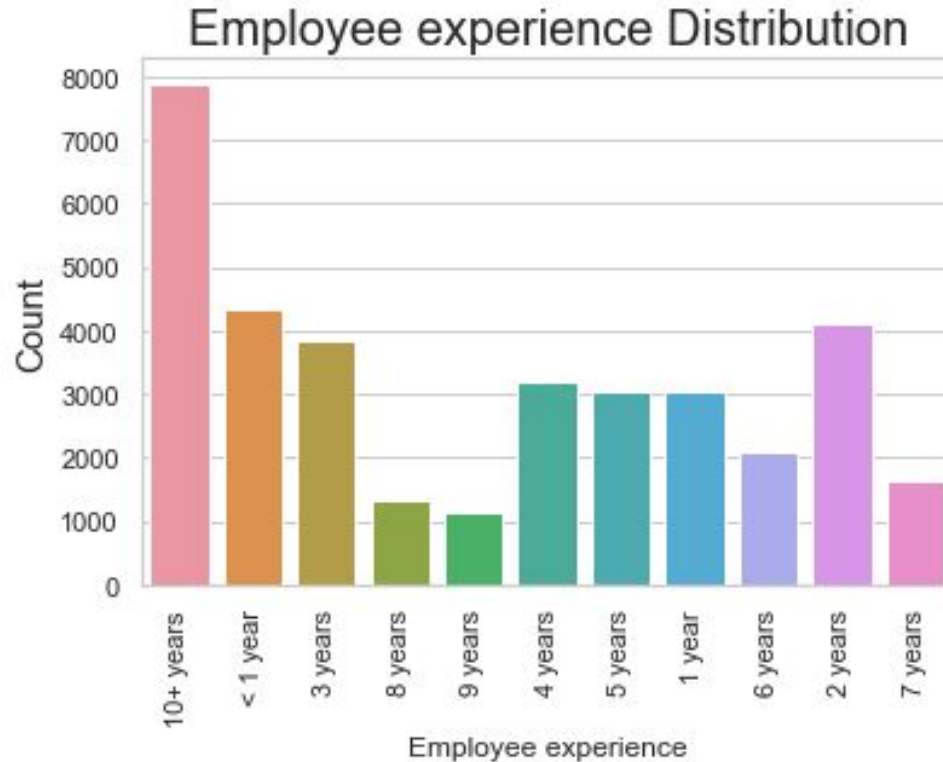
Insights: Maximum Number of loans are 'Not Verified' and these 'Not Verified' customers are potential risk to the business.

Loan Purpose - Analysis



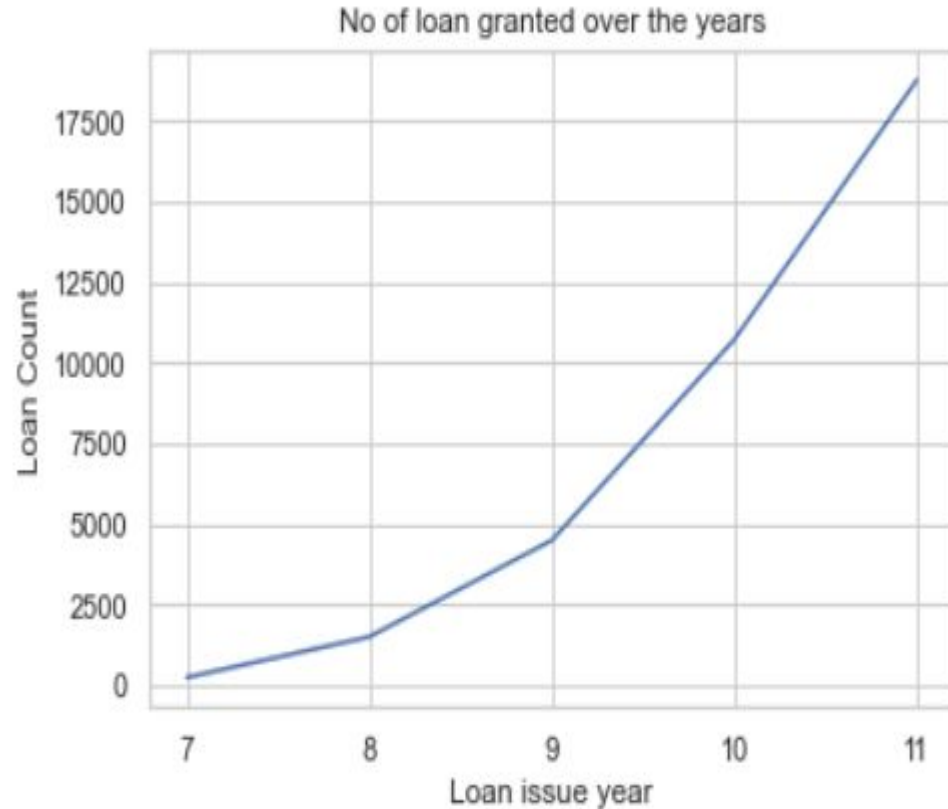
Insights: Majority of loans are taken for the debt consolidation purpose.

Employee Experience - Analysis



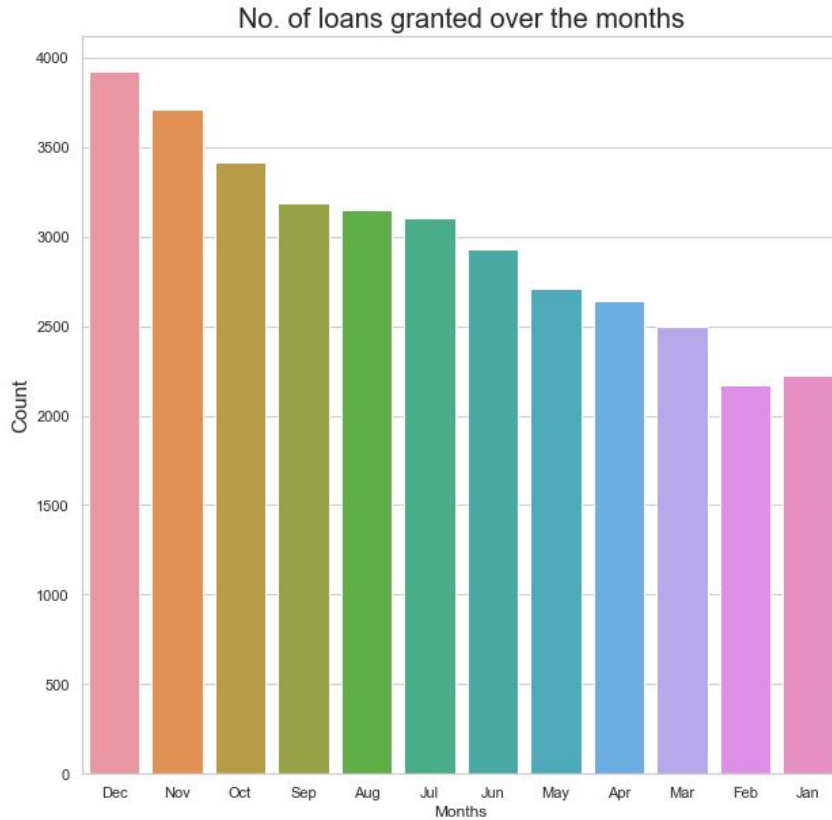
Insights : Applicants who have 10+ years and <1 year of experience are more for the loan.

Loan Issue Year - Analysis



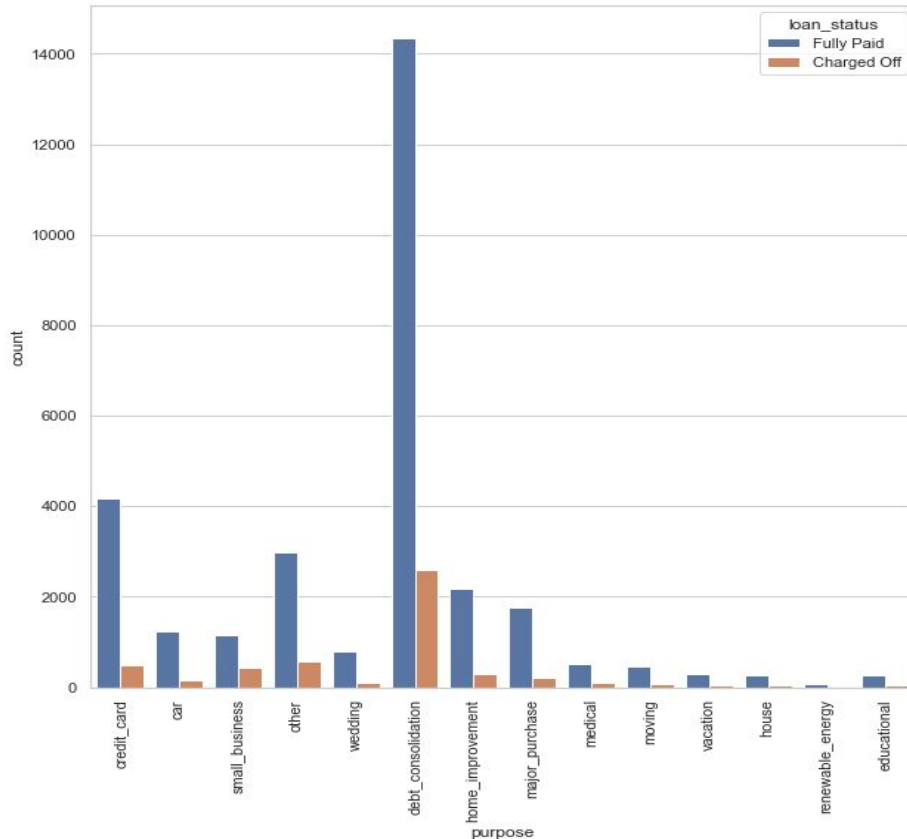
Insights: From the above graph it shows as over the years the number of approved loans been increased.

Loan Issue Month - Analysis



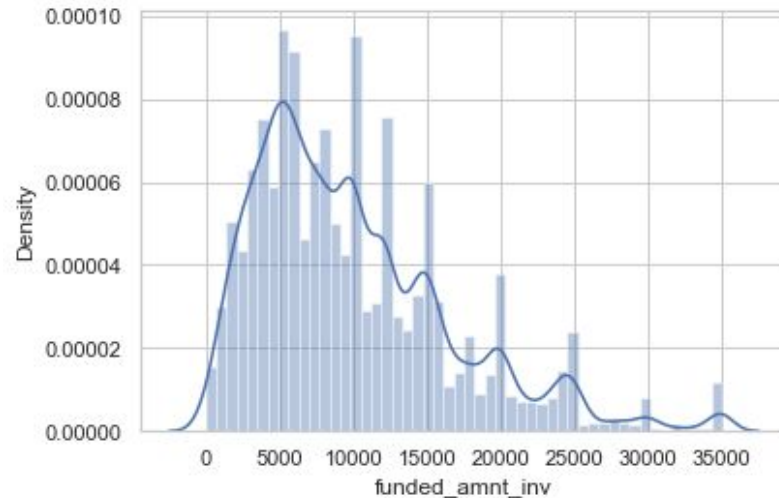
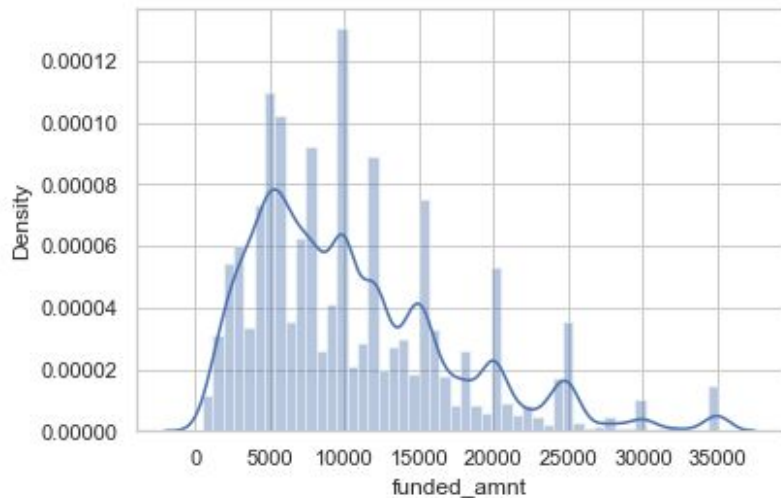
Insights: It seems like during December more number of customers are granted for the loan.

Loan Purpose – Analysis (Loan Status)



Insights: From the analysis top 2 purposes for applying the loans shows as 'debt consolidation' & 'credit card'. Seems a lot of people are trapped in the credit card and other loans, they are trying to close their existing loan accounts in order to get relieved from them. (Taking the new loans to close the existing ones).

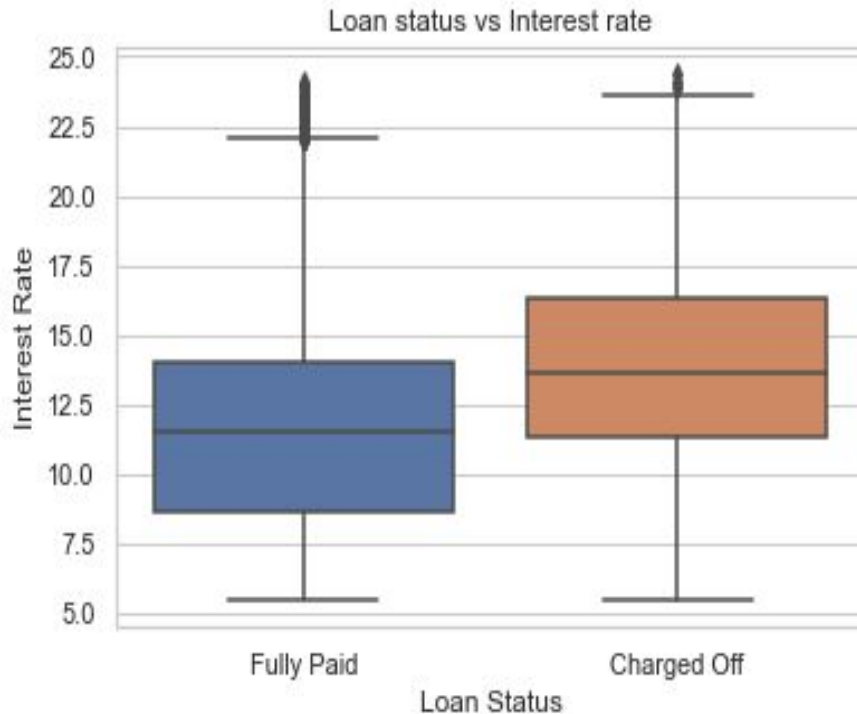
Distribution of Funded amount by Investors & funded amount



Insights: Majority of Amount funded by investors & funded amount is 5000

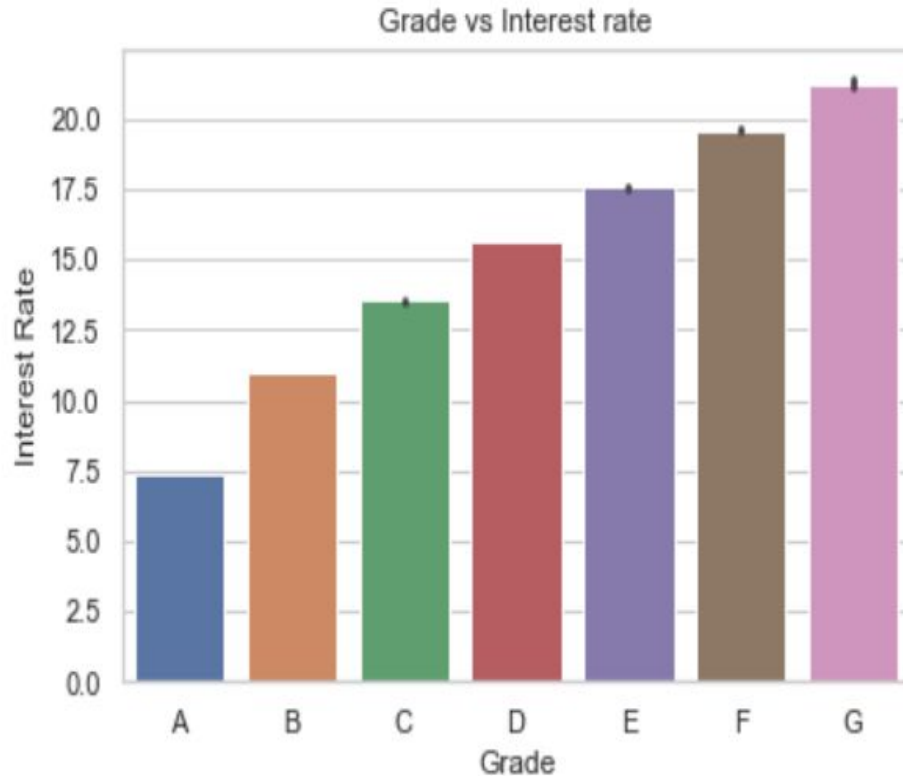
Bivariate Analysis

Loan Status Vs Interest Rate



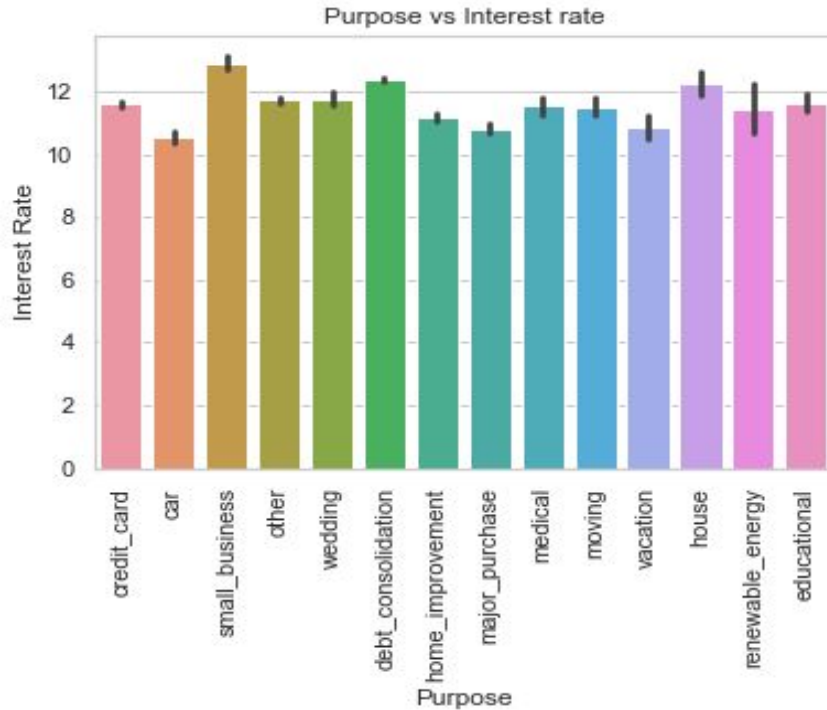
Insights: It shows that Charged Off loans has higher interest rates and I think it's a good strategy to handle the risk.

Grade Vs Interest Rate



Interest rates are high for lower grades of borrowers. It seems a good strategy and the grading system in the company works well and they can continue using this.

Purpose vs Interest Rate

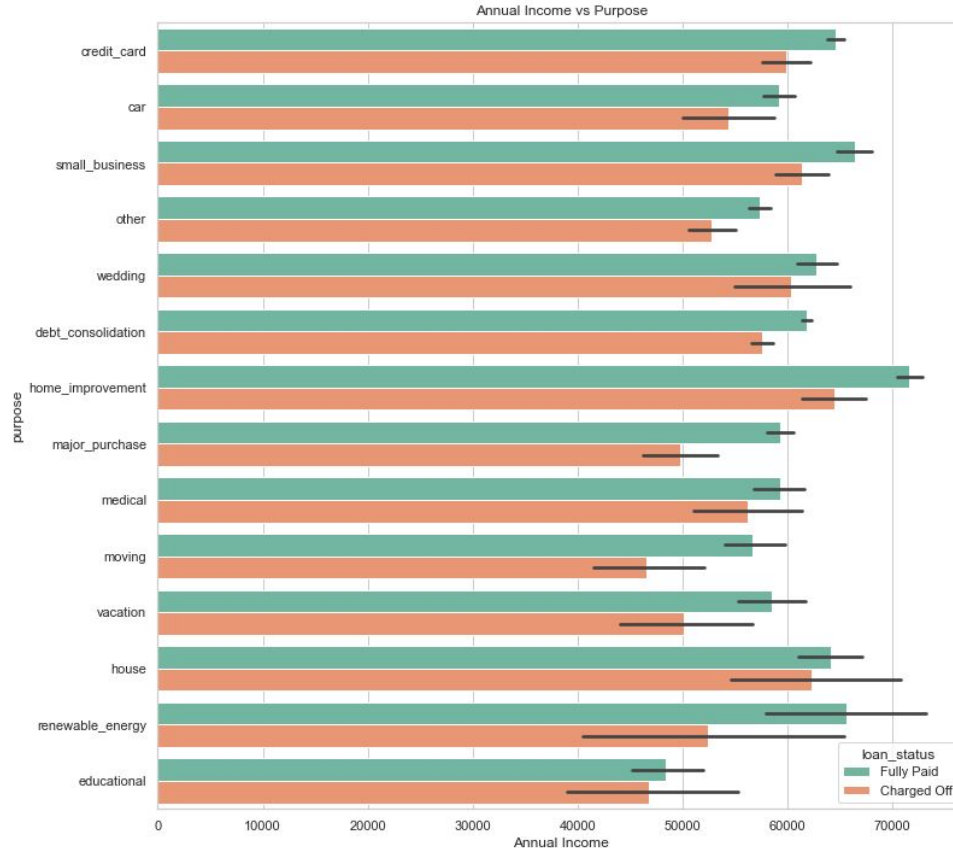


Insights: It looks like highest interest rates (above 12%) are given to small business, debt consolidation & House.

It seems company identified these loans borrowers are at risk and they have increased their interest rates. However, we need to look at other driving factors to see if we need to continue offering the high interest rates to these borrowers.

Example: Small business group of borrowers maybe a potential risk.

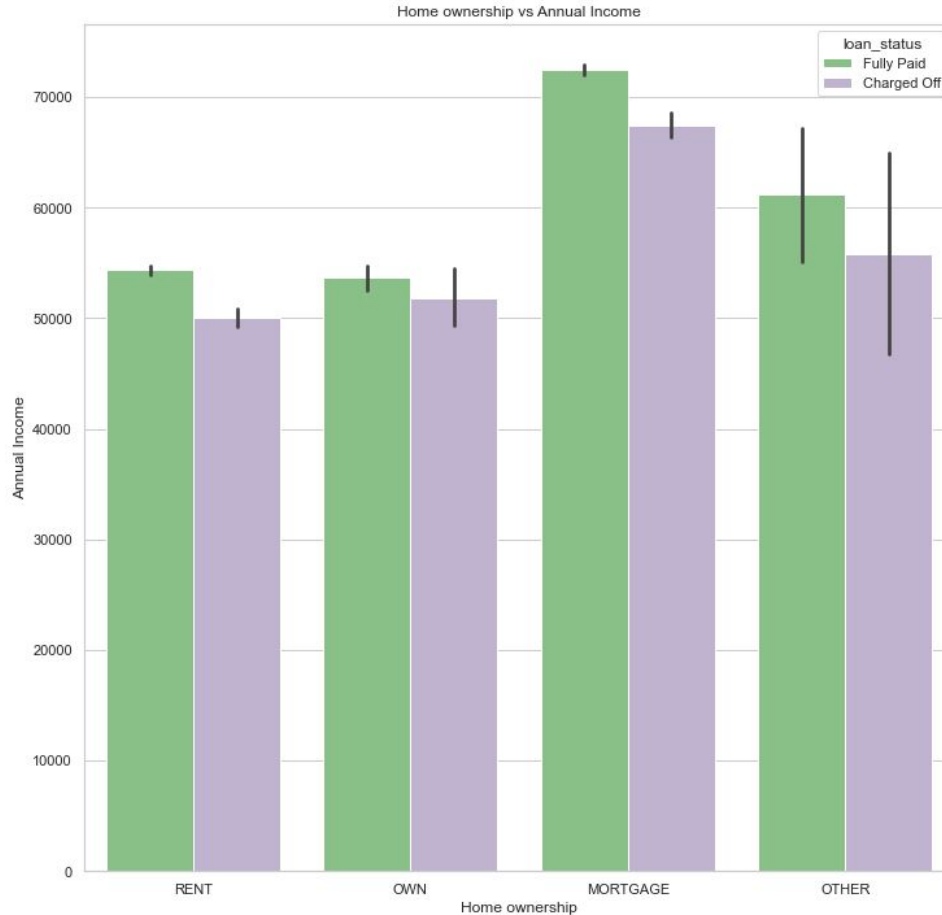
Annual Income vs Purpose (Loan Status)



Insights: From the Analysis, we can say that borrowers with higher salary has largely applied loans for purposes such as 'home improvement', 'house', 'renewable energy' and 'small business'

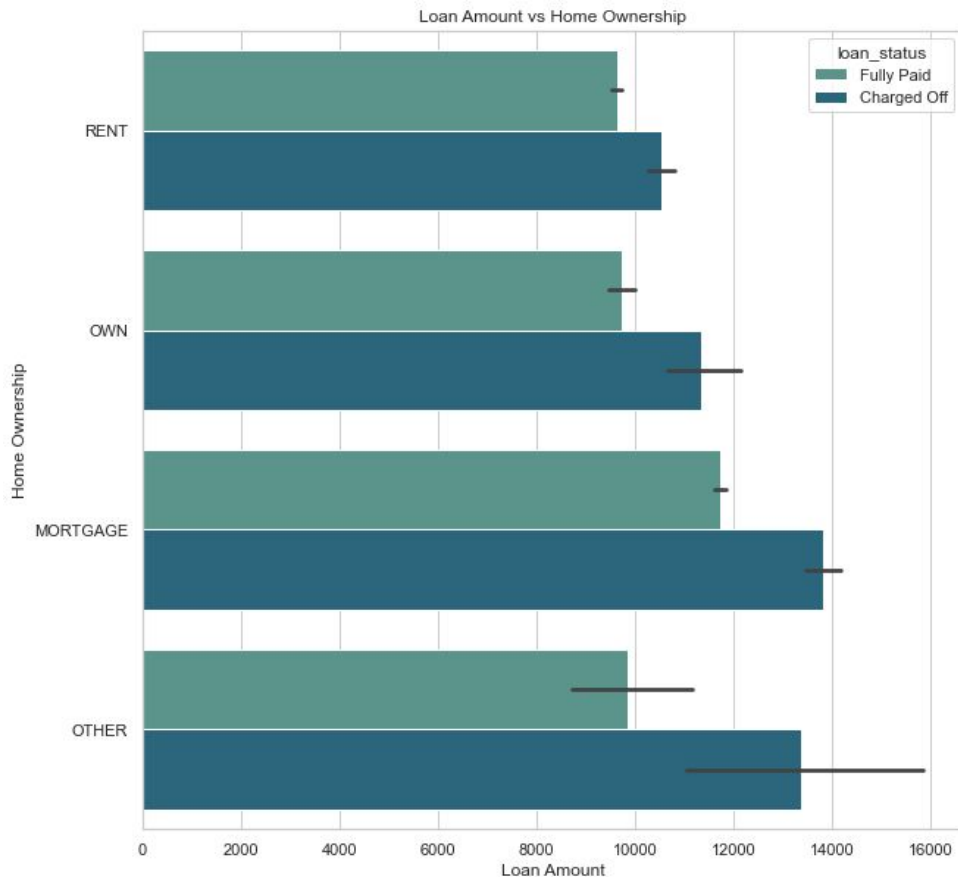
There is a high probability of defaulting when borrowers take loan for 'home improvement', 'house', 'small business' with a income of 60K-70K.

Home Ownership vs Annual Income (Loan Status)



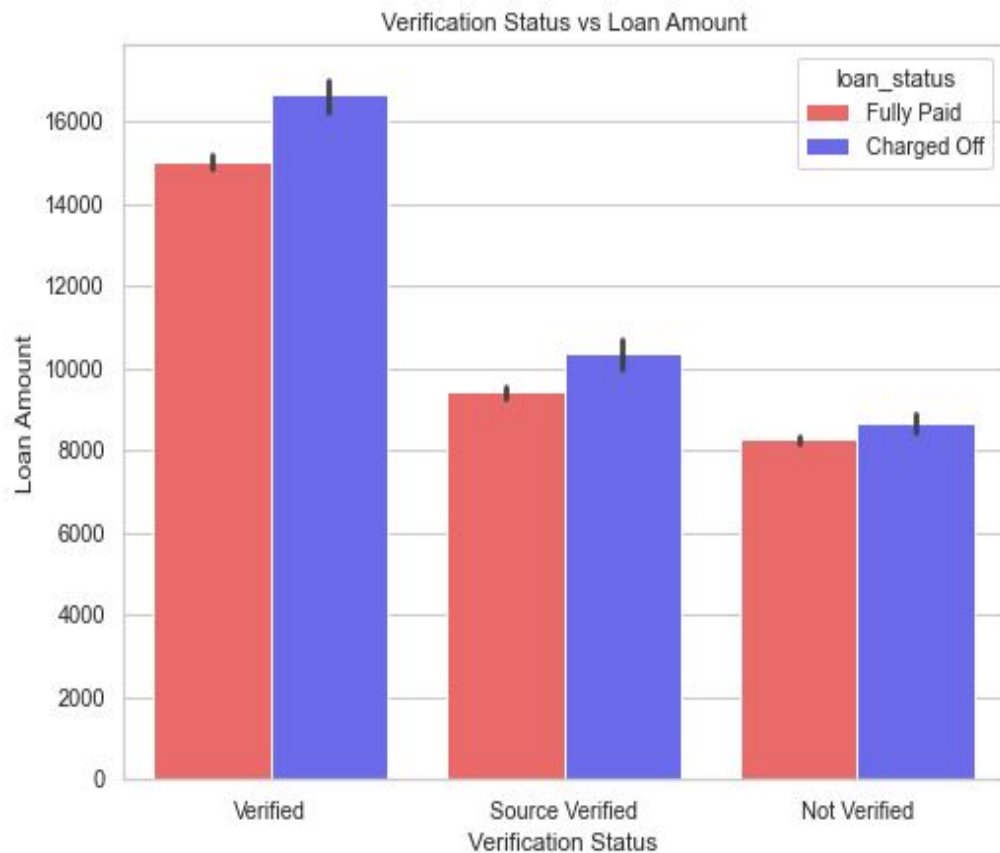
Insights: It looks like borrowers who have an income of 60K - 70K take the Mortgage loan, more likely to be defaulted. So, the company has to reduce the number of loans to be approved in this category.

Loan Amount vs Home Ownership (Loan Status)



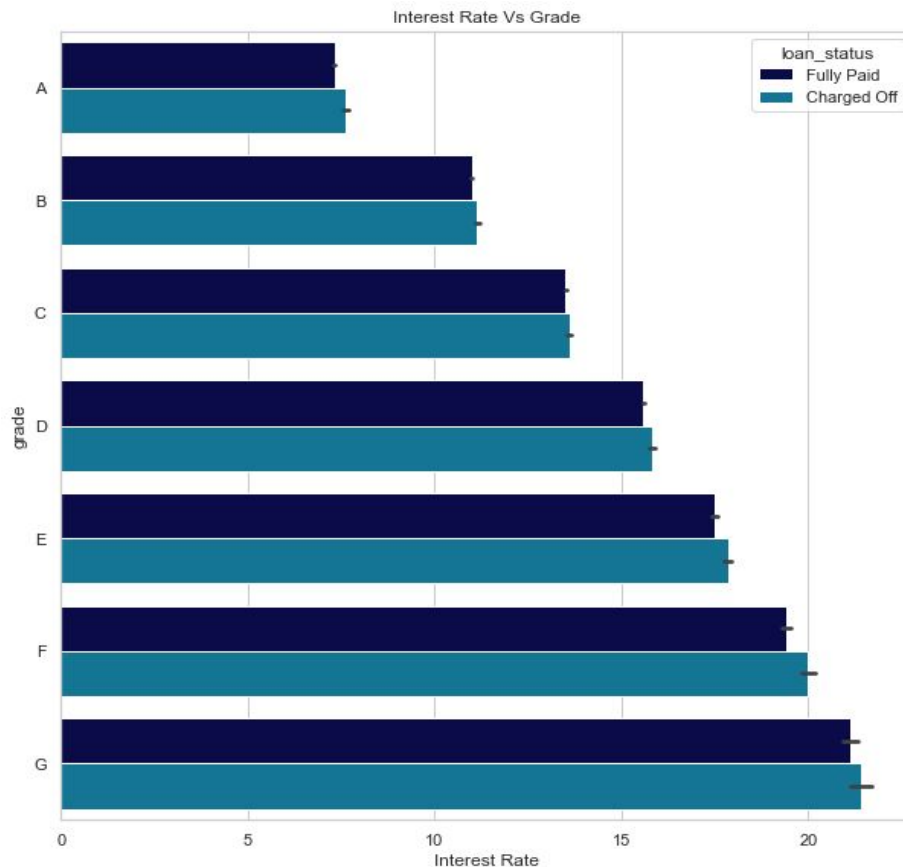
Insights: From the chart the loan amount is higher for mortgage loans. It seems company's loan amount strategy is well defined because buying the house required more amount and also when the borrowers getting defaulted the company has an option of auction the property to get the money back. So, the point is even though the defaulters and the loan amount are higher in mortgage its fine for the company to offer more mortgage loans because the risk seems to be lower.

Verification Status vs Loan Amount (Loan Status)



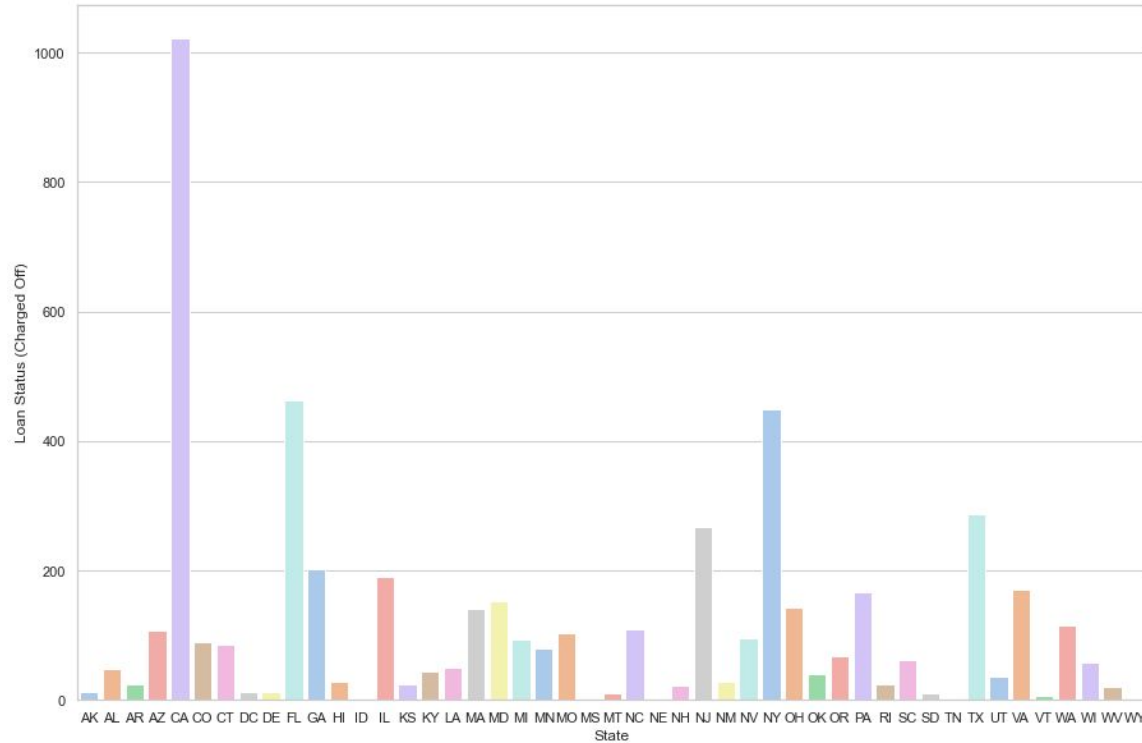
Insights: In the Not Verified case the company has given the loan amount less than 10K and from the above observation charged off cases in Not verified is so lower than the Verified with higher loan amount.

Interest Rate vs Grade (Loan Status)



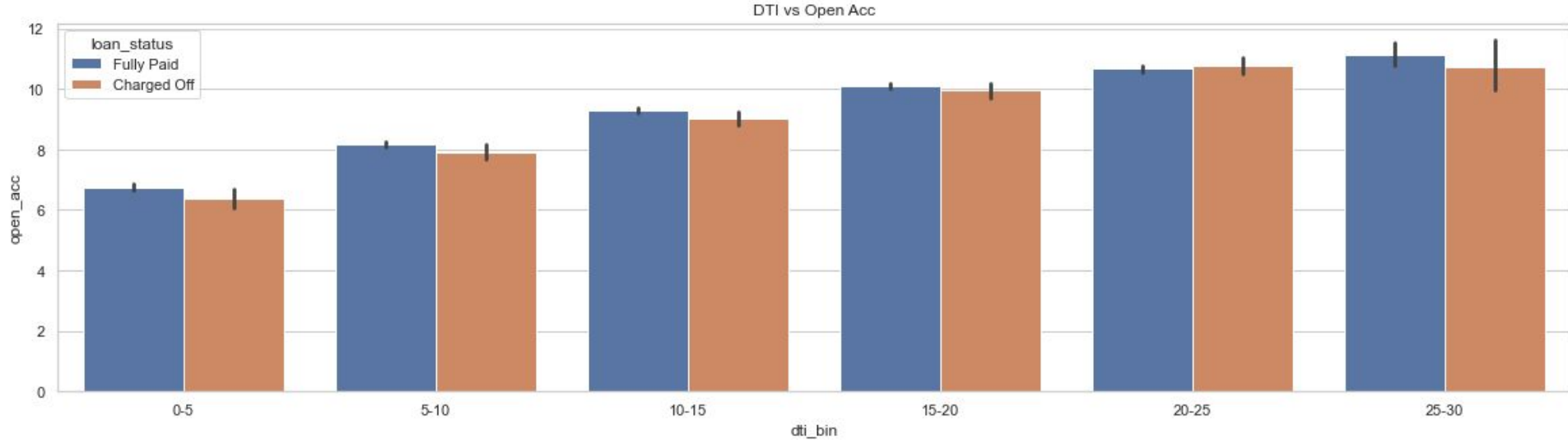
Insights: The company has given the higher interest rates for lower grade borrowers E,F,G in order to mitigate the risk. We think the company can continue this strategy. However, giving the loans to lower grade borrowers always riskier.

State vs Loan Status (Charged Off)



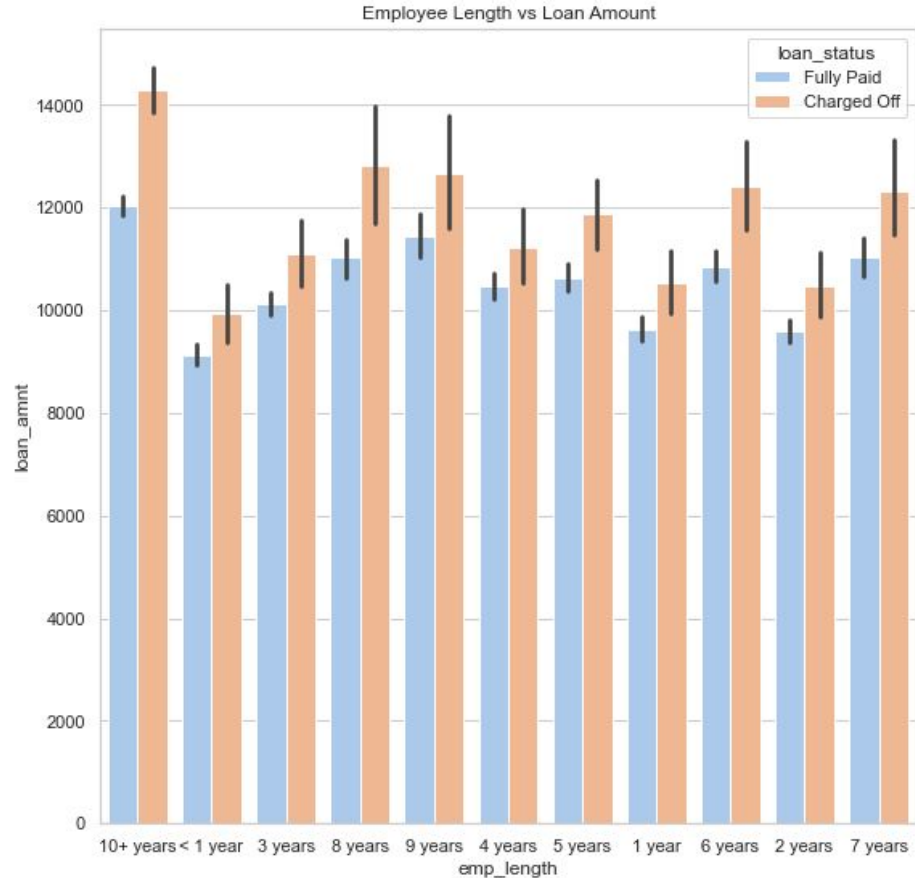
Insights: From the above bar chart it shows CA, NY & FL has high charged off loans.

DTI vs Open Acc (Loan Status)



Insights: From the above chart higher the dti the number of open accounts are more. The company has to focus more on lower dti loan applicants and stop approving the loans for higher dti applicants.

Employee Length vs Loan Amount (Loan Status)



Insights: Borrowers with longer working history got the loan approved for the higher loan amount.

Conclusion:

Variable	Interence
Purpose of Loan	Small businesses are particularly risky, therefore should be cautiously sanctioned
Interest Rate	Higher rates are not deterrent to defaults and therefore denying loans to risky individuals may be better strategy than approving their loan with higher interest
Loan amount to Annual income ratio	Higher loan amount to annual income ratio is associated with higher chance for potential default. Therefore, annual income should be used as metric to determine the upper bound of loan amount
Verification Status	'Not Verified' customers are potential risk to the business. The Company should analyze more details of these borrowers before approving the loans
DTI	The company has to focus more on lower dti loan applicants and stop approving the loans for higher dti applicants

Recommendations:

Reduce/Continue/Stop	Reason
Reduce	Approving the loans for debt consolidations
Reduce	Approving the loans for borrowers whose experience is less than 1 year and consider more from the applicants whose experience is above 2 years
Reduce	Approving the loans for “Not Verified” borrowers
Continue	Grade system works well. They can use it for determining the higher rates for lower grades.
Reduce	Approving the loans for “Home Improvement”, “Small Business”, “House” with an income of 60K - 70K
Reduce	Approving the Mortgage Loan whose annual income is <70K
Stop	Approving the loans for lower grade borrowers like E,F,G

Thank You