# Lending Club Case Study

CHAITANYA PATCHIGOLLA

ARUNPRASAD SRIDHARAN

# PROBLEM STATEMENT

You work for a consumer finance company which specializes in lending various types of loans to urban customers. When the company receives a loan application, the company has to make a decision for loan approval based on the applicant's profile.

The company wants to understand the driving factors (or driver variables) behind loan default, i.e. the variables which are strong indicators of default. The company can utilize this knowledge for its portfolio and risk assessment.

# Tasks Done

## Data Cleaning

- *Remove Columns*
- *Impute Data*
- *Transform Data*

## Analysis

- *Univariate Analysis*
- *Segmented Univariate Analysis*
- *Multivariate Analysis*

## Conclusions

# Data Preprocessing Summary

## Identified Data Issues:

- 54 fully n.a. and null columns dropped
- 9 duplicate columns dropped
- 10 irrelevant columns dropped

## Data Imputation:

- Imputed missing values in 5 columns meaningfully.
  i.e. mths_since_last_delinq, emp_length, pub_rec_bankruptcies, mths_since_last_record, revol_util

## Data Transformation:

- Replaced and transformed values in few columns by changing type from object to int64 / float64
  - Removed 'months' keyword for all values in 'term' column and converted to int64
  - Removed '%' keyword for all values in 'int_rate' and 'revol_util' columns and converted type to float64
  - 'emp_length' is converted from object type to float64

# Univariate analysis

"Higher Loan Amounts Lead to Increasing Charge-Offs"

•In Loans exceeding $30,000 -> ~24.5% of borrowers default (among both Charged Off and Fully Paid categories).
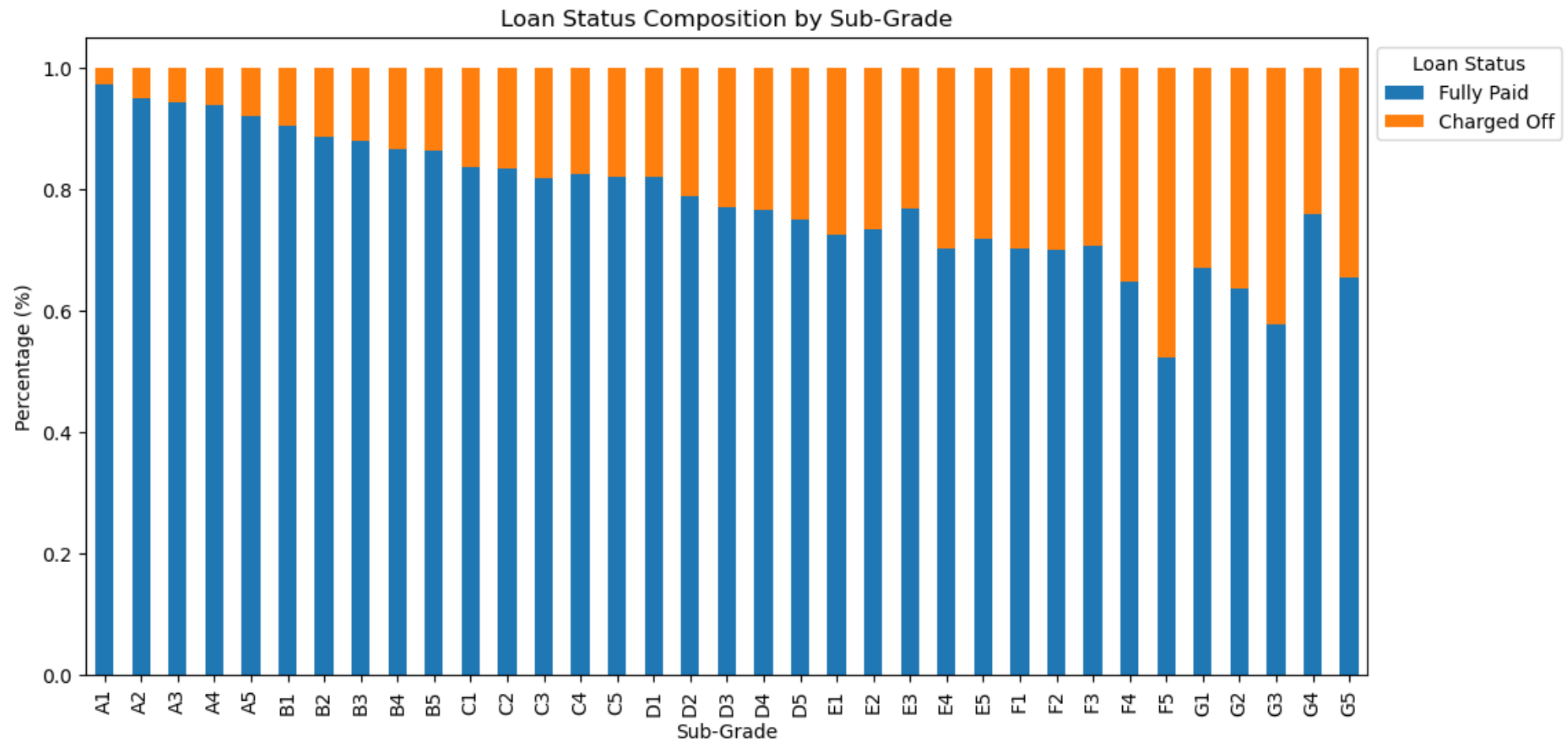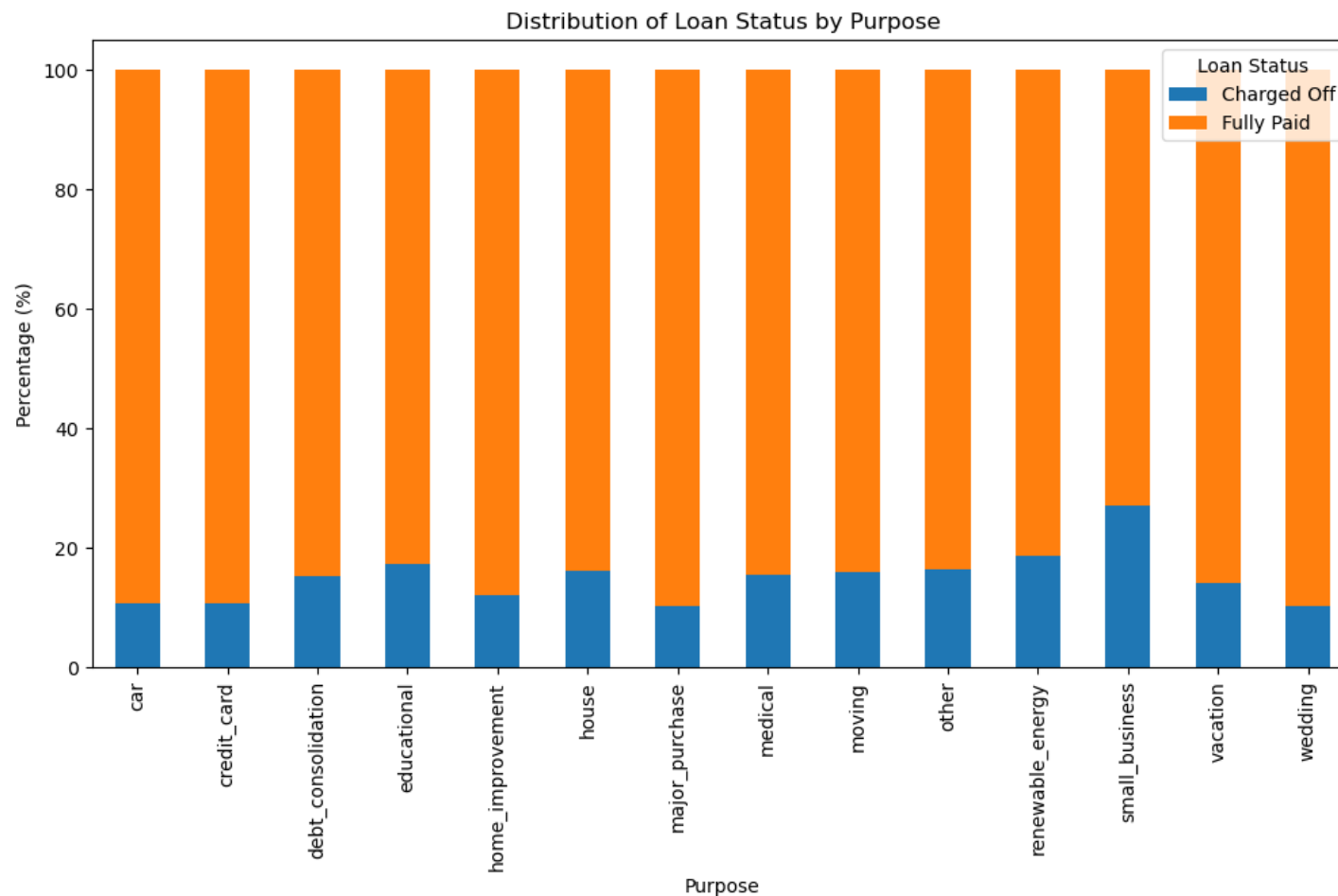
Loan Status Composition by Grade
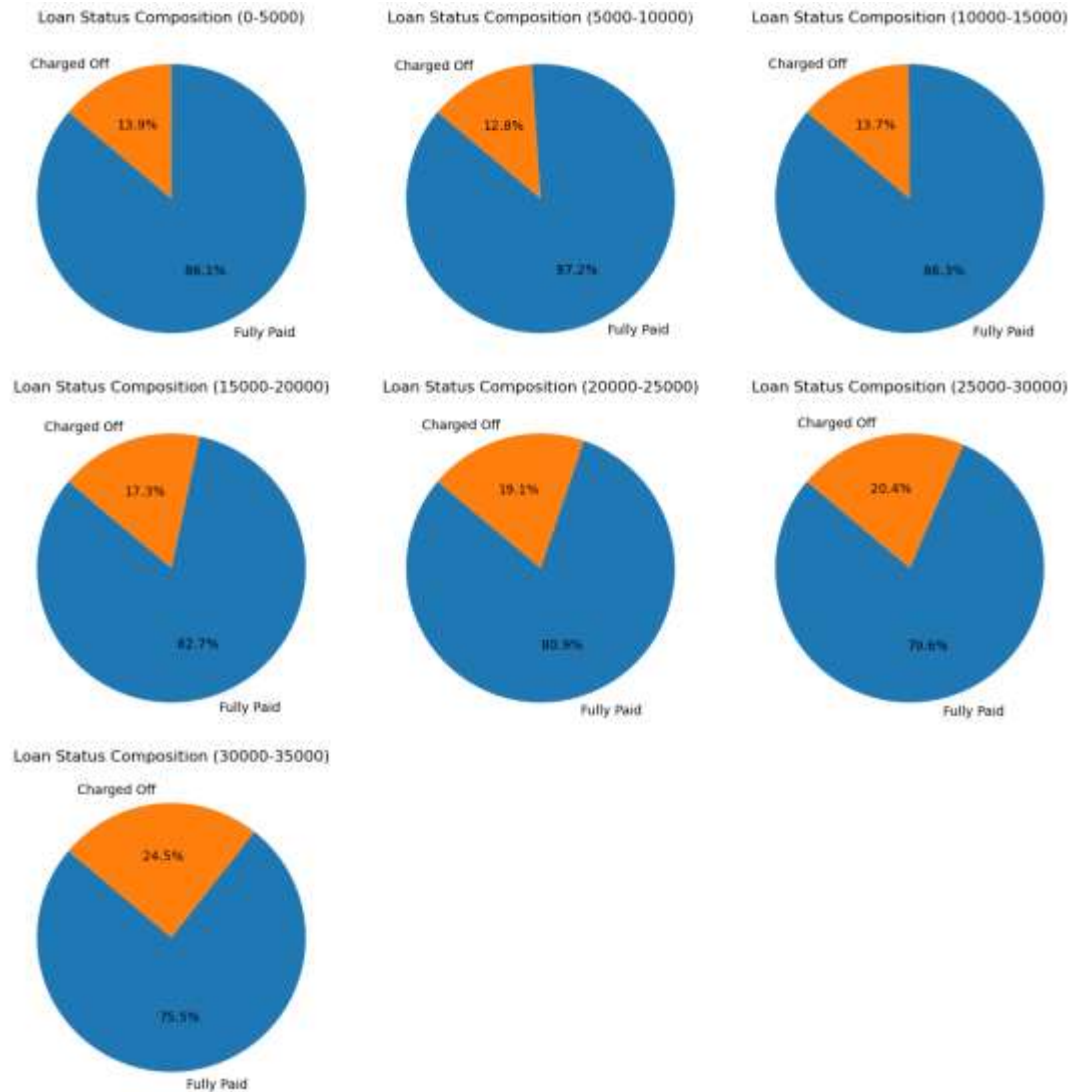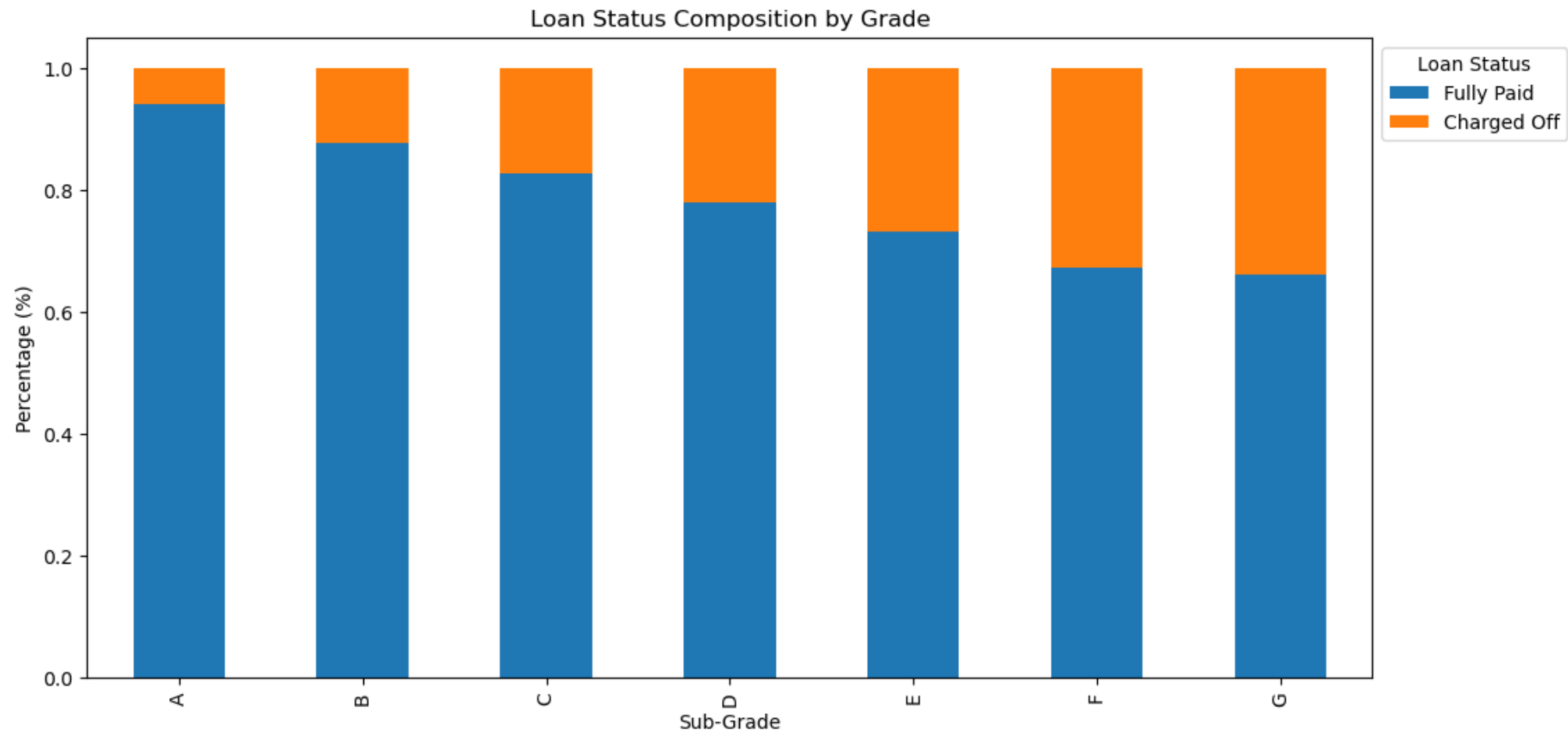
# Significant Charge-Off Rates in Grade F and G Loans

Higher the grade alphabetically, higher the risk.

Notably, F5 subgroup stands out with a striking 50% charge-off rate

Bar graph depicting "Defaulters distribution by Sub-Grade"

Distribution of Loan Status by Purpose

# Marriage loan is safest. Small Business Loans are risky.

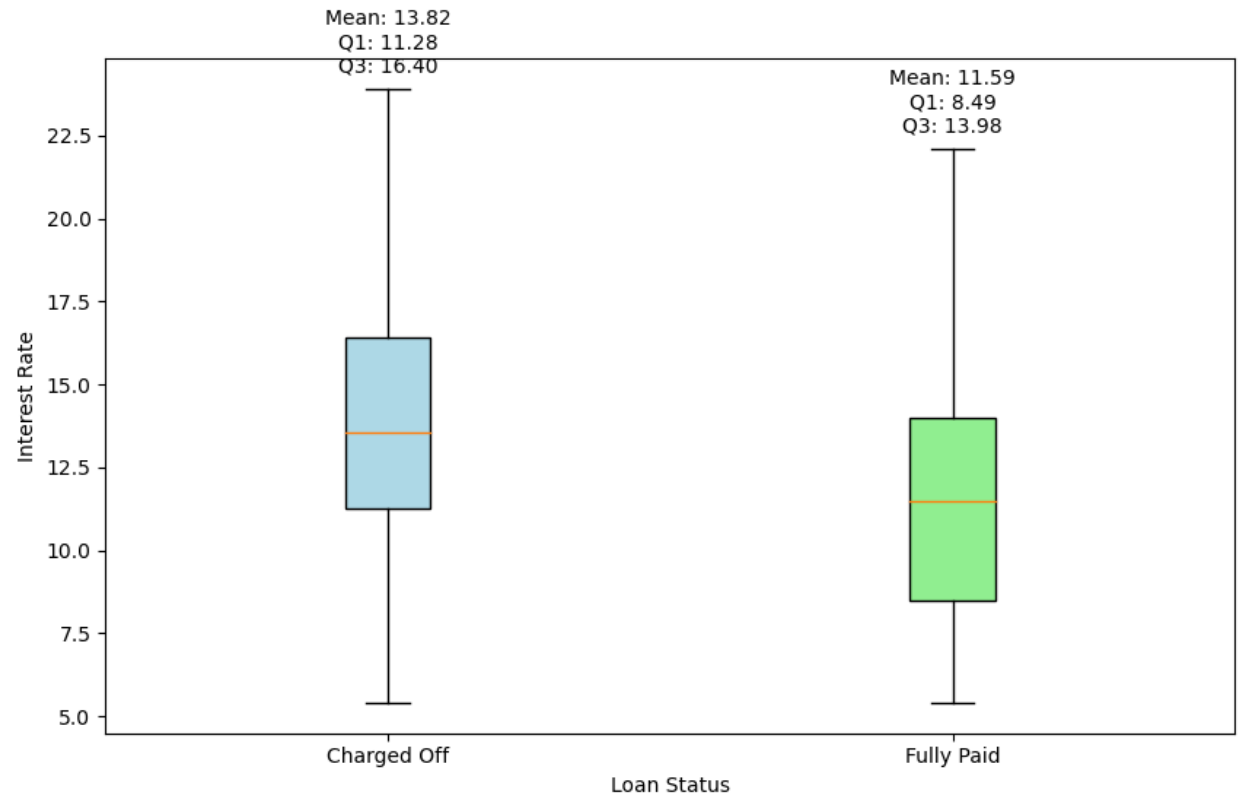"Small Business" Loans exhibit the highest charge-off rate, Warranting a closer look at their interest rates.

"Marriage" Loans are the most secure, suggesting the potential for rate adjustments elsewhere."
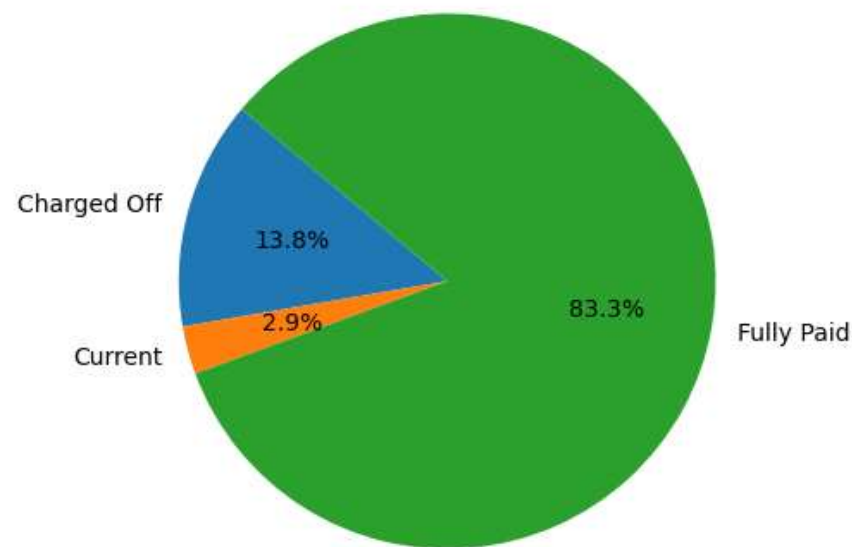
# Exploring Interest Rate Influence on Loan Repayment

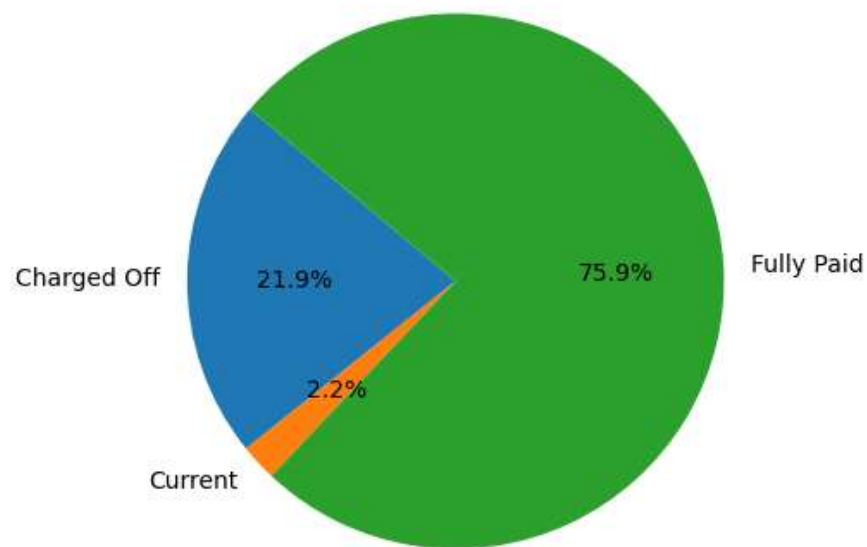Box plot of Charged Off loans and Fully Paid loans provide many insights.

Loans featuring interest rates less than 11.26% demonstrate a notably elevated likelihood of achieving full repayment
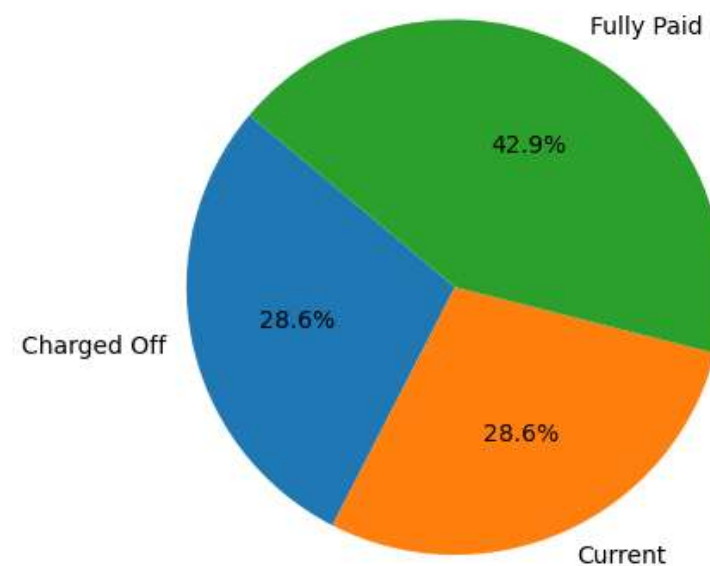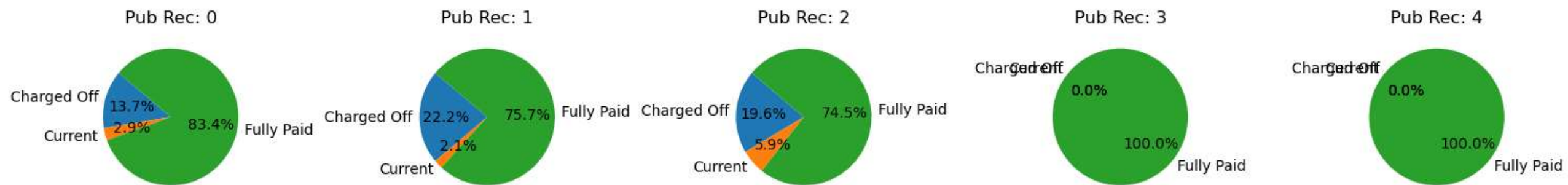
# Assessing Default Risk Factors

Clients with a history of derogatory credit incidents or a public record of bankruptcies are at a heightened risk of loan defaults

Public Record of Bankruptcies distribution

Multi-variate Analysis

# Plot Loan Amount vs Interest rate across grades

Clean Segmentation on interest rate and grade. Interest rate increases as the grade lowers

Larger number of Higher loan amounts defaulted by low grade applicants or for loans with higher interest rates

Risk of people who default increases with higher interest rate, higher loan amount and lower grade
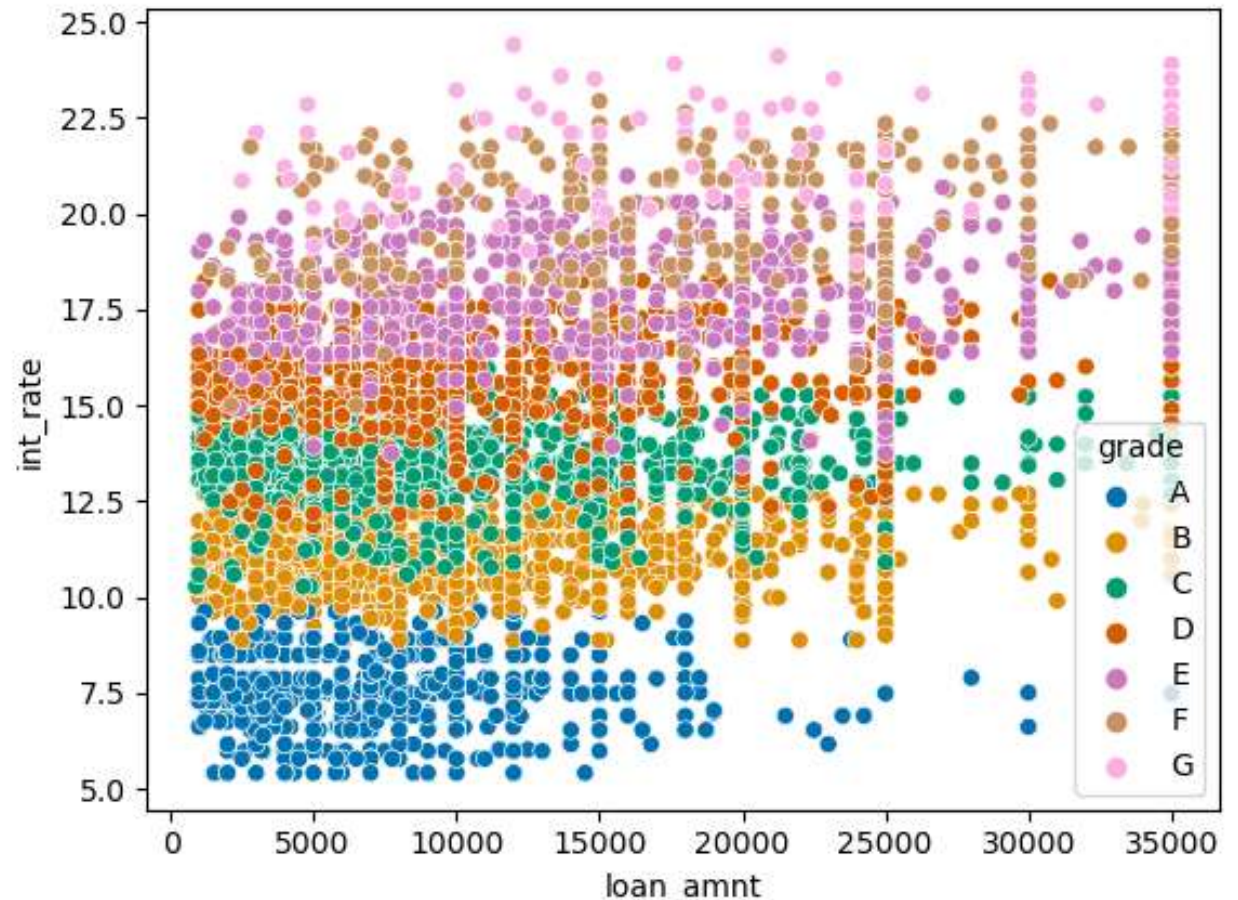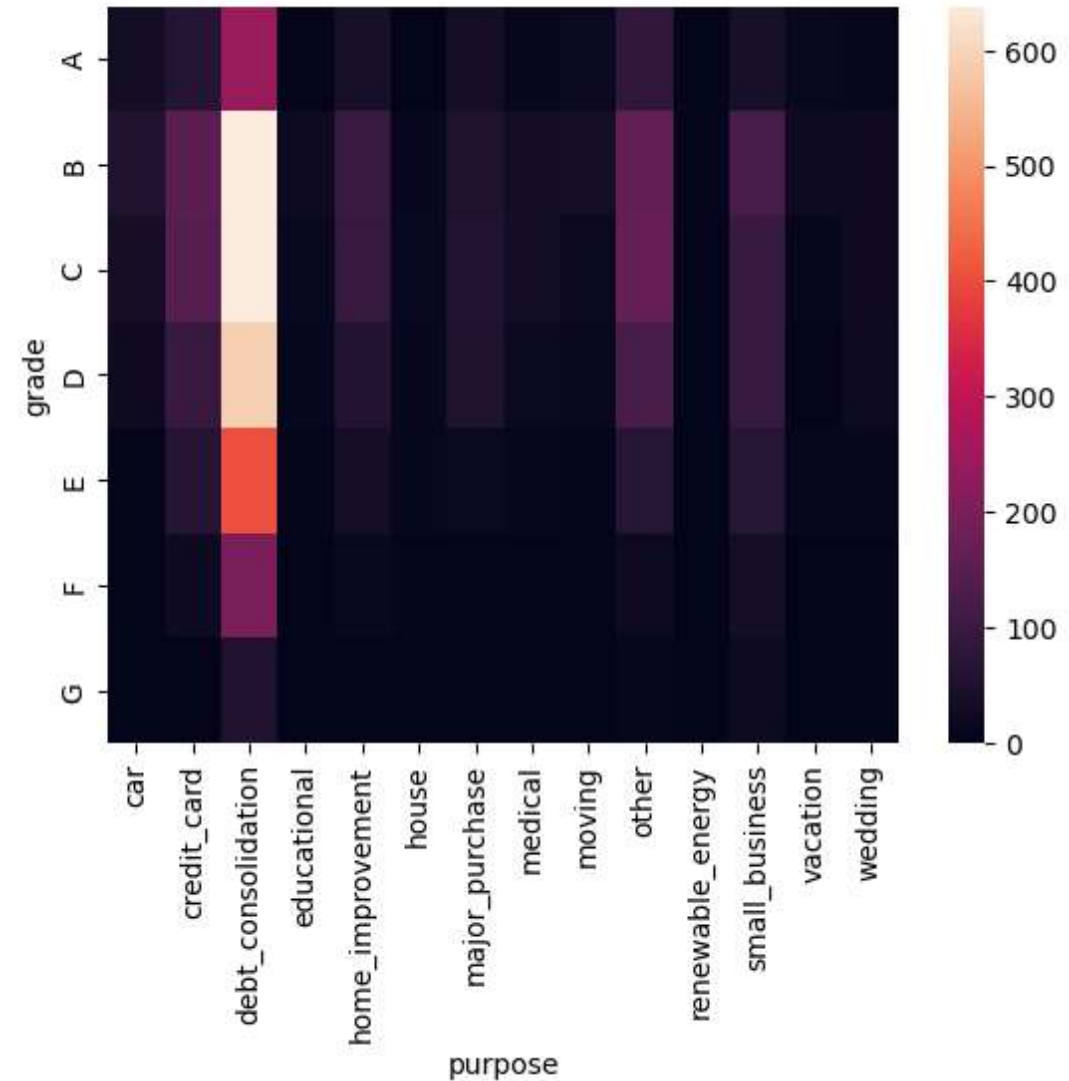
# Heatmap of Grade Vs Purpose

More borrowers across grade B,C and D, taken loan for debt consolidation has defaulted

People who have taken loan for Credit Card, Debt Consolidation, Other and Small business are more likely to default
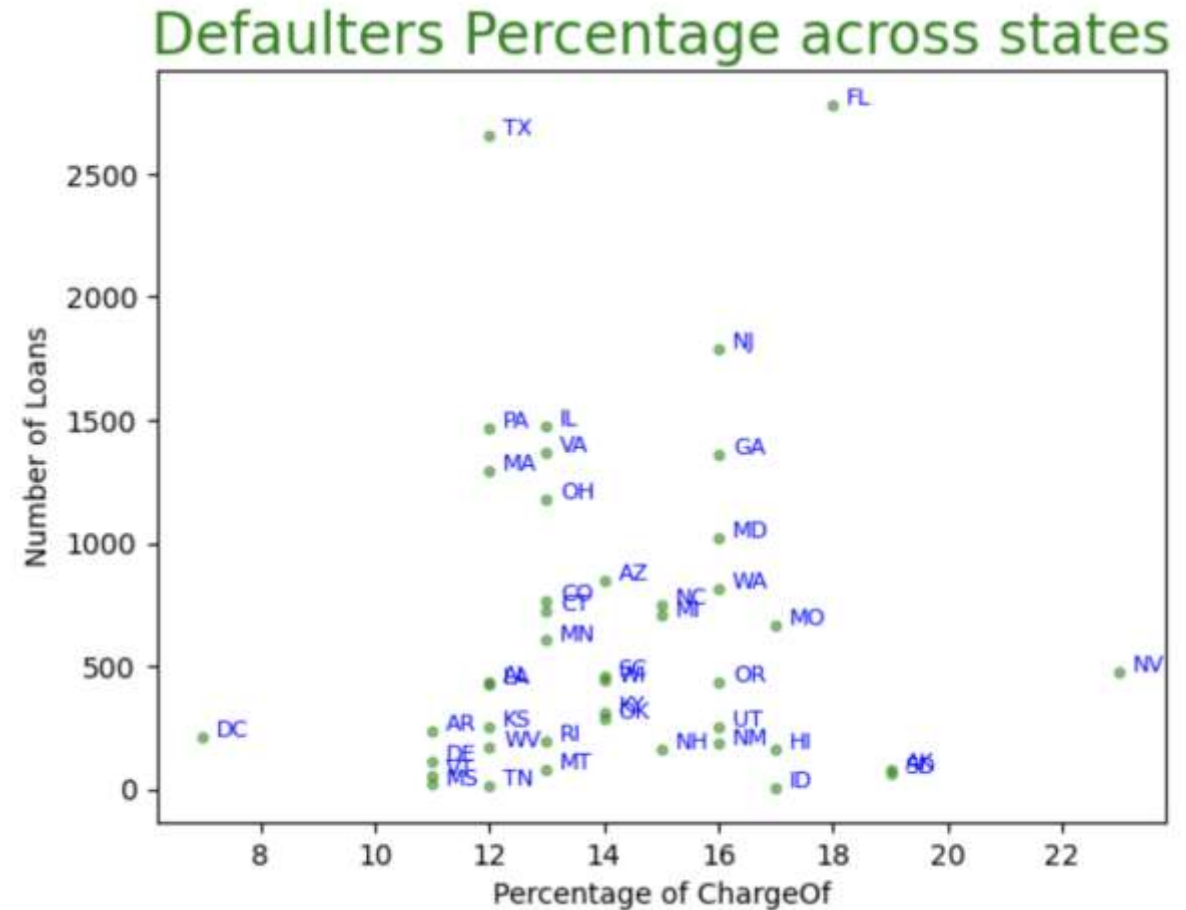
# Charged of % vs number of loans issued across states

Borrowers from the state of Florida has received more number loans and 18% of them have defaulted

Borrowers from the state of Nevada and Nebraska has highest default percentage

NJ and TX are the other states that has high number of defaults



Defaulters Percentage across states

# Charged of % vs number of loans issued across Grades

- Number of loans issued decreases gradually from high to low grades

- Clearly the borrowers with lower grades are more likely to default



Defaulters Percentage across Grades
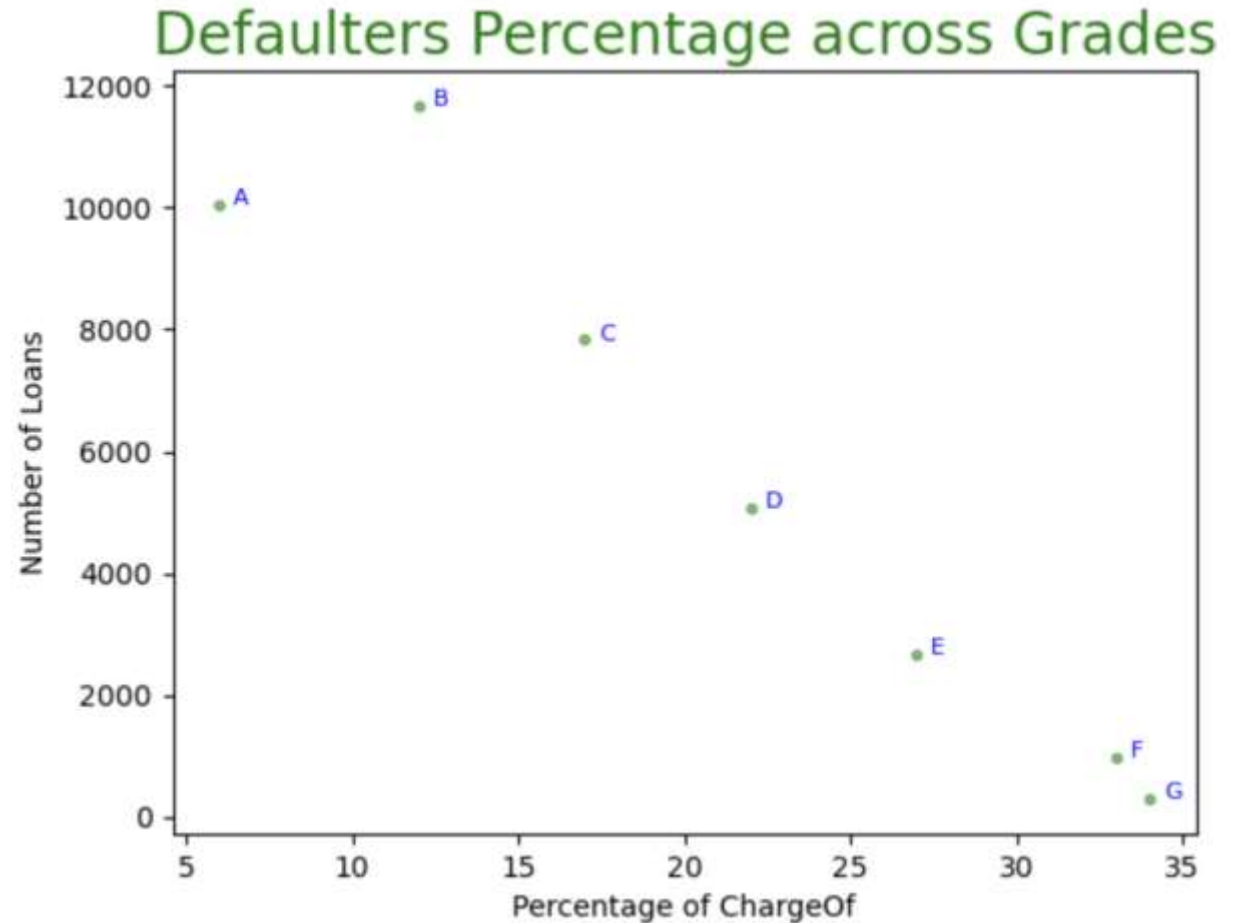
# Charged of % vs number of loans issued across Grades and purpose

- People who have taken loan for debt consolidation are more likely to default

- Lower the grade higher the default percentage for debt consolidation loans

- Small business loans taken by lower grade borrowers are more like to default next to debt consolidation
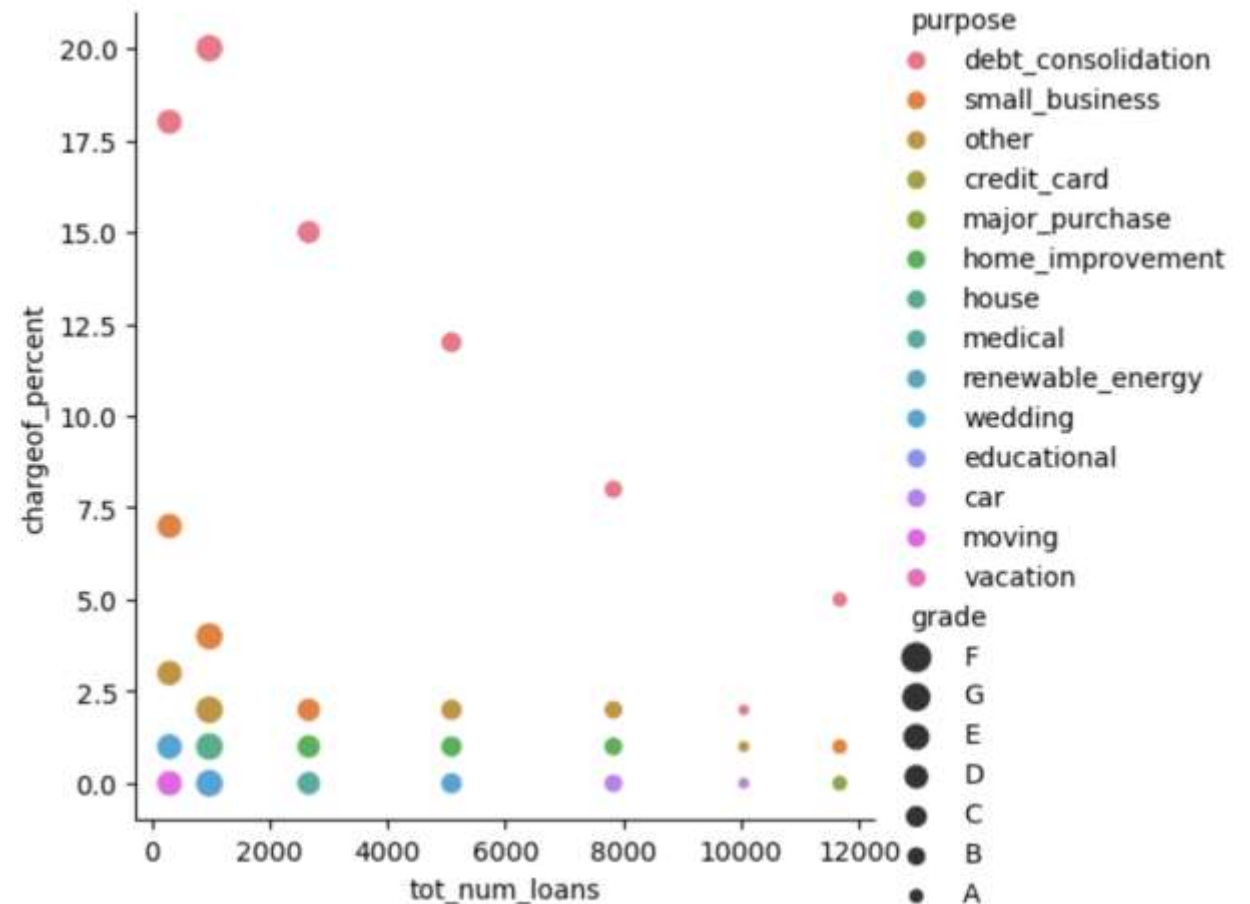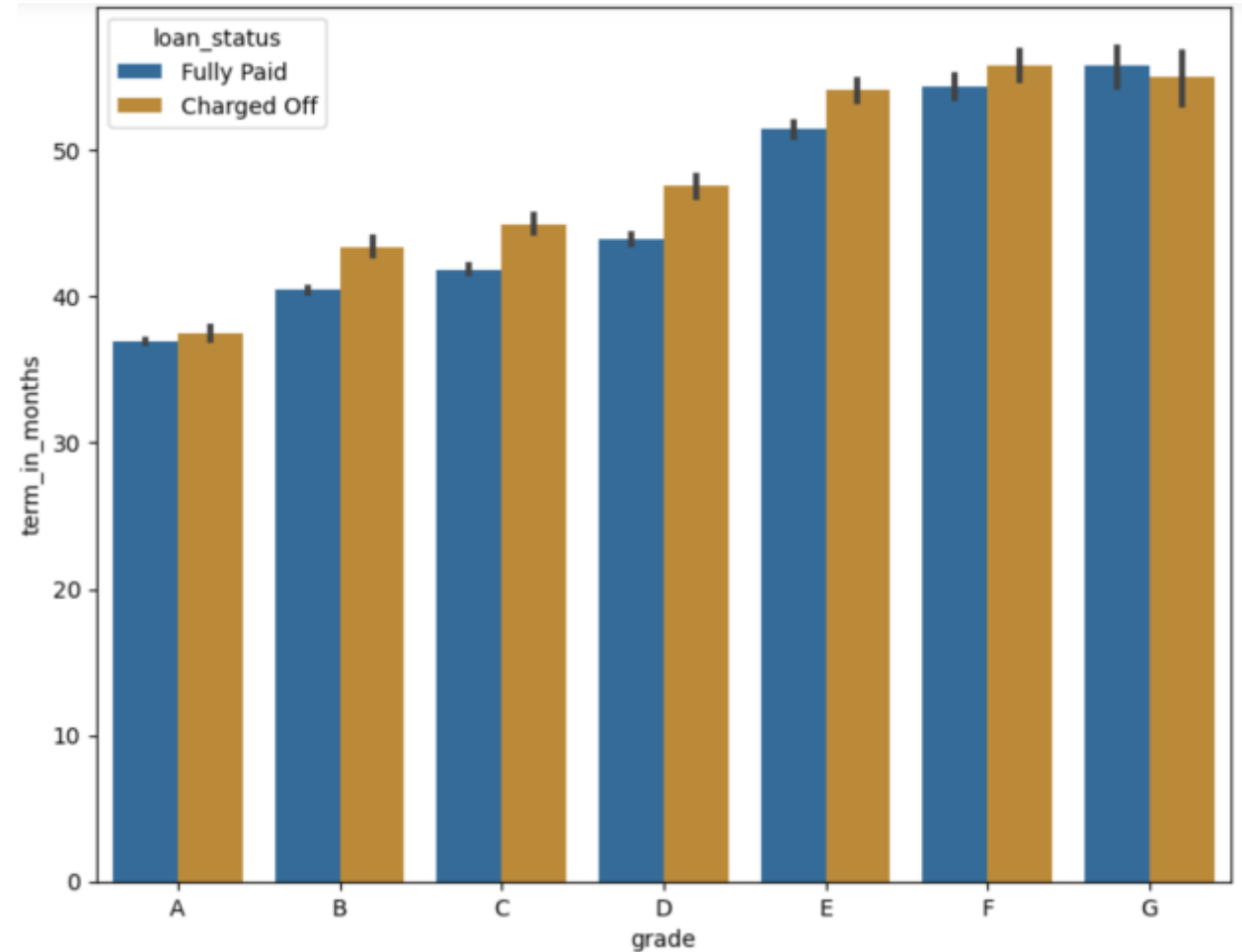
# Charged of % vs DTI value bin

- Risk of charge-of is higher with borrowers with higher Debt to Income ration
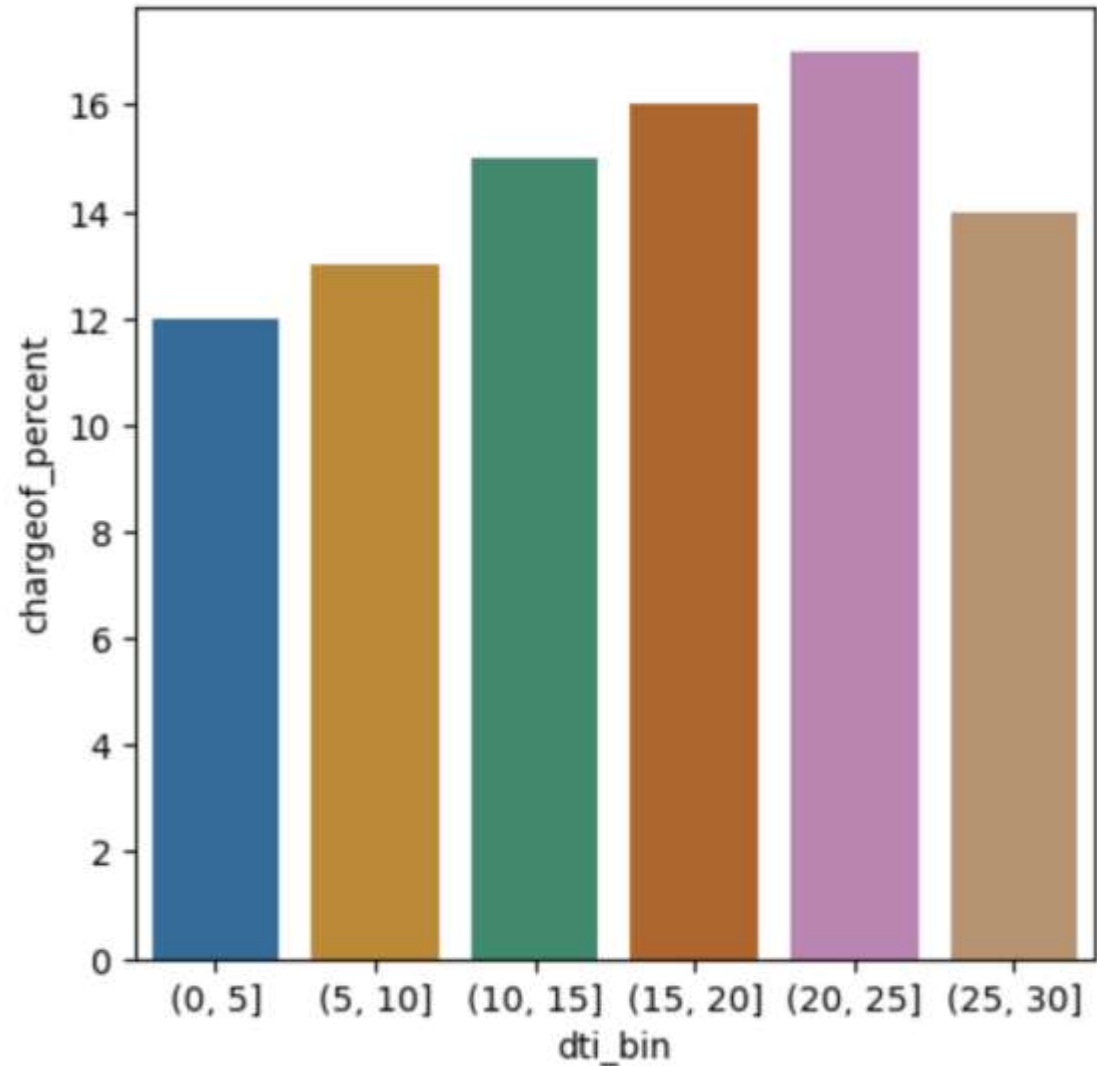
# Number of Terms vs Grade

- Number of terms are higher for borrowers with lower grades

- There are no significant difference in default percentage proportional to terms

# Conclusions

- Larger number of Higher loan amounts defaulted by low grade applicants or for loans with higher interest rates

- Risk of people who default increases with higher interest rate, higher loan amount and lower grade

- Borrowers from the state of Florida has received more number loans and 18% of them have defaulted

- Borrowers from the state of Nevada and Nebraska has highest default percentage

- NJ and TX are the other states that has high number of defaults

- Clients with a history of derogatory credit incidents or a public record of bankruptcies are at a heightened risk of loan defaults

- More borrowers across grade B,C and D, taken loan for debt consolidation has defaulted

- People who have taken loan for the purpose of Debt Consolidation, Credit Card and Small business are more likely to default and probability is higher for lower grade borrowers among that.