

# Lending Club Case Study

## GROUP MEMBERS -

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# Background – Lending Club Case Study

## **Background**

Lending club is the largest peer-to-peer marketplace connecting borrowers with lenders. Borrowers apply through an online platform where they are assigned an internal score. Lenders decide 1) whether to lend and 2) the terms of loan such as interest rate, monthly instalment, tenure etc.

Some popular products are credit card loans, debt consolidation loans, house loans, car loans etc.

## **Business Objective**

To identify variables which are strong indicators of default and potentially use the insights in approval/rejection decision making.

# The problem Statement

## 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.

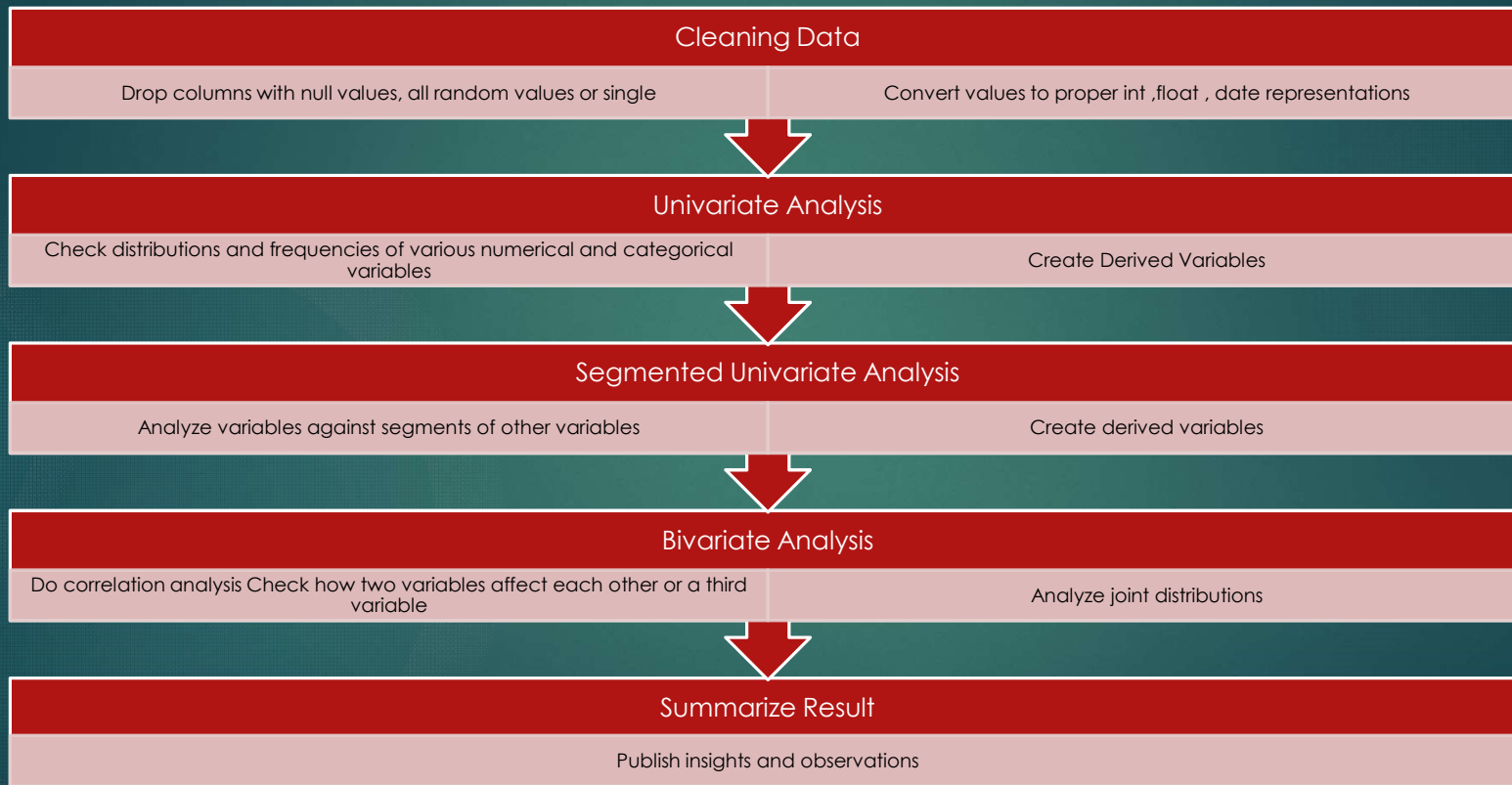
The company can utilize this knowledge for its portfolio and risk assessment.

## 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



# Data Understanding

## Types of variables

- Customer (applicant) demographic
- Loan related information & characteristics
- Customer behavior (if the loan is granted)

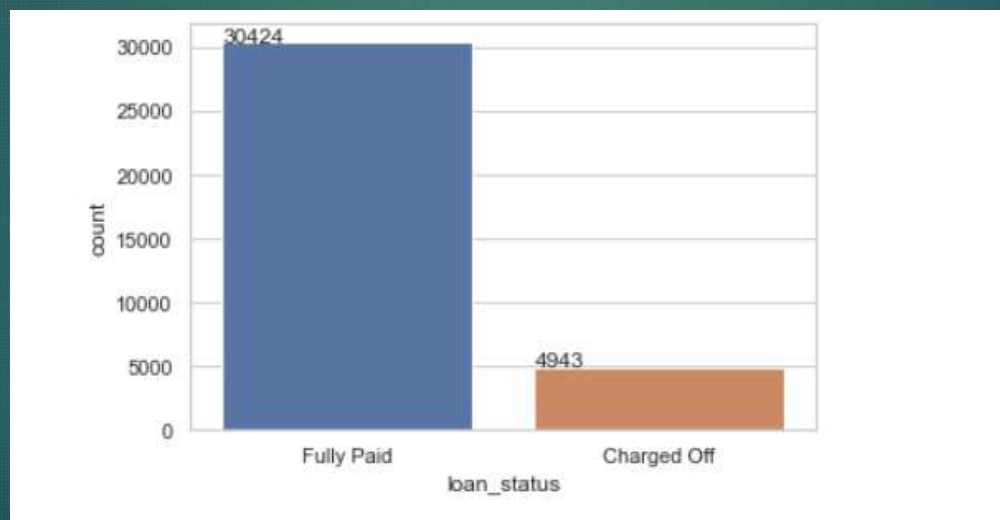
Customer's Demographics
Employement Length
Employement title
Annual Income
Zip Code
Description

Loan Information & Characteristics
Loan Amount
Funded Amount
Funded Amount Investment
Interest Rate
Loan Status
Laon Grade

Customer Behaviour variables
Delinquency year -2
earliest credit line
Revolving balance
Recoveries
Application type
Loan purpose

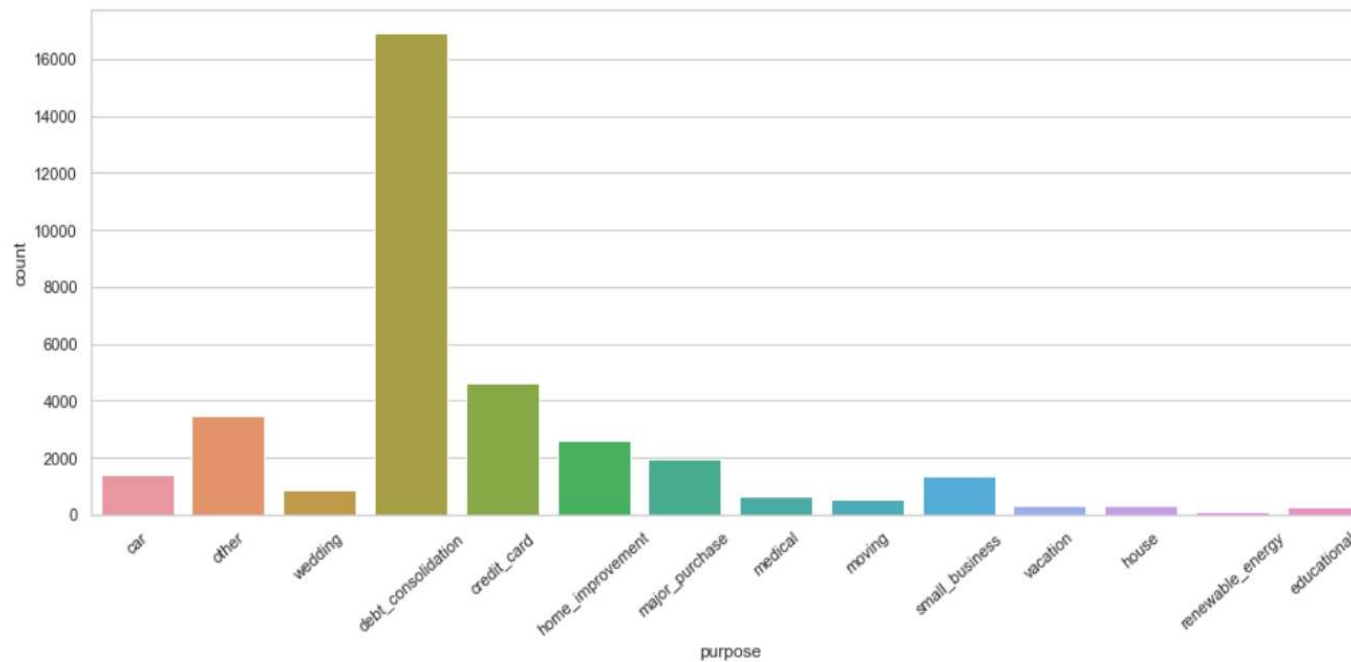
# Analysis – Overall Loan Status

- ▶ Approximately 14% of the loans are defaulted



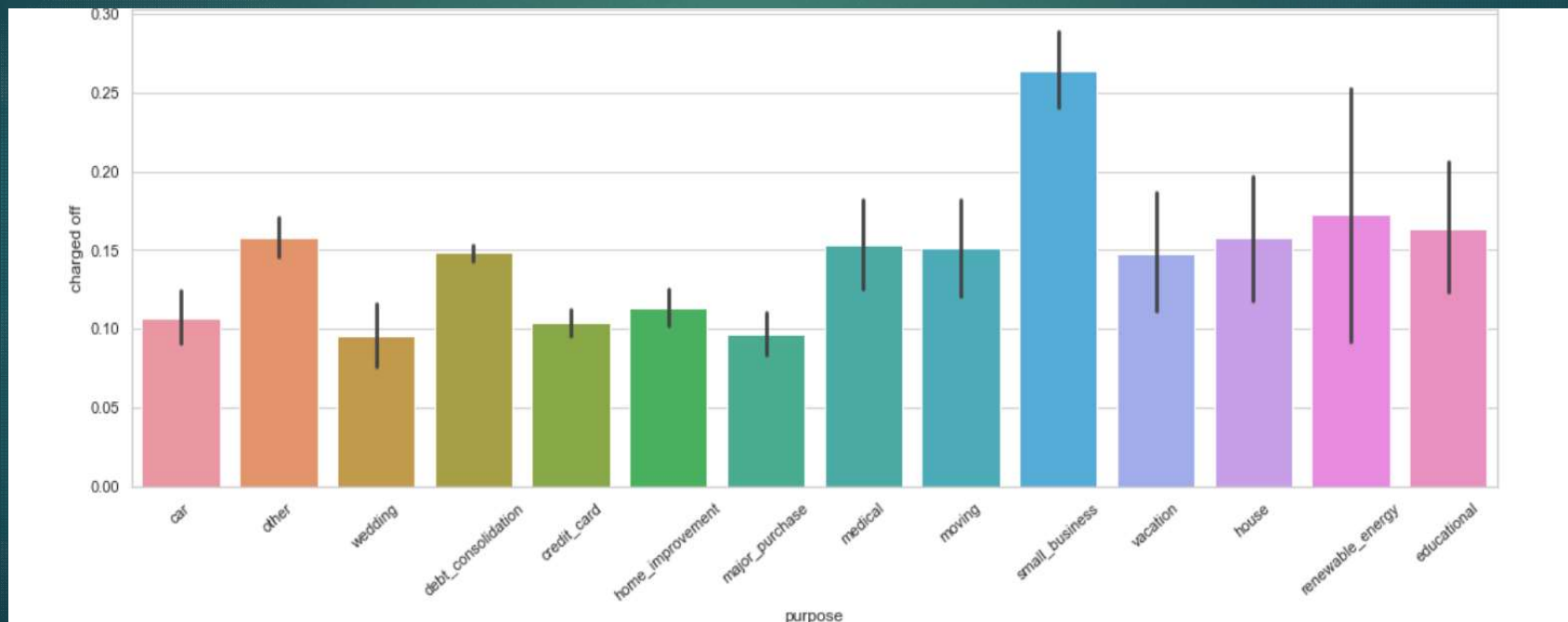
# Analysis – Loan Understanding - Purpose

- ▶ Maximum loans are taken for debt consolidation followed by credit card, Home improvement, Major purchase.



# Defaults by Loan Purpose

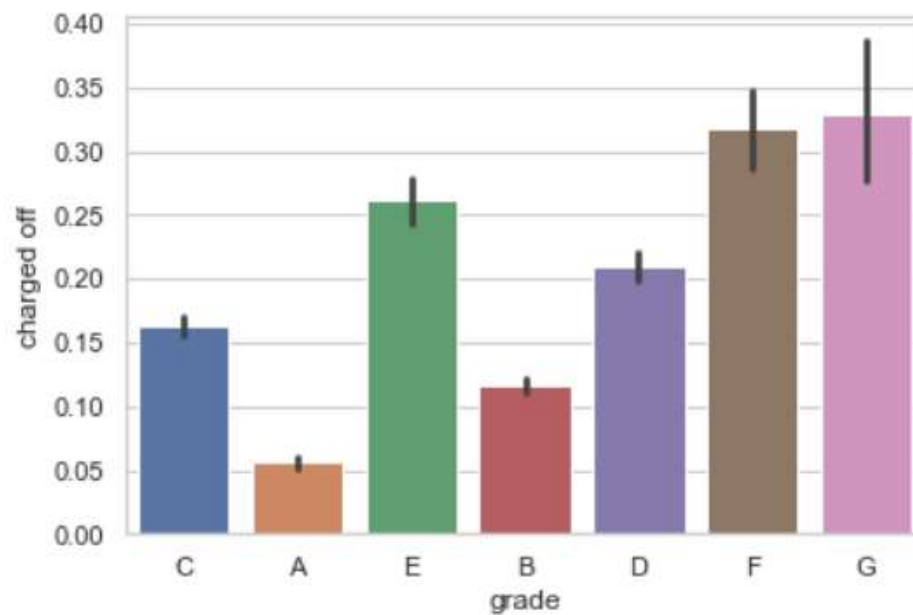
- ▶ More than a quarter of loans taken for the purpose of running a small business are charged off.





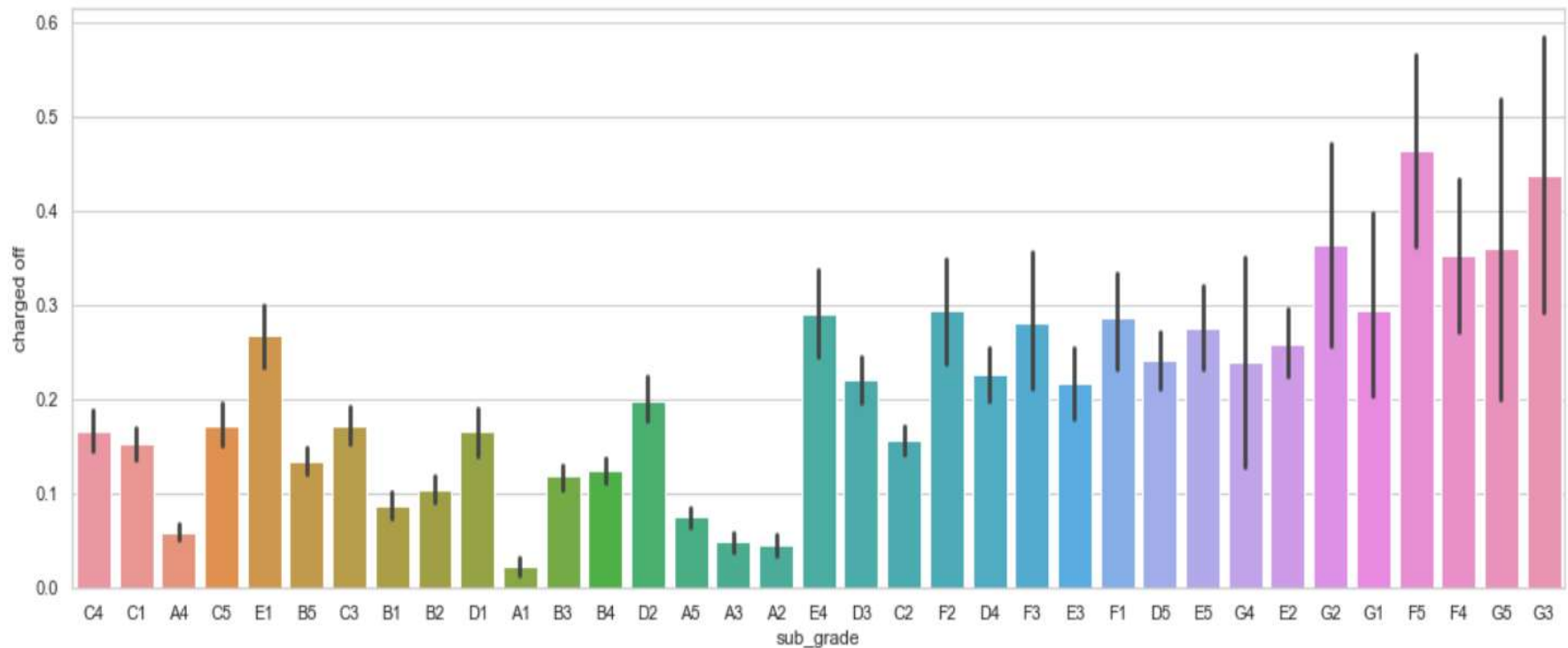
# Defaults By Grade & Sub Grade

- The higher default rate happens for the lower grades. So, the grading system is working.



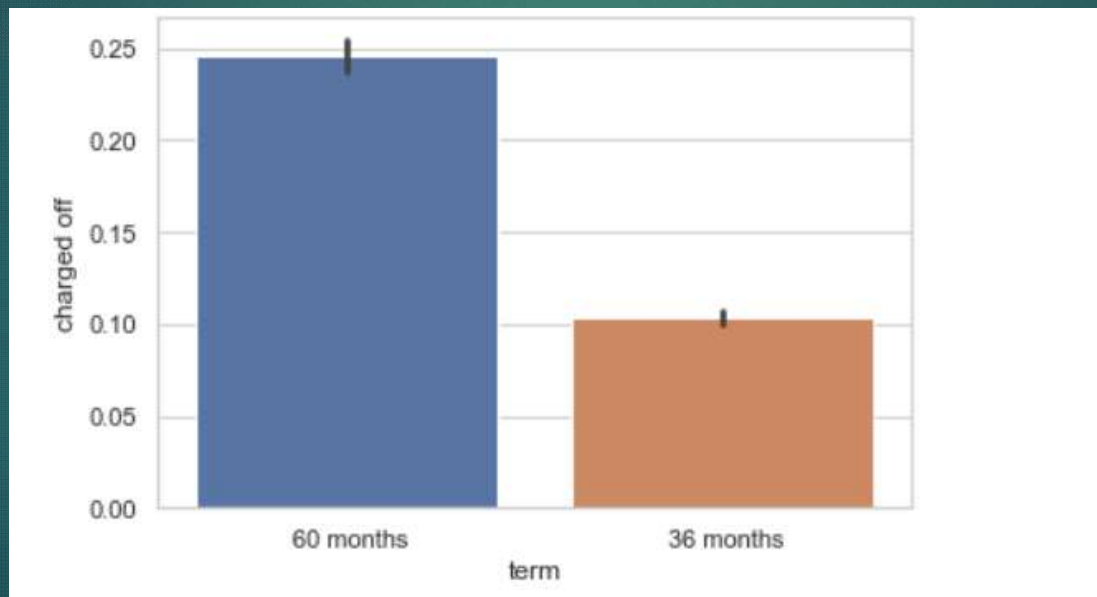
# Defaults By Grade & Sub Grade

- ▶ The higher default rate for the lower sub grade. The sub grading system is also working fine.



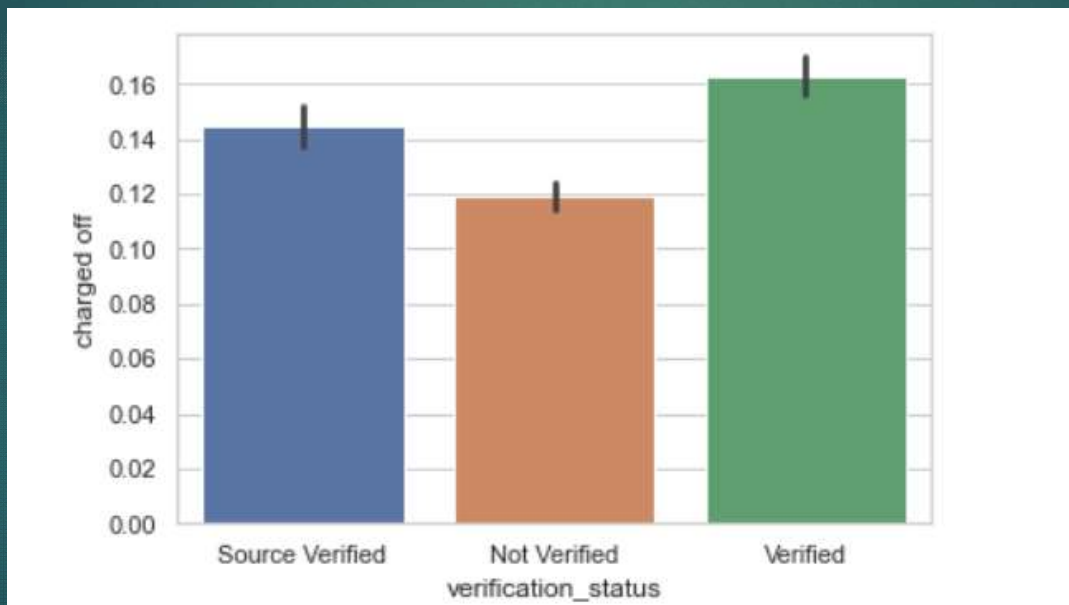
# Defaults By Term

- ▶ The long term loans are more likely to get defaulted. The chances are more than double for the 60 months loans. So, Lending club should focus on giving short term loans.



# Defaults By Verification

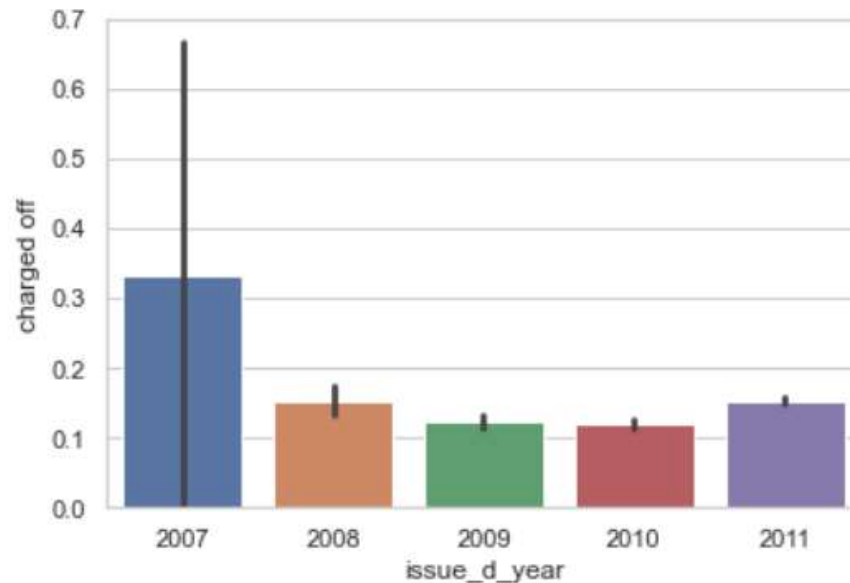
- ▶ Most loan defaults happen for the verified loans. The verification system needs to be improved.





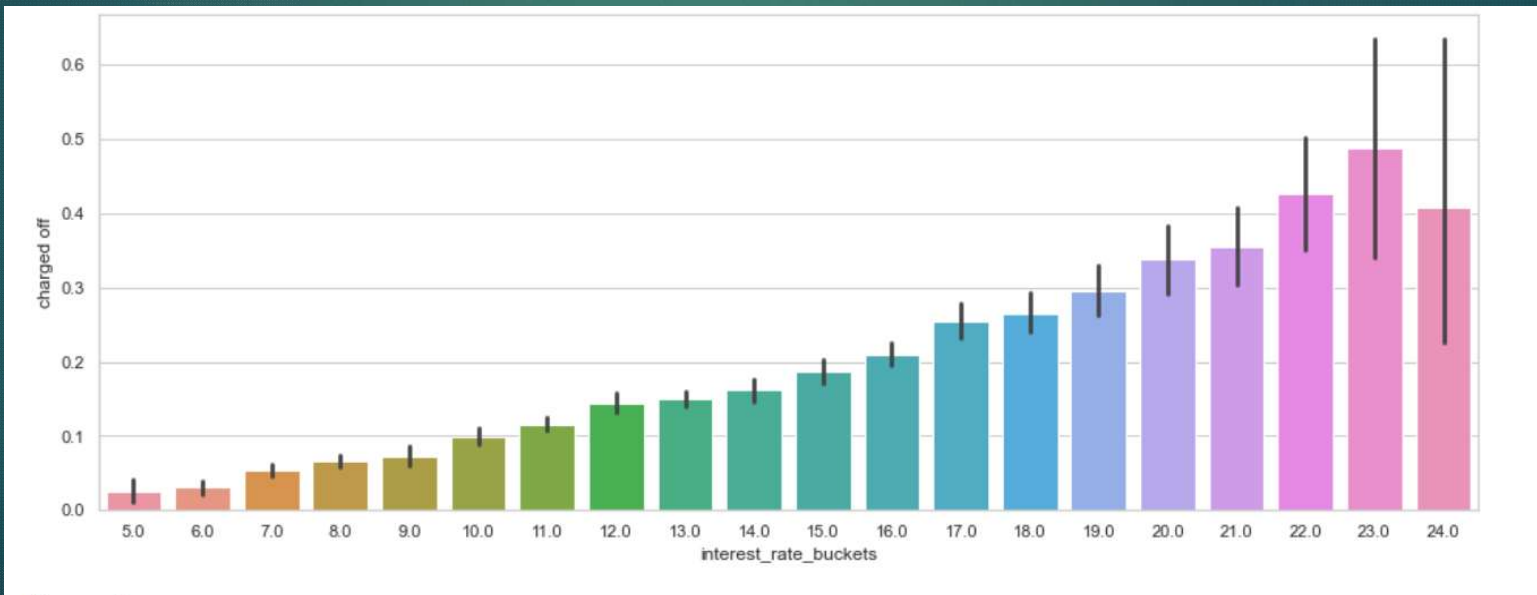
# Defaults By Loan Year

- ▶ Most bad loans get approved in 2007 on average
- ▶ The default loans were decreasing from 2008 to 2010. However there is an increase in the year 2011.



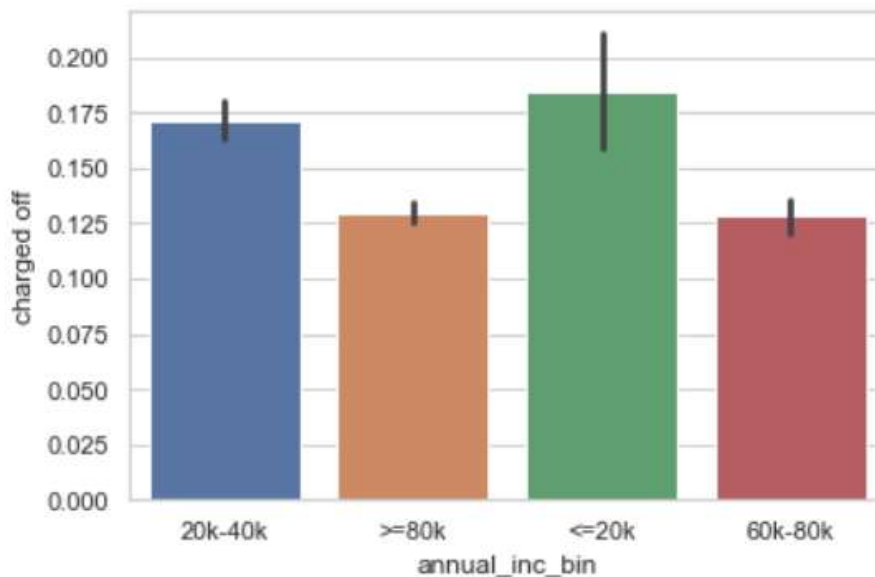
# Defaults By Interest Rate

- ▶ Percentage of Defaults increases monotonically with higher interest rates. At rates of 19% and above, more than 30% of loans are Charged Off.



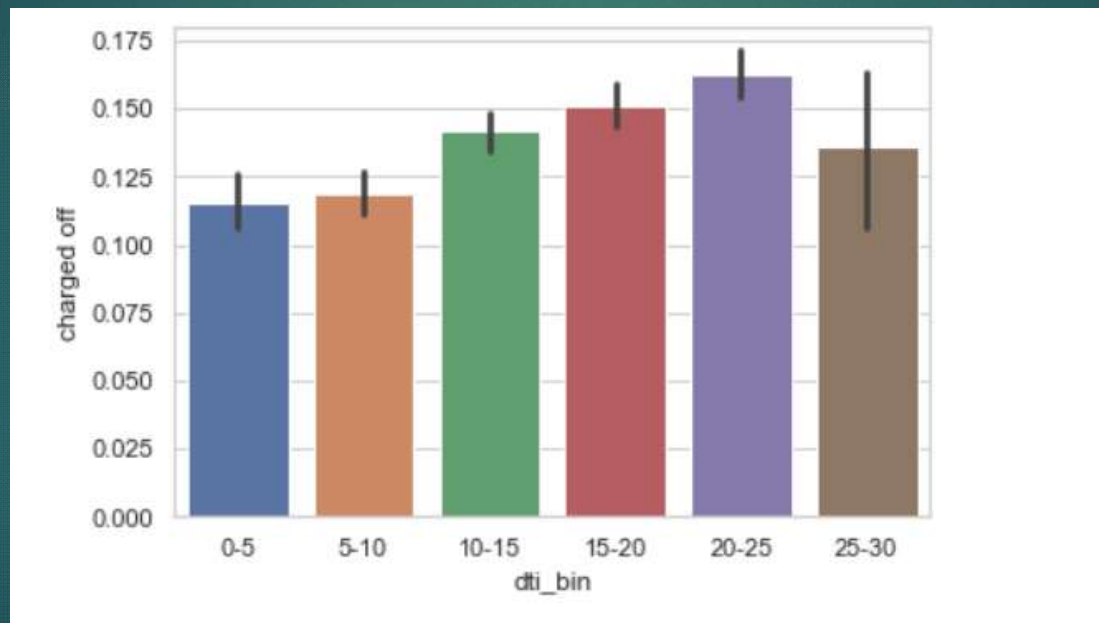
# Defaults By Borrower's Income

- ▶ Borrowers having annual income less than 20000 default on their loans at much higher rates.
- ▶ Loan default decreases with higher annual income.



# Defaults By Debt to Income Ratio

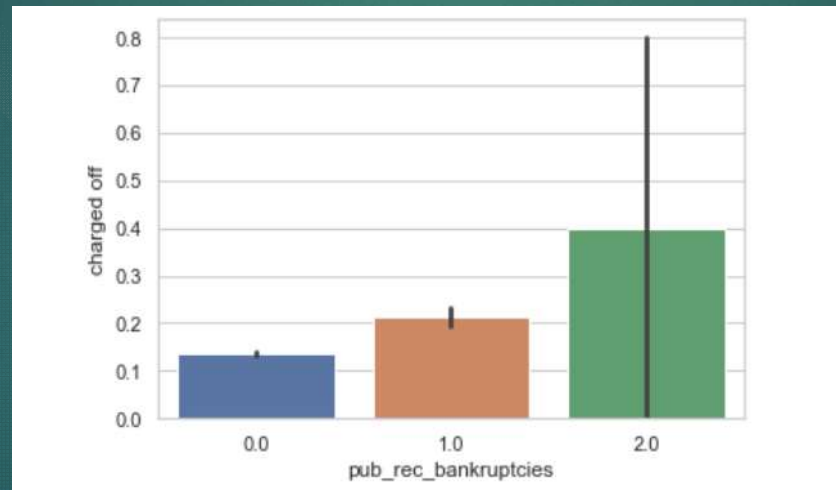
- ▶ Percentage of default rises with dti ratio.
- ▶ As the dti ratio rises above 20, the loans become risky.





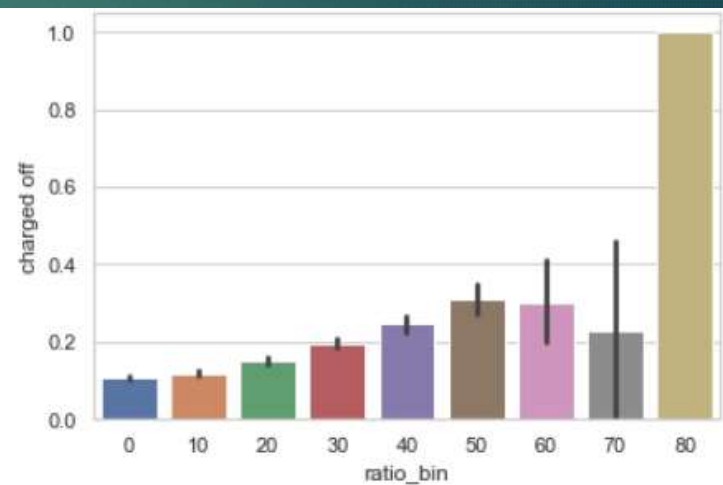
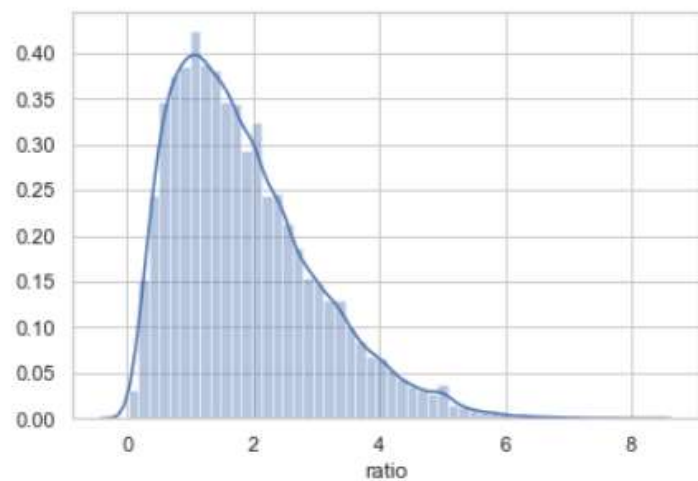
# Defaults by prior bad record

- ▶ 96% have no bankruptcy record.
- ▶ Having even 1 bankruptcy record increases the chances of Charge Off significantly.



# Defaults By ratio of loan amount to annual income

- ▶ The default rate gets increased with Loan amount and Annual Income ratio with more than 30%



# Recommendation(s)

- ▶ Stop – approving loans where amount/income is higher than 30%
- ▶ Reduce – number of approvals where purpose is small business
- ▶ Stop – approving loans to people with prior bad record. Or at least stop approving high-value loans
- ▶ Start – charging higher interest rates for loans with dti greater than 20

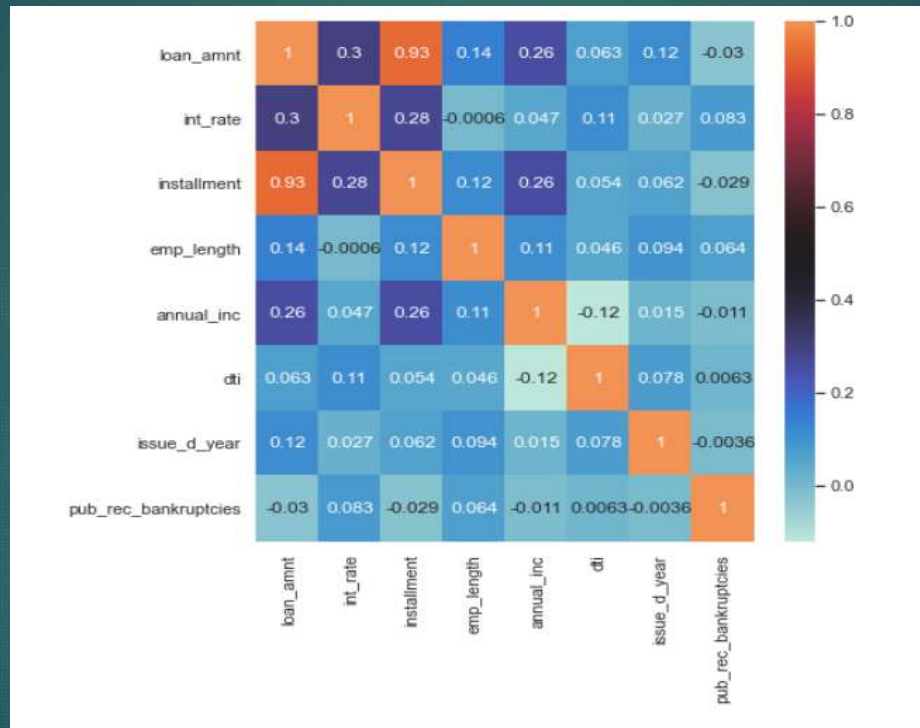


# Appendix - Correlations [1/2]

- ▶ Loan Amount is correlated (positive) with the installments , interest rates , annual income.
- ▶ Interest rate is correlated (positive) with installment

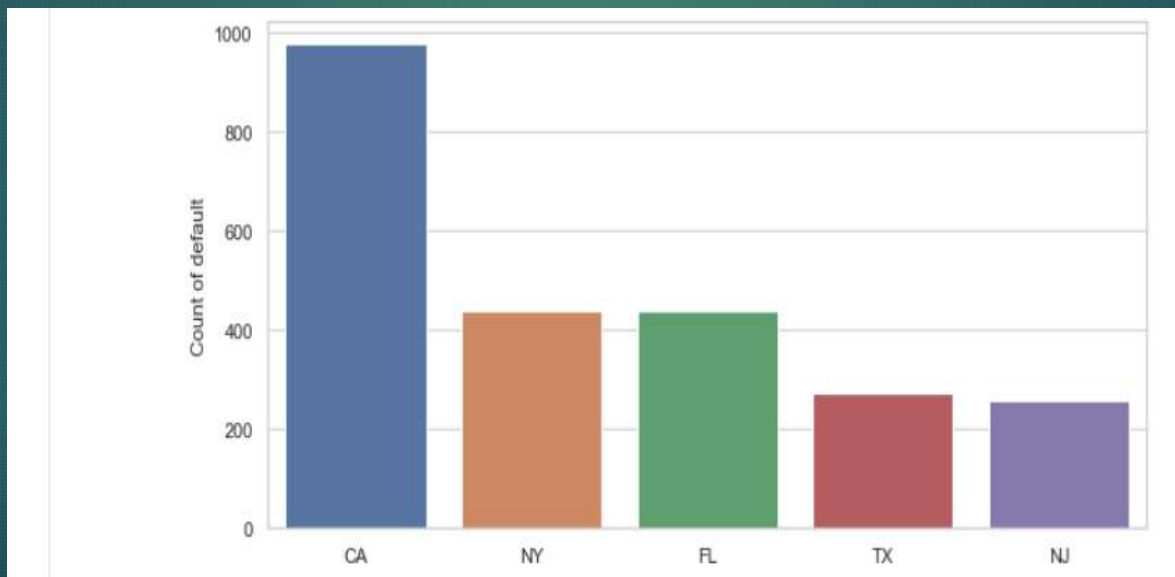


# Appendix – Correlations [2/2]



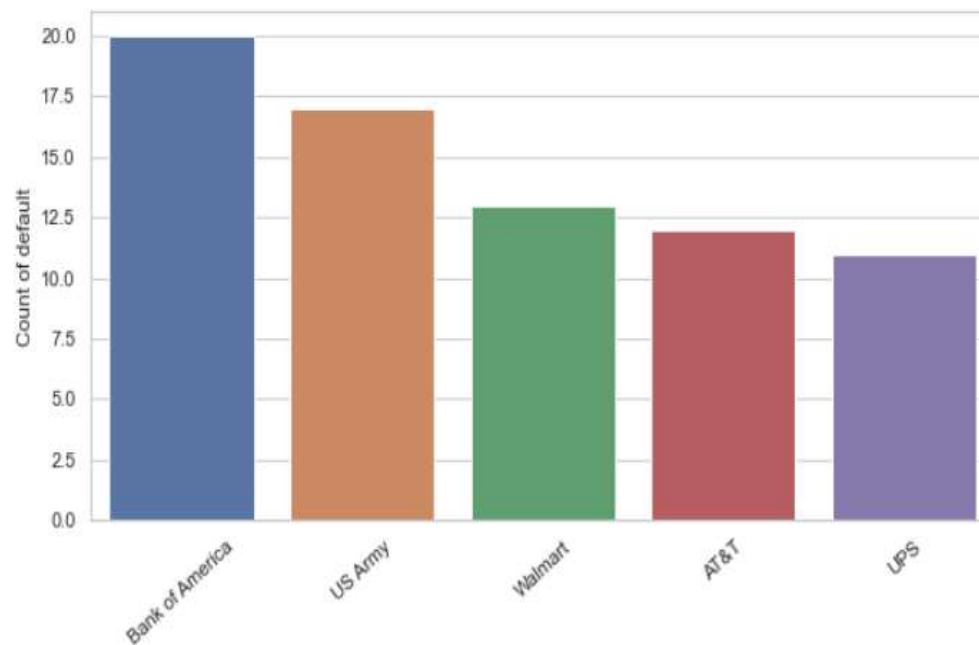
# Appendix – Defaults By State

- ▶ Maximum defaulters are in populous states, California, New York, Florida and Texas.



# Appendix – Defaults By Employer

- ▶ Maximum defaulters are from large organizations – Bank of America, US Army , Walmart , AT&T etc.



# Appendix – Loan Amount

- ▶ The loan amount increases the chances of default are also increases.

