

# Lending Club Case Study

MLG C5

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# I. Background of the Project

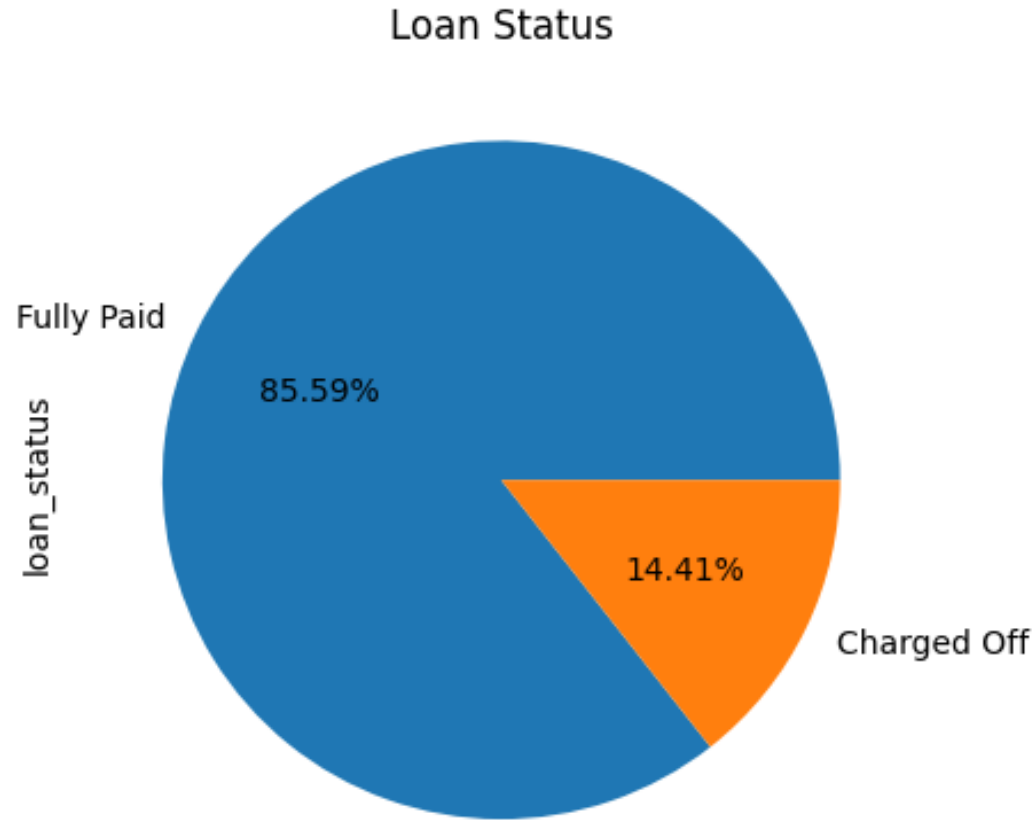
- **Lending Club** is the largest online loan marketplace, facilitating personal loans, business loans, and financing of medical procedures.
- The company must **make decision** when accepting loan request. After the loan accepted, there will be 2 cases:
  - **Fully Paid**: Applicant has fully paid the loan
  - **Charged Off**: Applicant has not paid the instalments in due time for a long period of time (he/she has **defaulted** on the loan)
- The aim of this project is to identify the **driving factors behind loan default**, so that the Lending Club can come up with right decision when reviewing loan applications

# II. Data Cleaning

- Columns cleaning
  - We drop **customer behavior columns**, as they are not available at the time of loan application, and thus they cannot be used as predictor for credit approval
  - Drop columns that have **more than 80% of missing values**
  - Drop columns with **only 1 unique values**, as it will have no effect on the analysis
- Rows cleaning
  - Removing rows with the status of the loan is **Current**, because we only need to analyze the loans that are ended.
  - Remove outliers

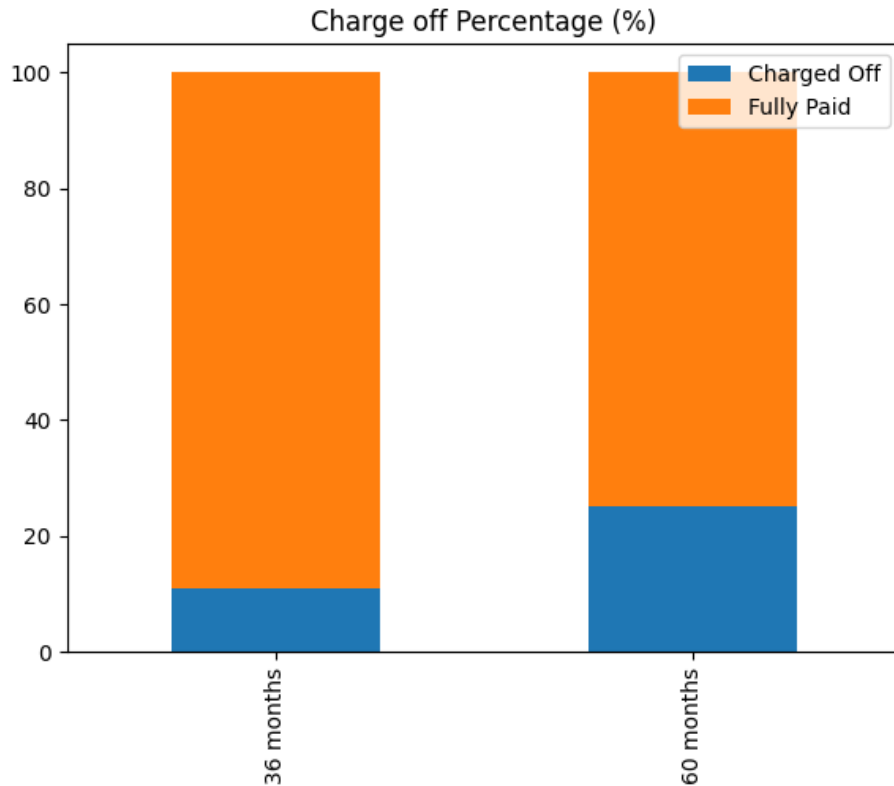
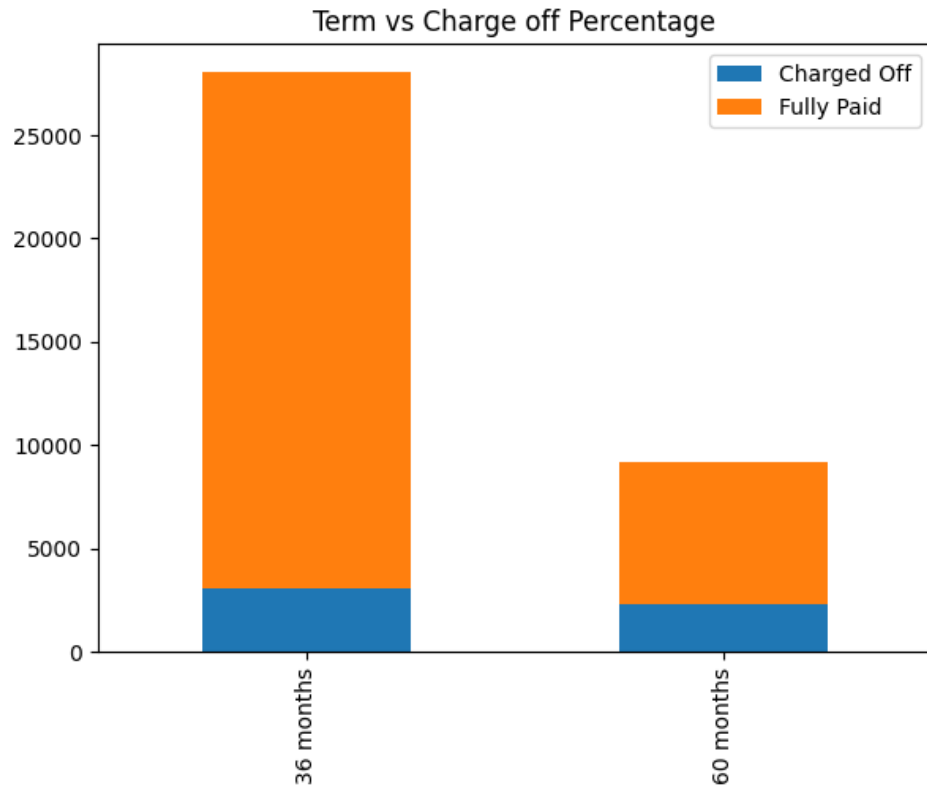
# **III. Data Analysis**

# Overall Charged Off Percentage



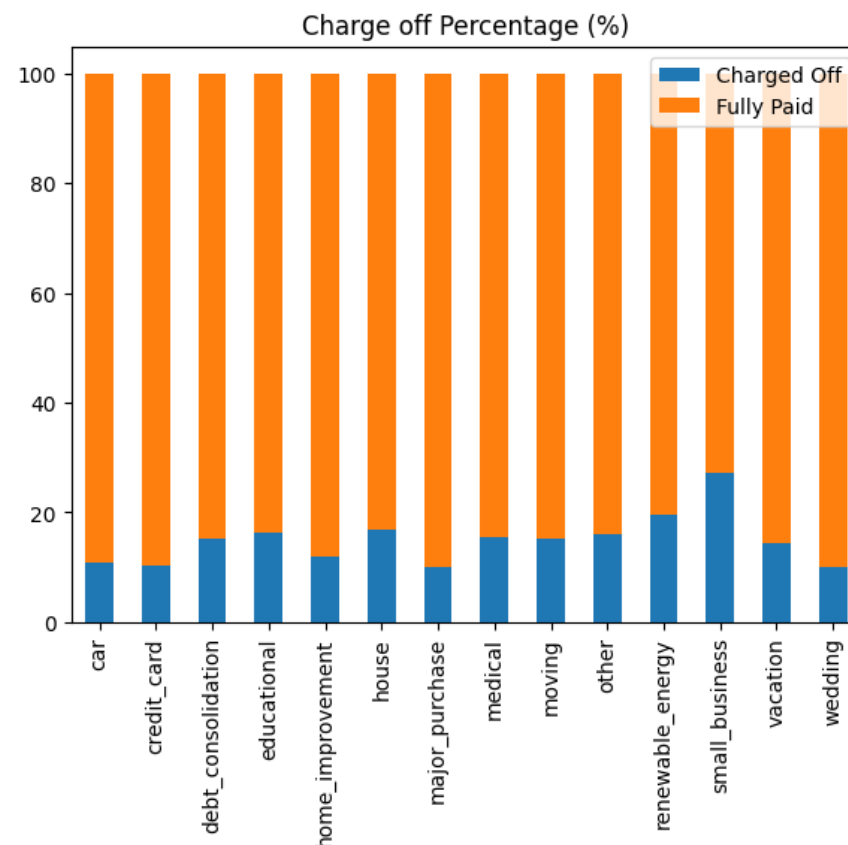
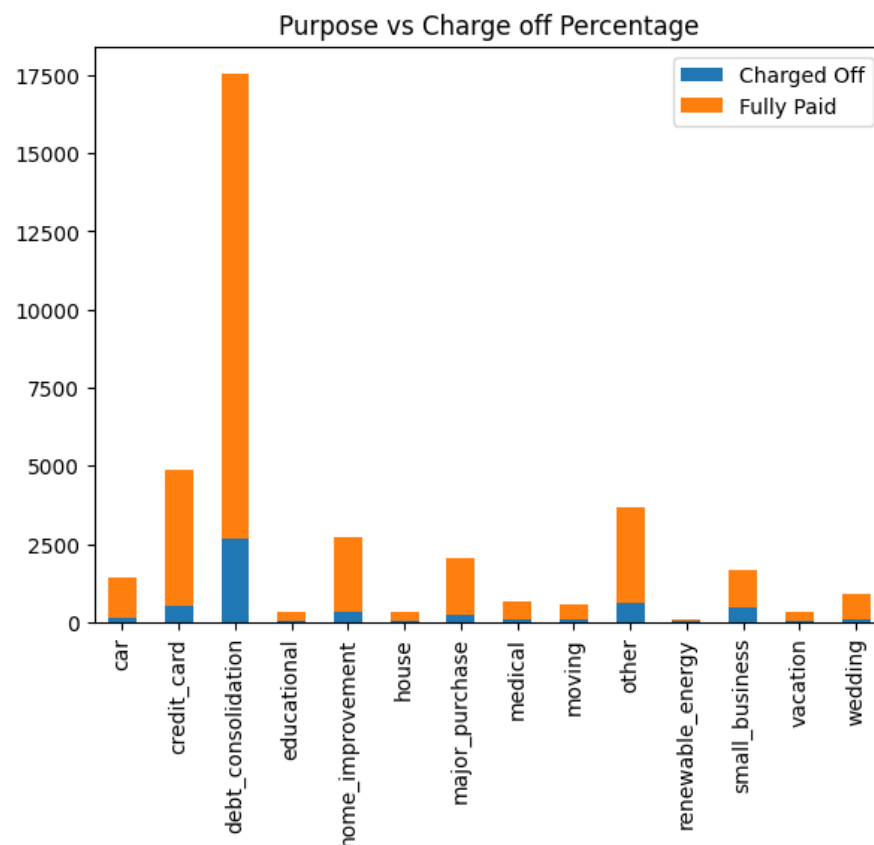
- Among 37163 loan applications, 14.41% was charged off

# Term vs Charged off Percentage



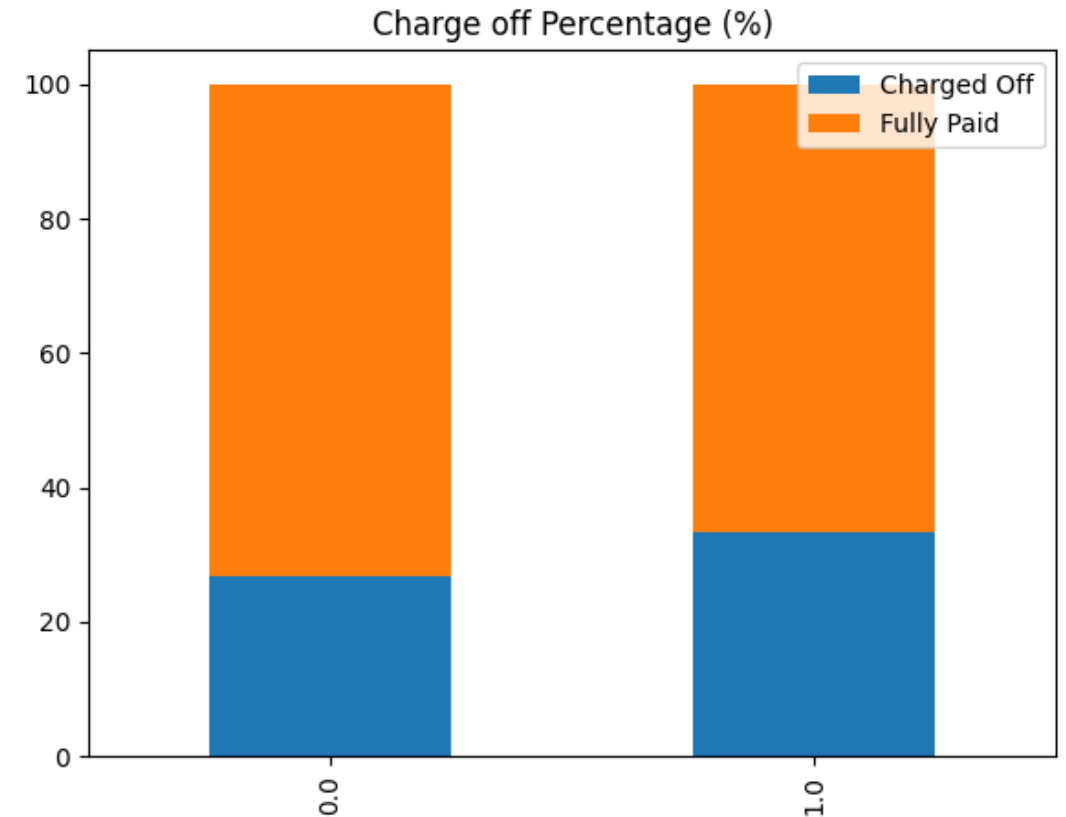
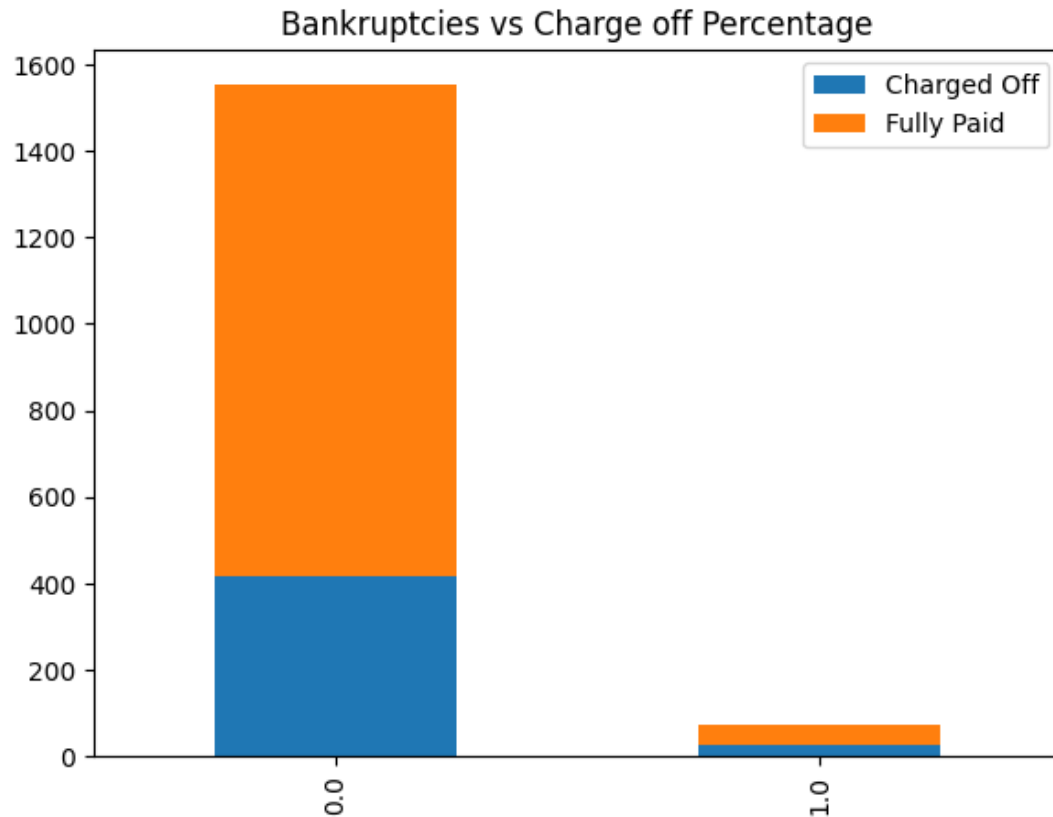
- Most of the loans were paid in 36 months term.
- However, 60-months loans saw a higher percentage in charged off compared to 36-months loans (25% compared to 10%)

# Loan Purpose vs Charged off Percentage



- Loan the had the purpose **Small Business** saw the most charged off percentage (25%)
- Second highest is **Renewable Energy**

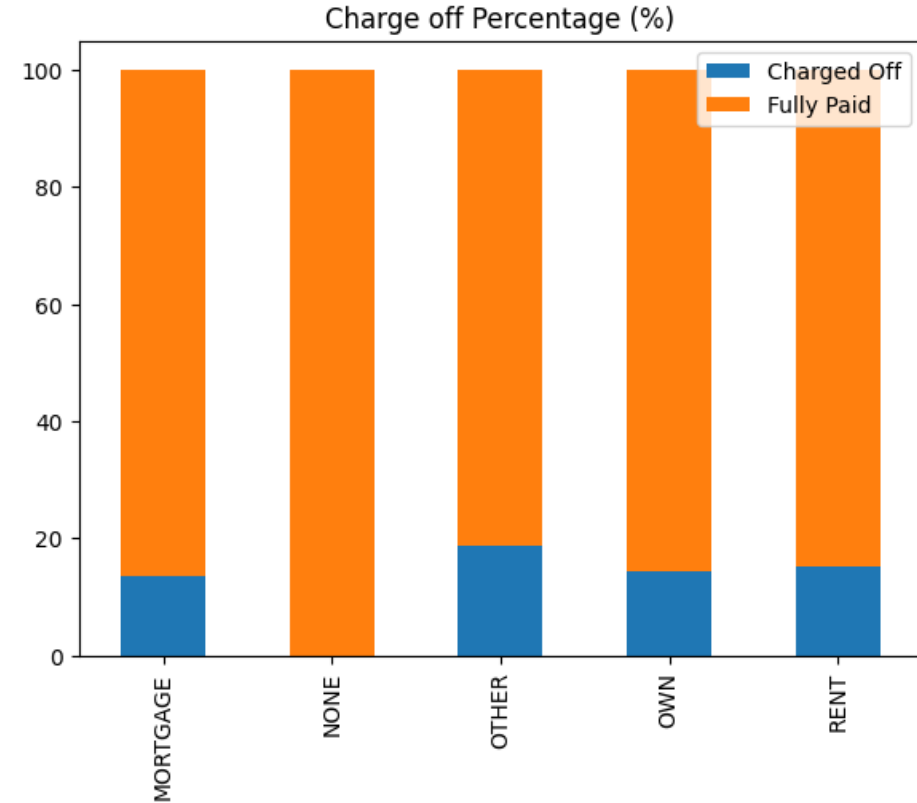
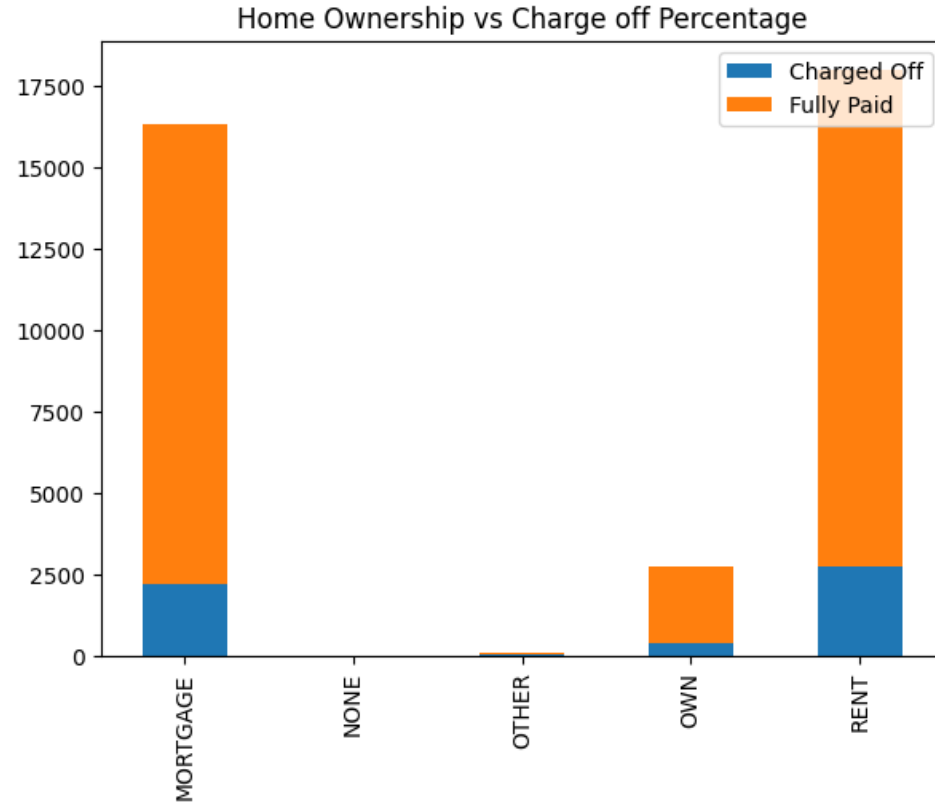
# Small Business and Bankruptcies



- Only few loans for small business had previous bankruptcies. However, **the percentage of charged off loans is higher** in those loans

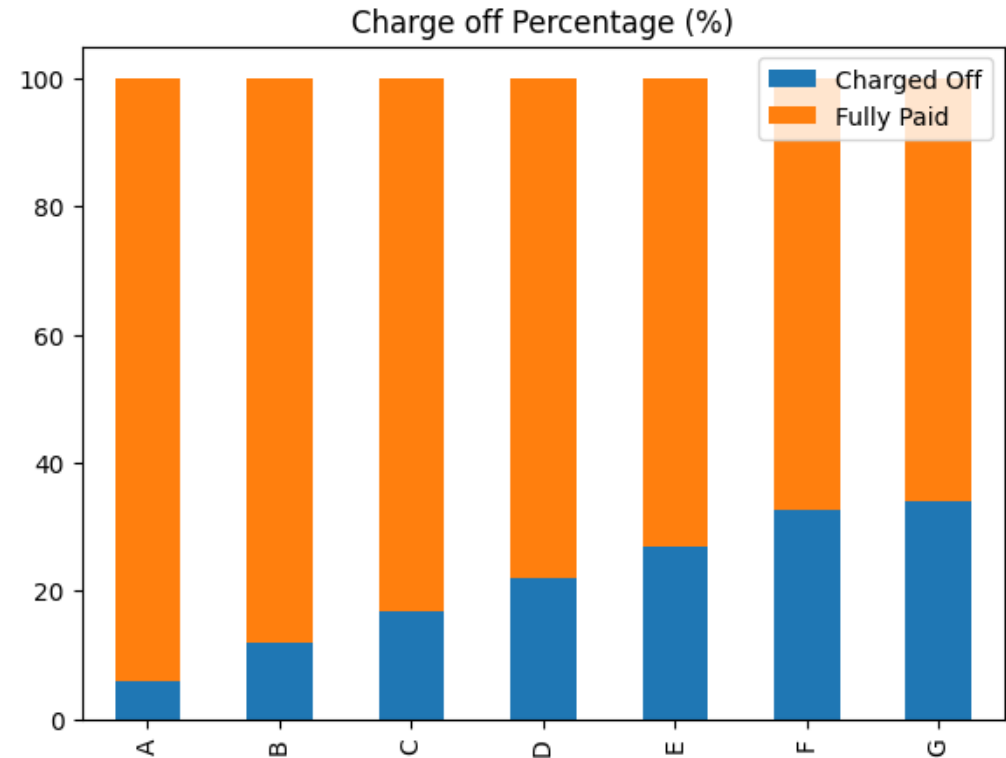
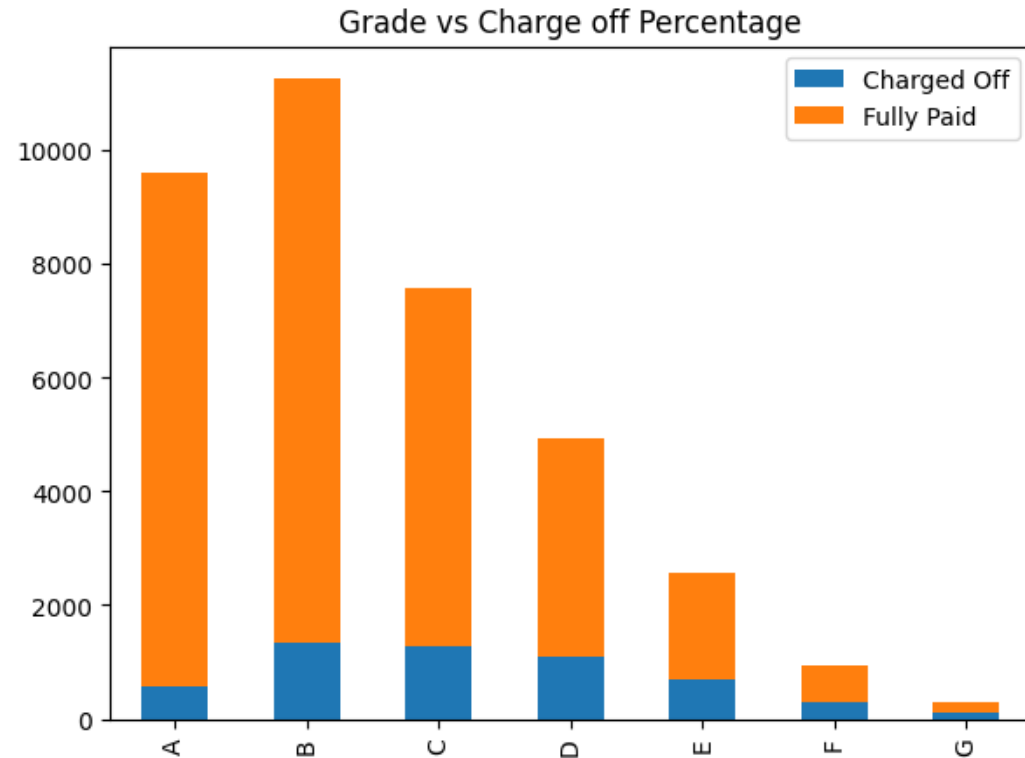


# Home Ownership vs Charged Off Percentage



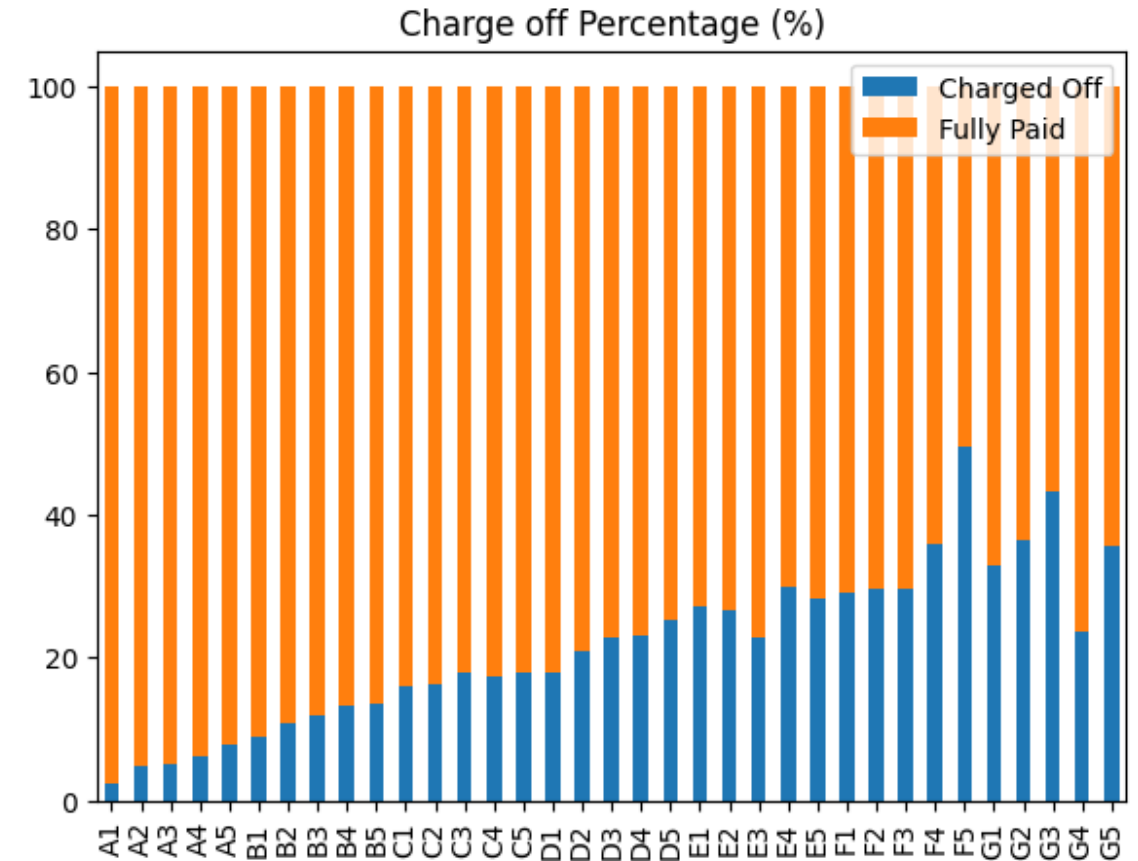
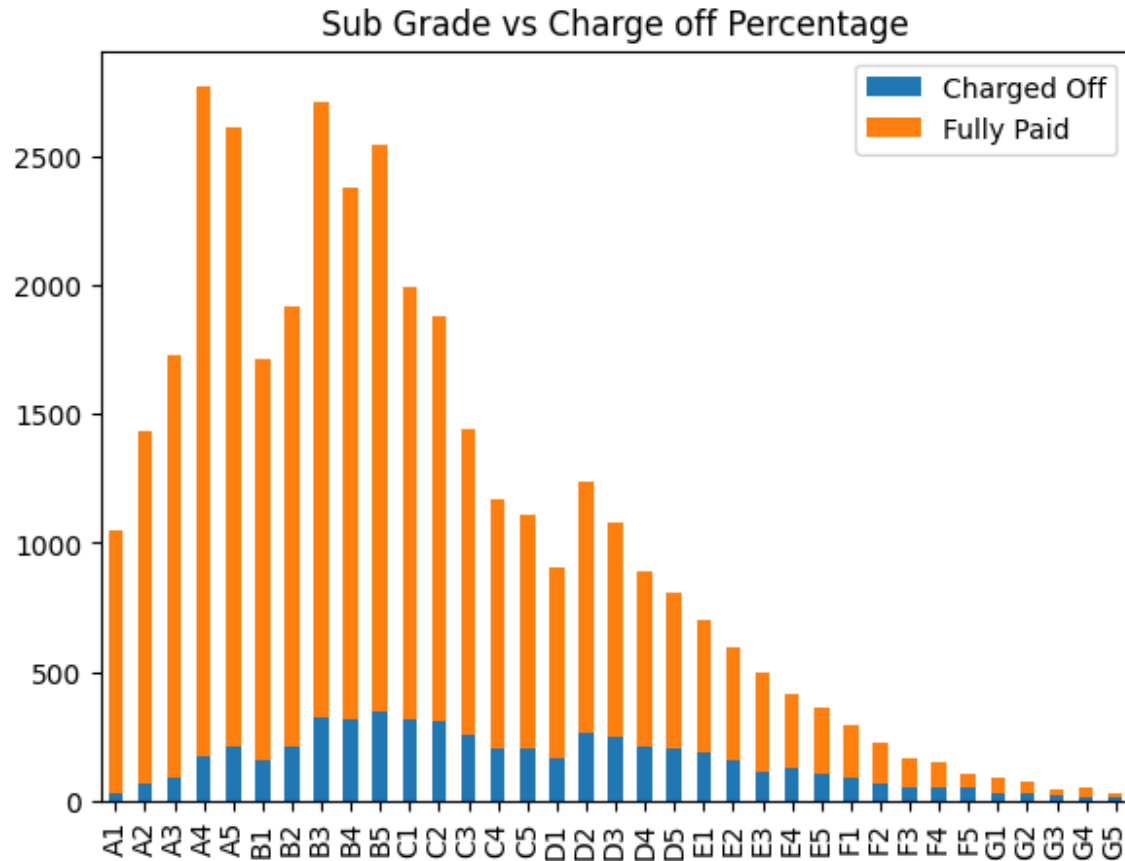
- There is no big difference in charged off percentage between Home Ownership status, Home Ownership seems **not to be a driving factor** for loans being default

# Grade vs Charged Off Percentage



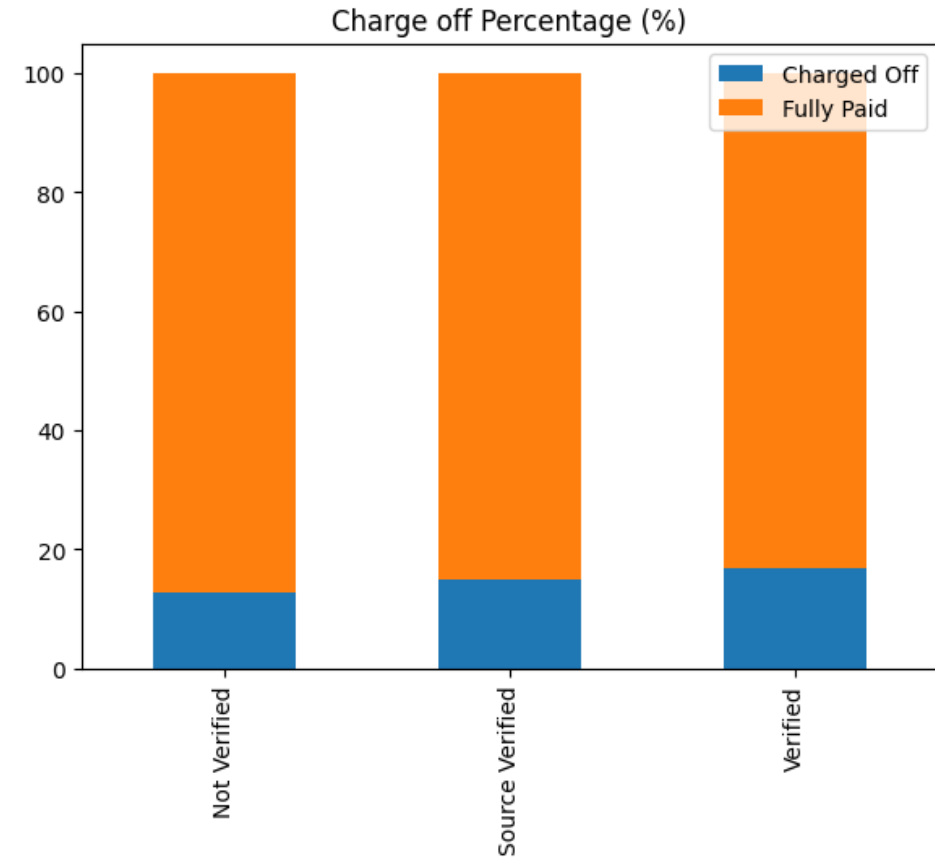
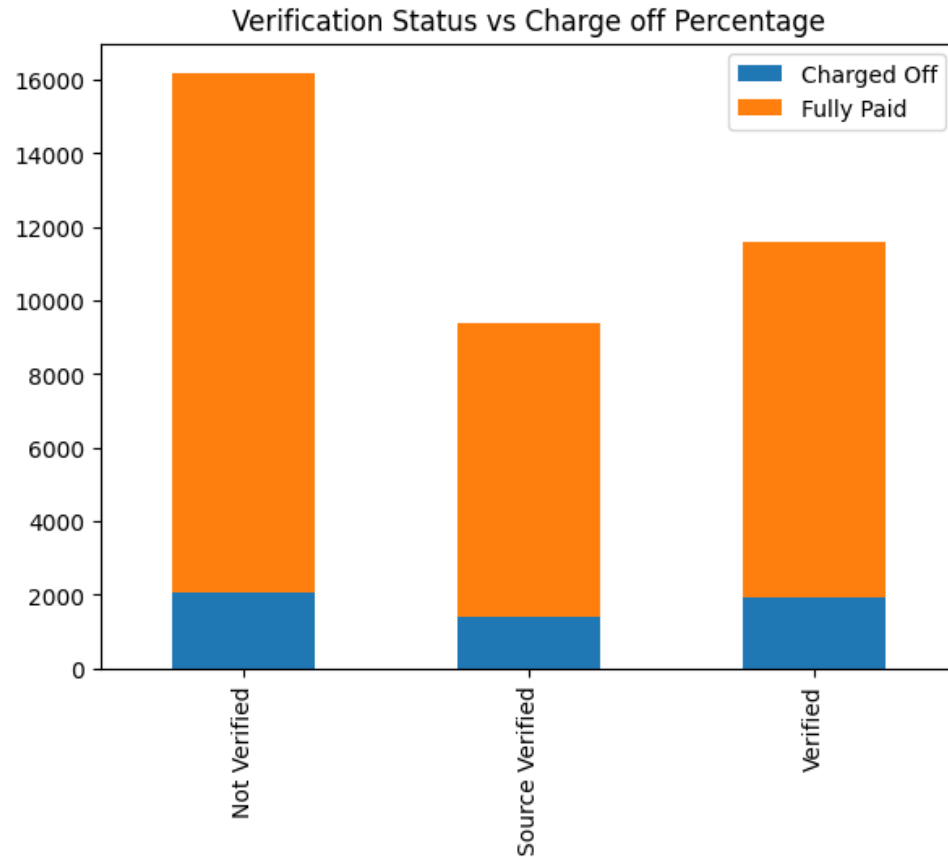
- The charged off percentage seems to increase from grade A -> G, highest in F and G (around 30%)

# Sub-Grade vs Charged Off Percentage



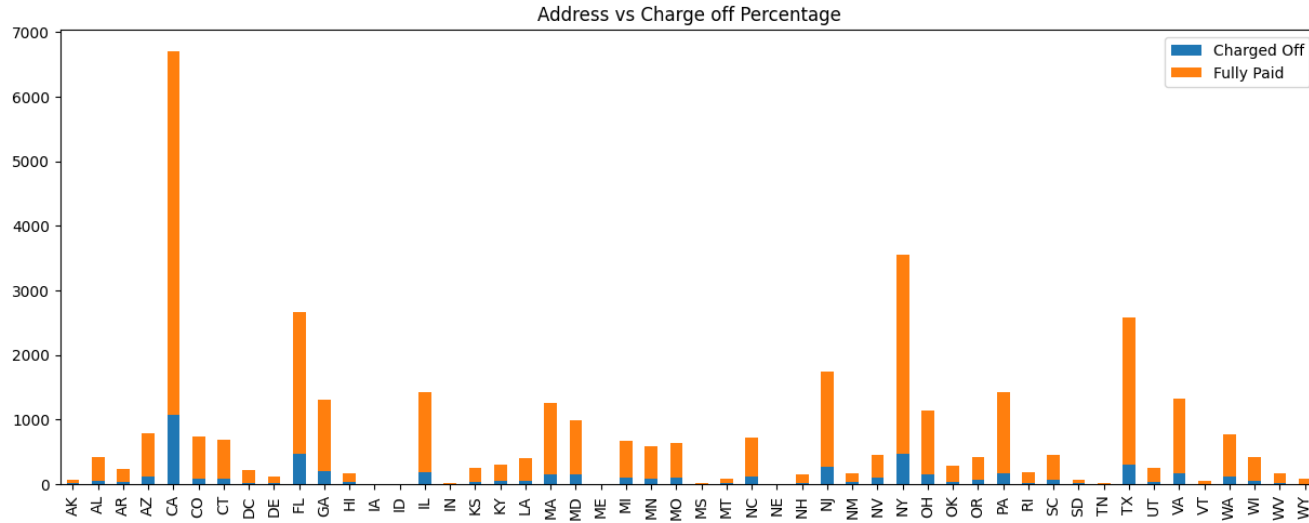
- The charged off percentage increase in subgroup (Eg: A1 -> A5), except for group **G**, where **G4** is the **lowest in charged of percentage**.
- F5 records **the highest charged off percentage** amongst all subgrade.

# Income Verification Status vs Charged Off Percentage

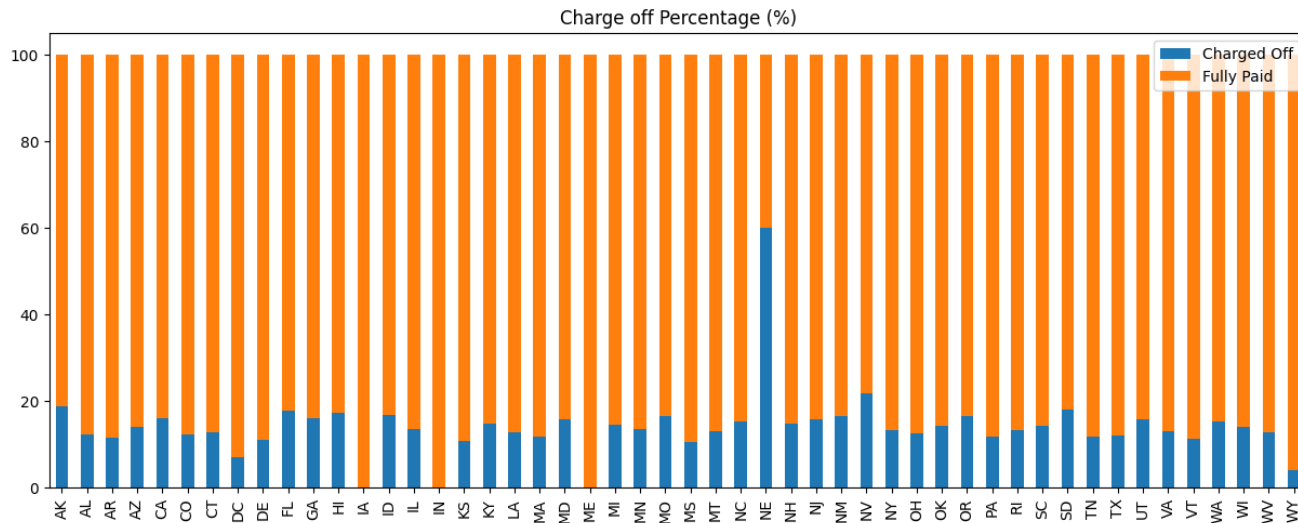


- Although there is no big difference in charged off percentage between **Verification Status**, but interestingly, **the loans with Verified Income records the highest Charge off Percentage**

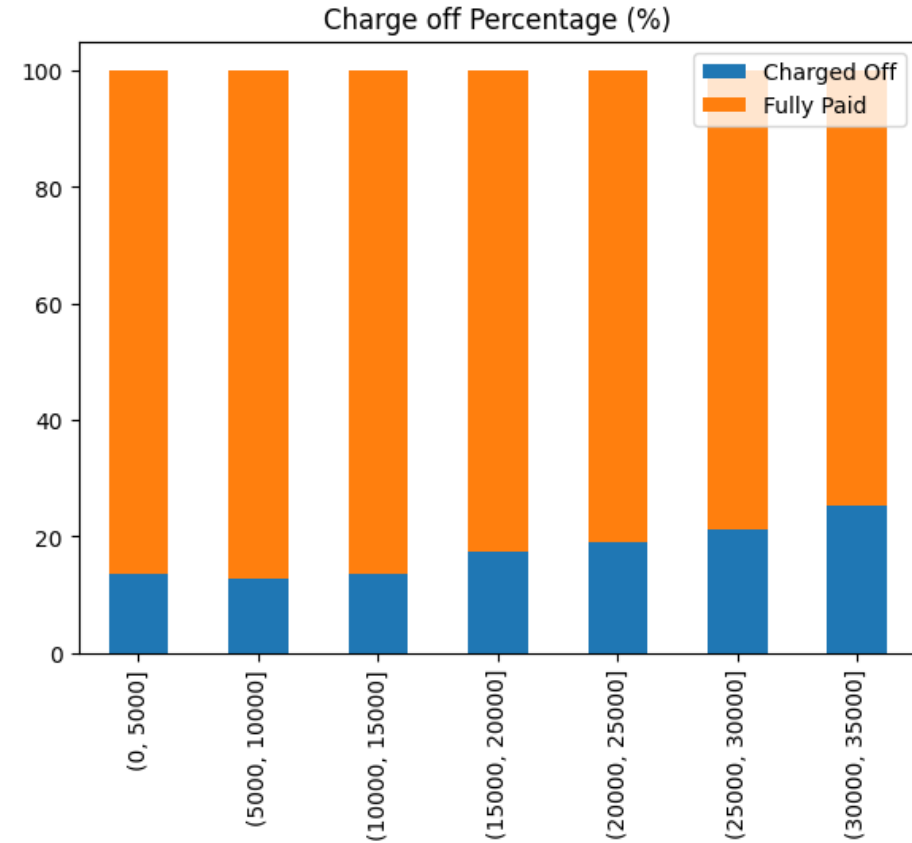
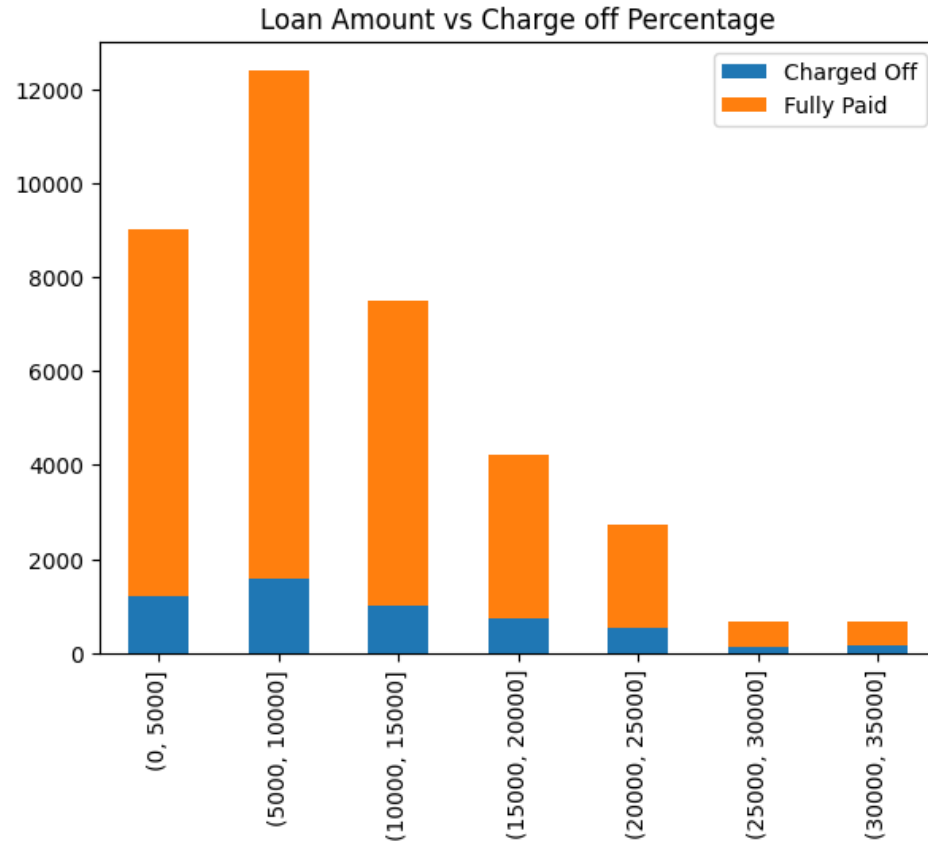
# Applicant's address vs Charged Off Percentage



- Most of the loans were issued to people from **CA (California)**
- **Nebraska (NE)** records an outstanding charged off rate compared to another state (over 60%)

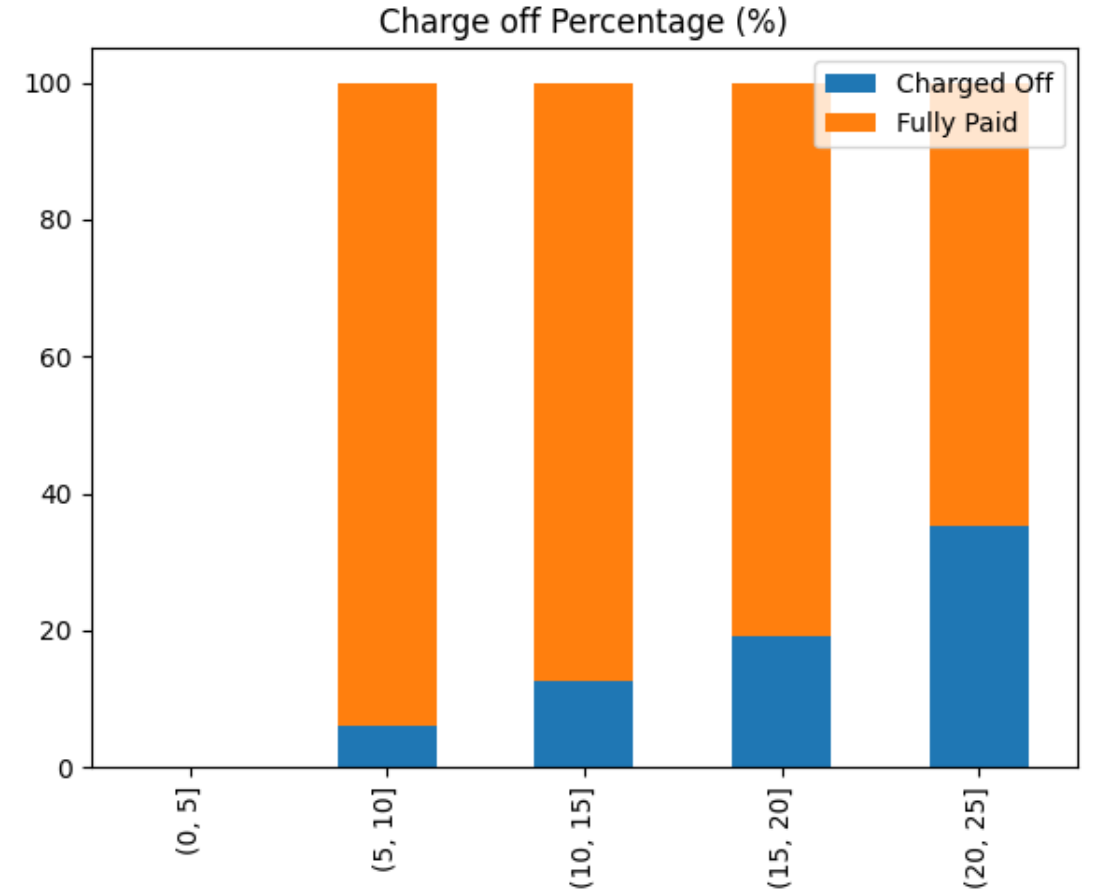
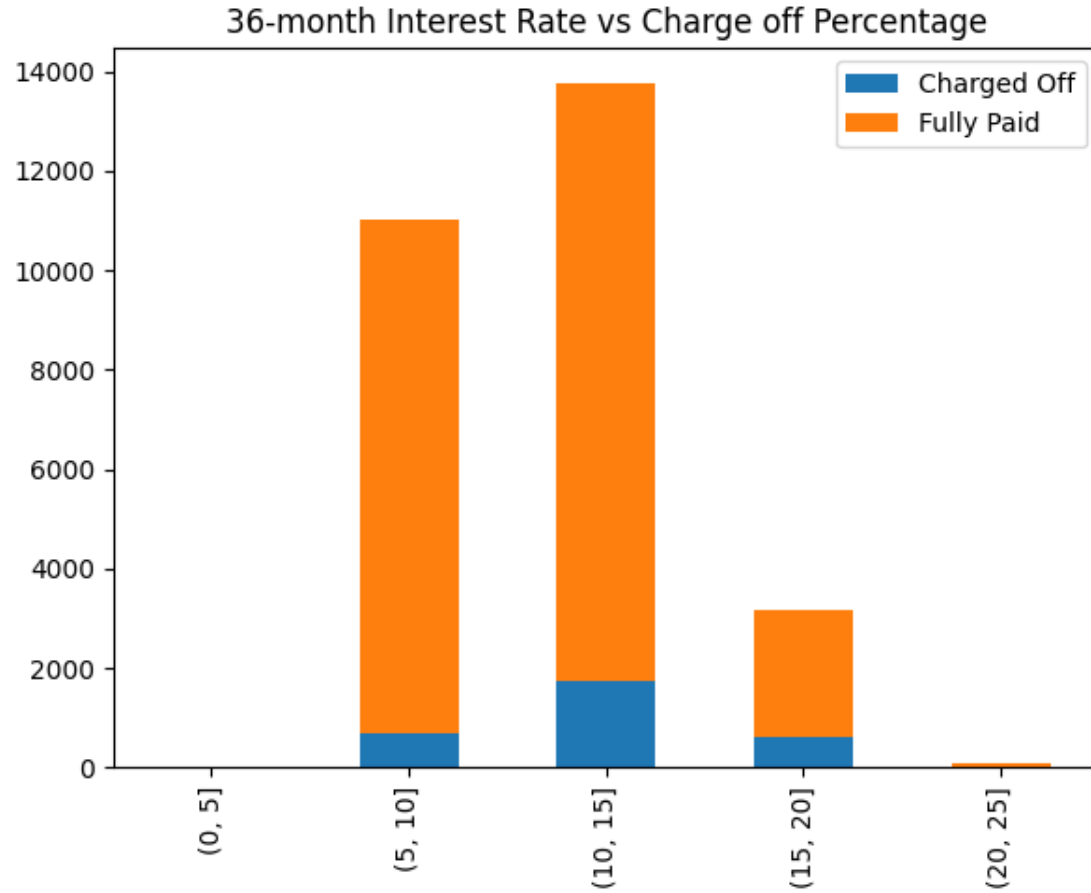


# Loan amount vs Charged Off Percentage

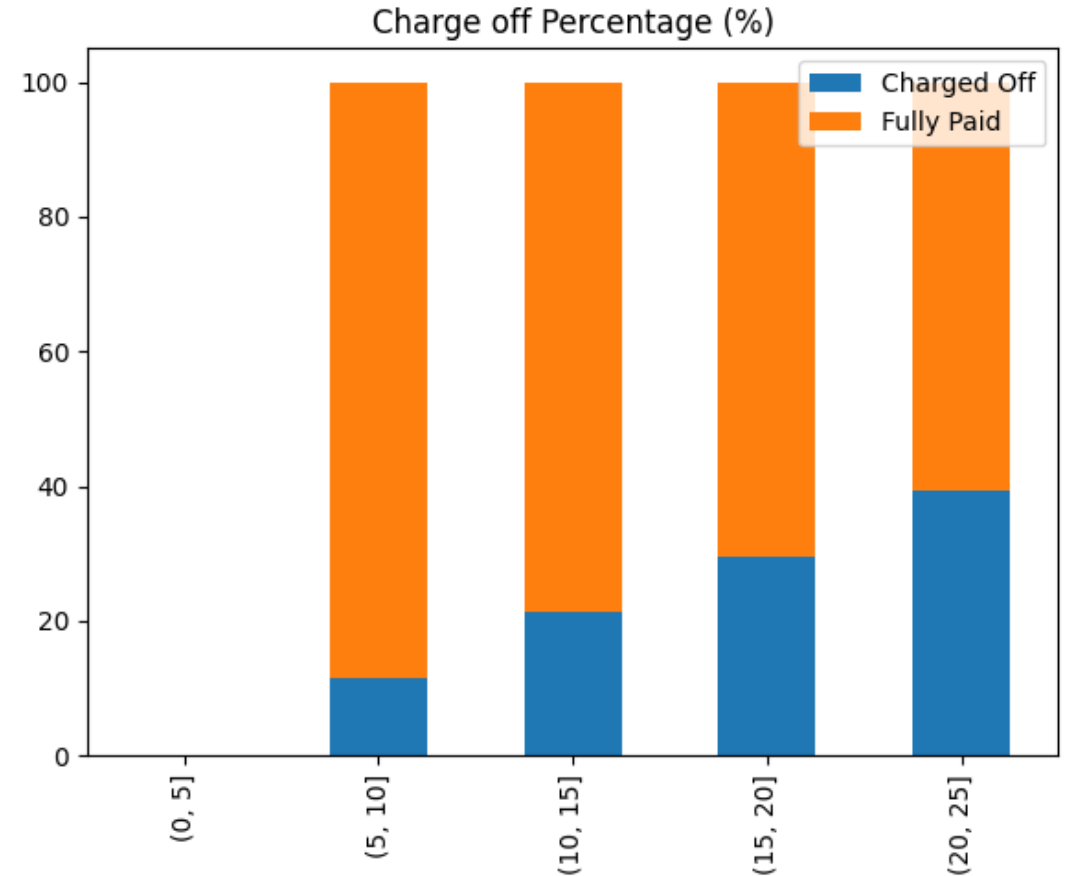
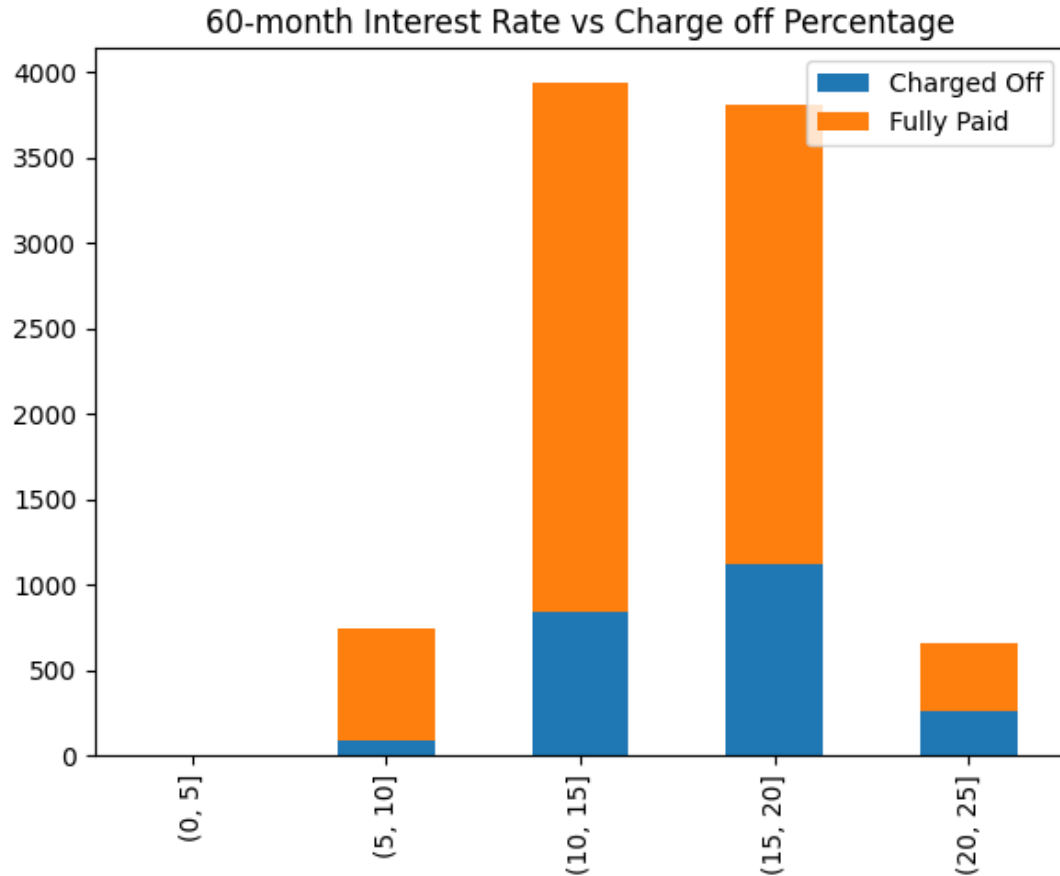


- Most of the loans were **between 5000 and 10000**
- Charge of percentage seems to **increase when loan amount increase**

# Interest Rate vs Charged Off Percentage (36-month loans)



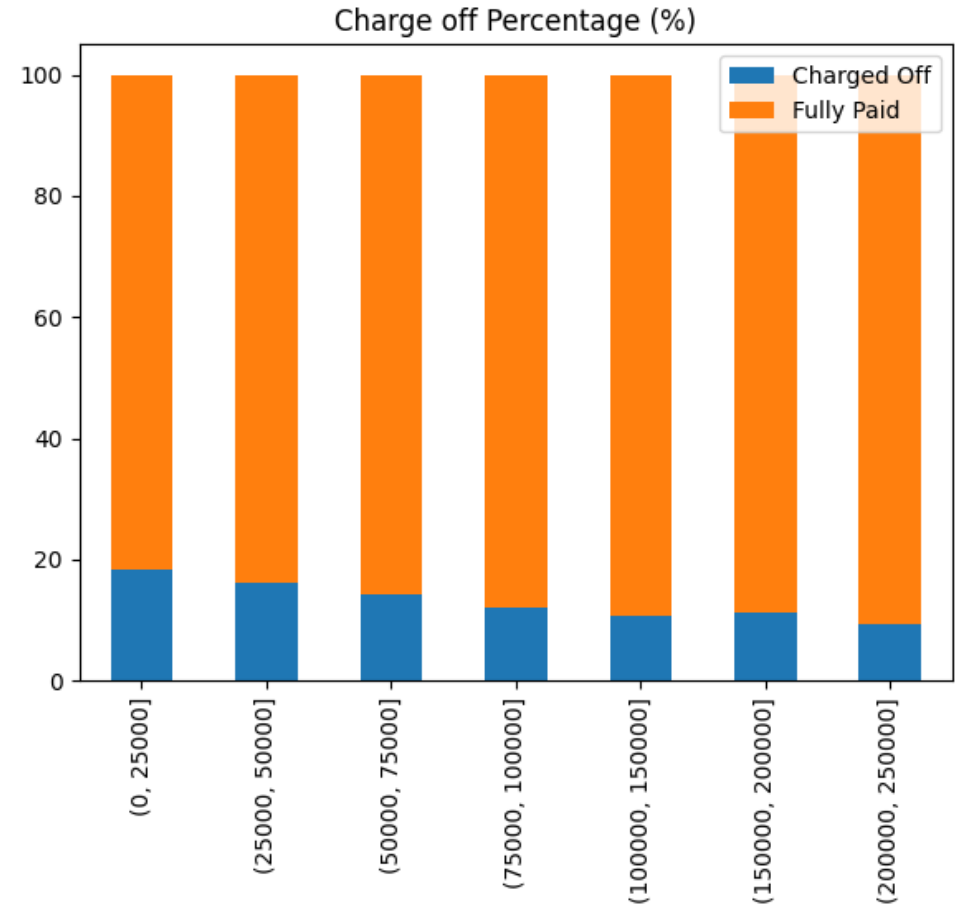
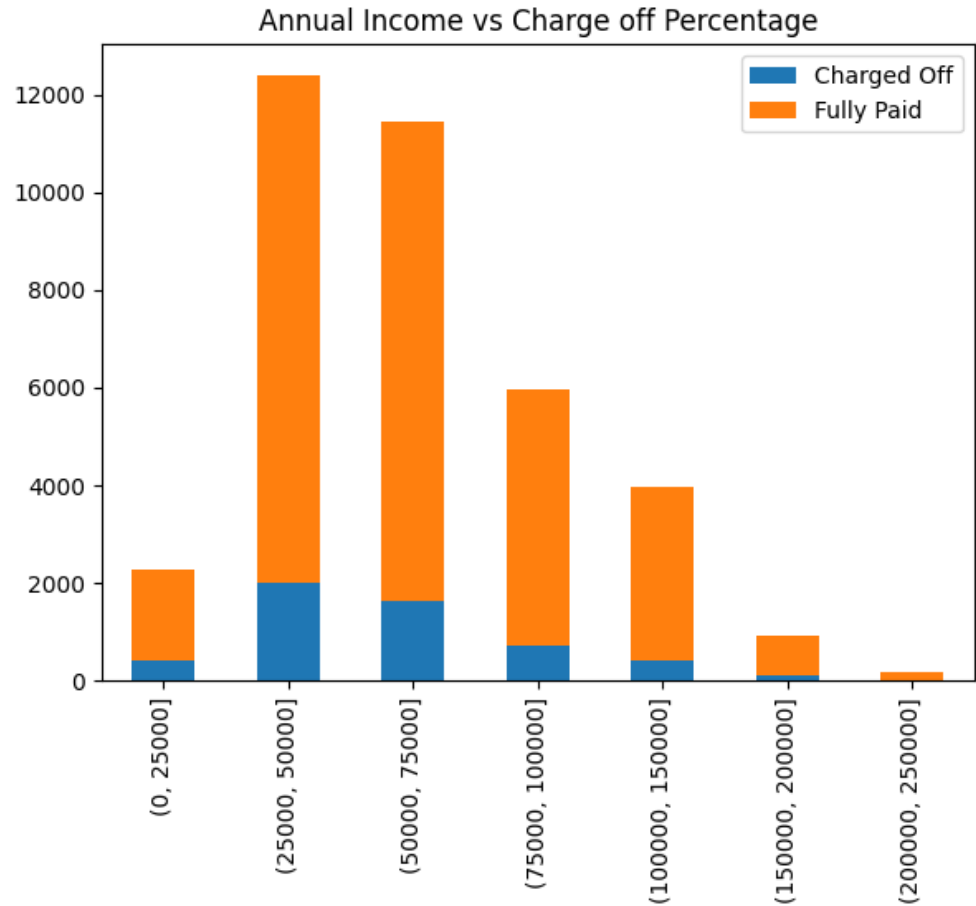
# Interest Rate vs Charged Off Percentage (60-month loans)



- The higher the interest rate, the higher charge off percentage

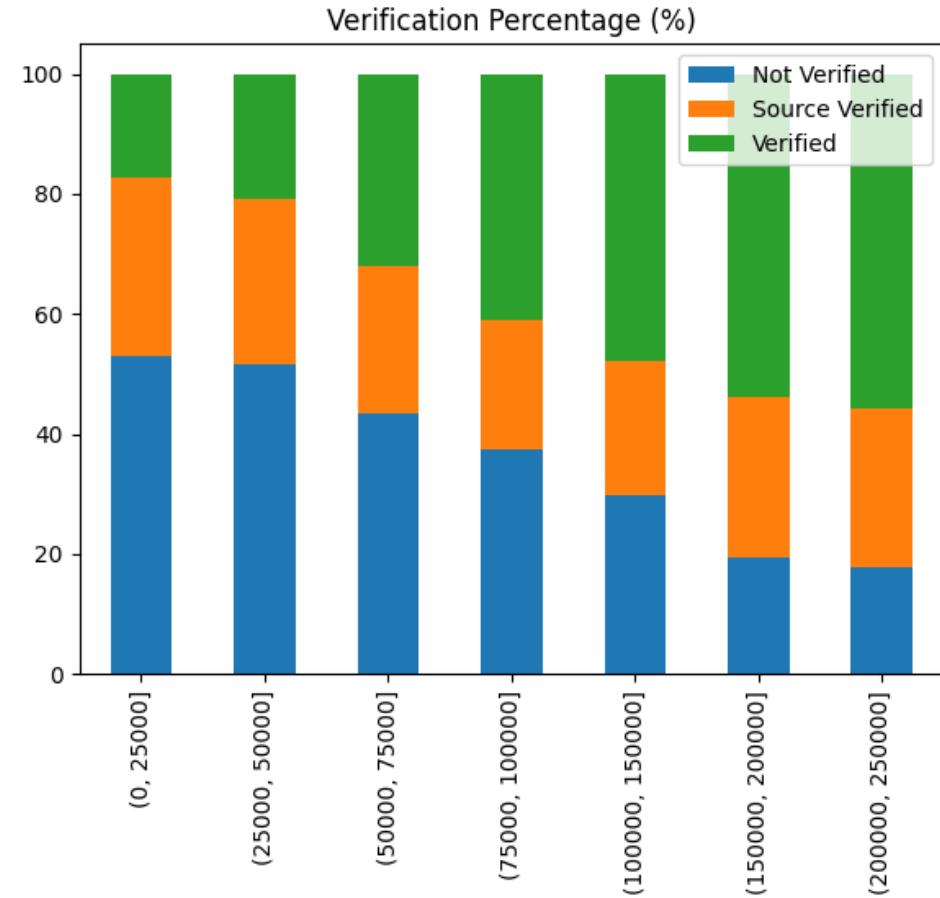
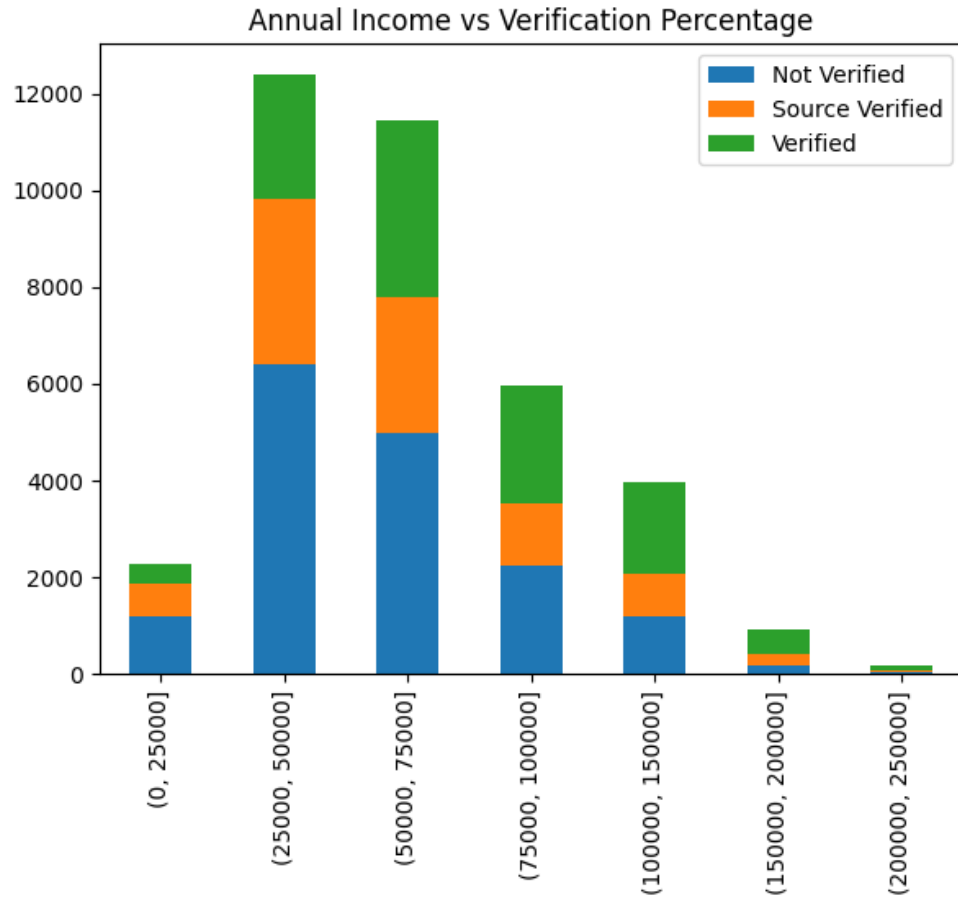


# Annual Income vs Charged Off Percentage



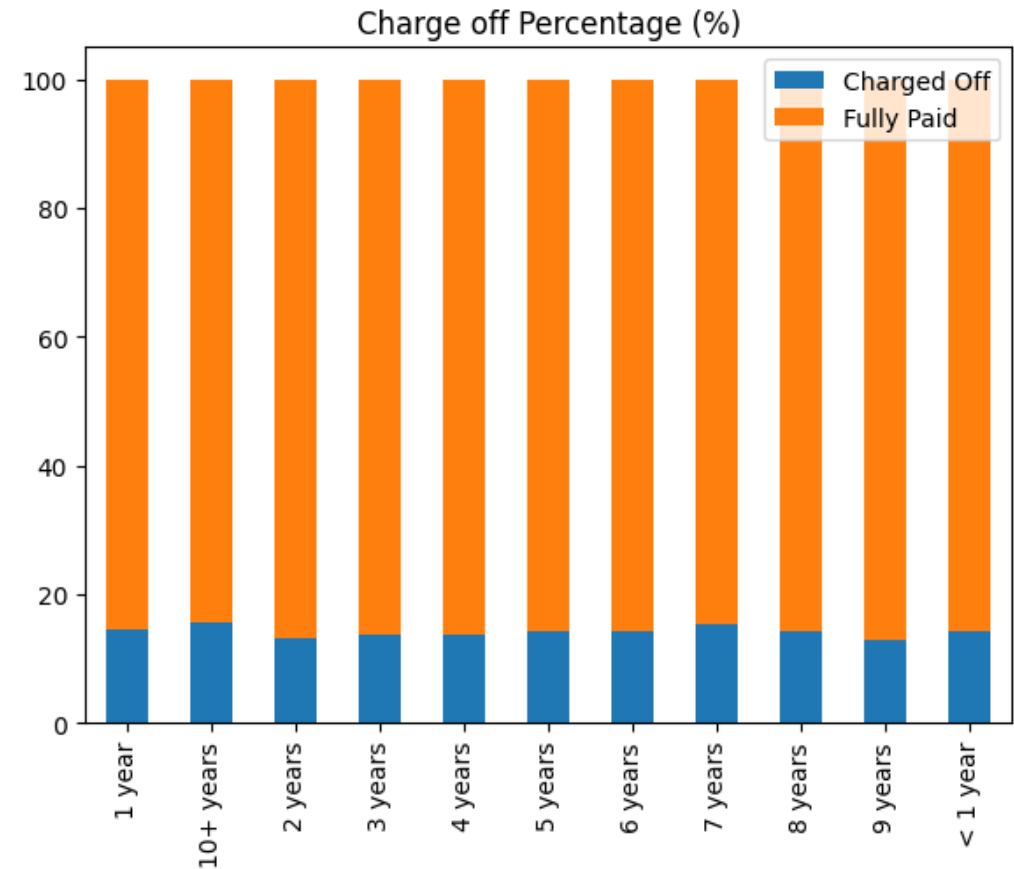
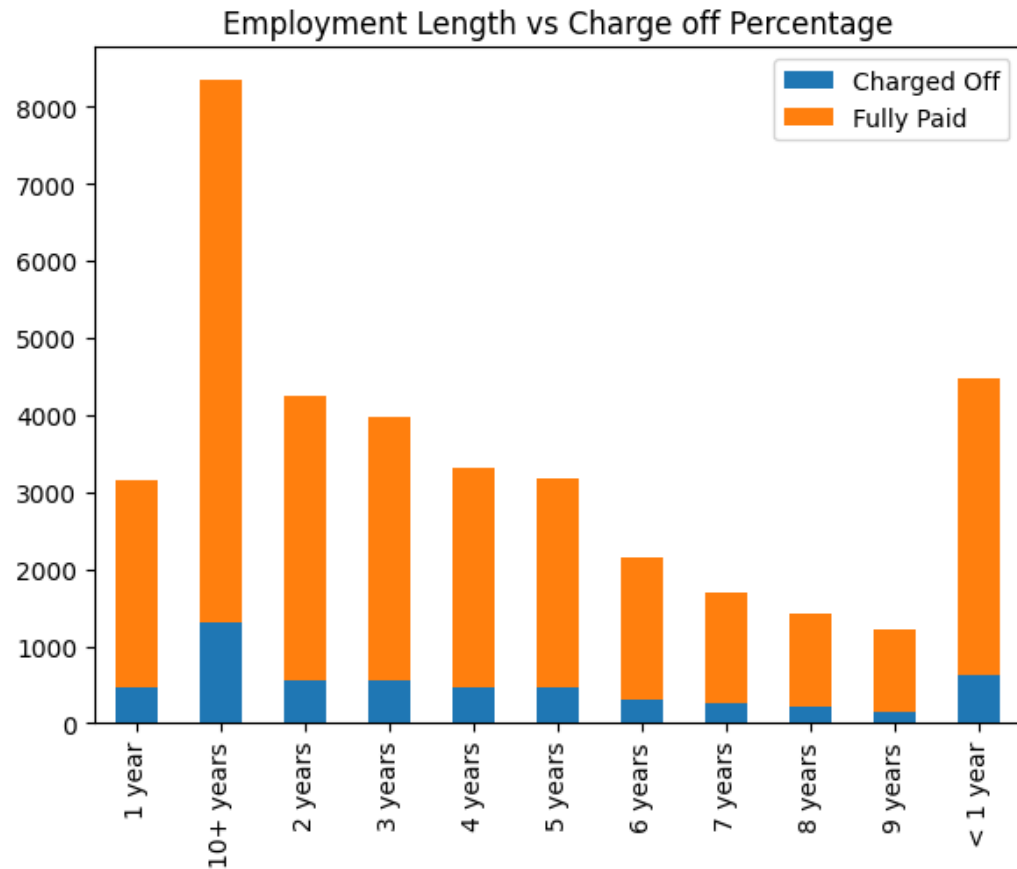
- Charged Off Percentage is the highest in the **0-25k and 25k-50k income group**.

# Annual Income vs Income Verification Status



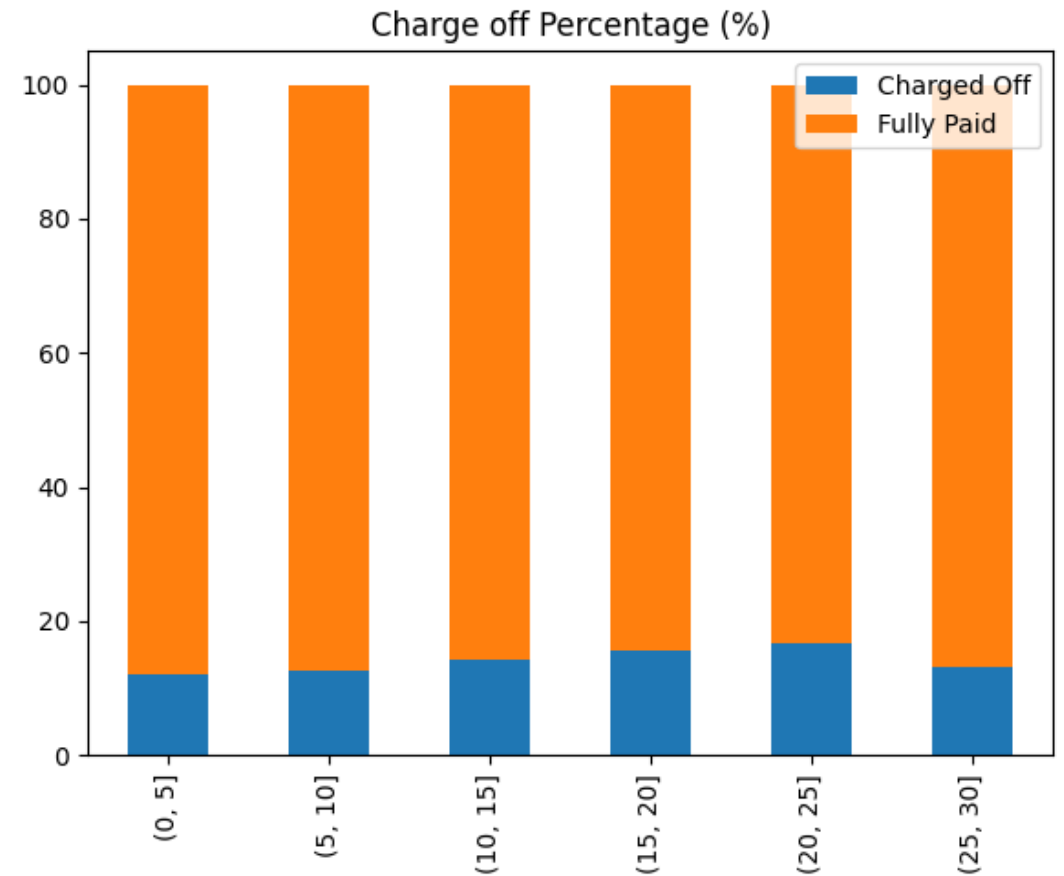
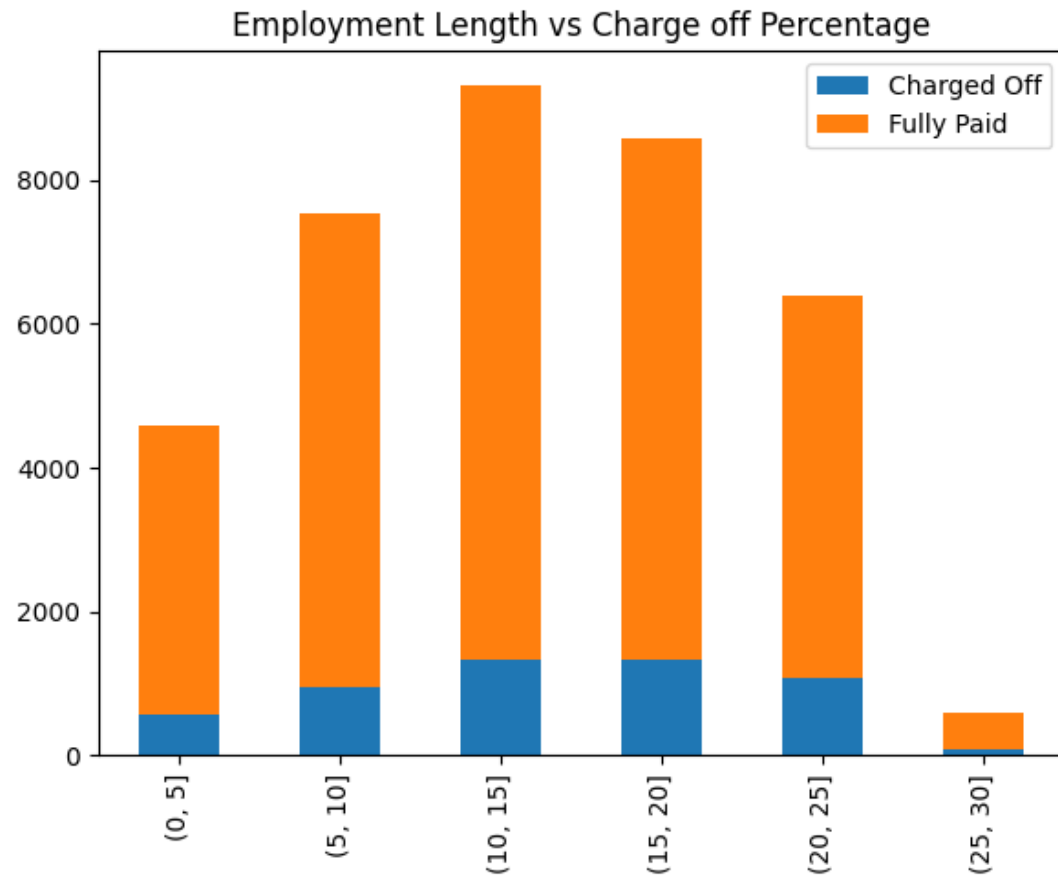
- Most of the income below 75000 a year **is not verified**

# Employment years vs Charged Off Percentage



- There is no big difference in Charged Off Percentage between employment years of loans' applicants

# DTI vs Charged Off Percentage



- There is no big difference in Charged Off Percentage between DTI groups

# Summary

**After analyzing the factors, we can summarize:**

- **High effect factors**

- Terms
- Interest Rate
- Annual Income and Verification Status
- Grade and Subgrade
- Loan Purpose
- Loan Amount
- Address

- **Low or None effect factors**

- DTI
- Employment Length
- Home Ownership

## IV. Business Recommendations

- Lending Club should be **careful** of the loans which **term is 60-month**, as the Charged Off Rate is much higher than 36-month loans (30% compared to 15%)
- Lending Club should be **cautious** when the lending purpose is **Small Business**, especially when the applicants had already had a public record bankruptcy
- Lending Club should **also take the applicant's LC assigned loan grade and subgrade into consideration**. **Grade A and B** are more likely to repay the loan, **while F and G** are more likely to charge off. **F5 has the highest charged off rate**, so Lending Club should be careful of **F5 applicants**.
- Among all the state, **Lending Club should be wary of Nebraska (NE) loans**, the charge off rate in this state is very high (over 60%)
- **The higher the loan amount, the higher the charged off rate**, Lending Club should be careful of the loans that has the **amount over 15000**
- **Annual income below 75000** is very low in Verification Status (Over 40% Unverified), and thus the Charged Off Percentage is high among those applicants whose income is below 75k. Lending Club need to be **more careful with those applicants**.