# LENDING CLUB CASE STUDY

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Objectives

1. Understand the driving factors behind loan default, i.e. the variables which are strong indicators of default.

2. Based on the data analysis come up with a recommendations to facilitate new approval decisions.

Methodology

1 Understanding the Dataset

2 Data Cleaning & Preparation

3 Exploratory Data Analysis

  • Univariate, Segmented Univariate, Bivariate Analysis with Visualization

4 Derive Conclusions
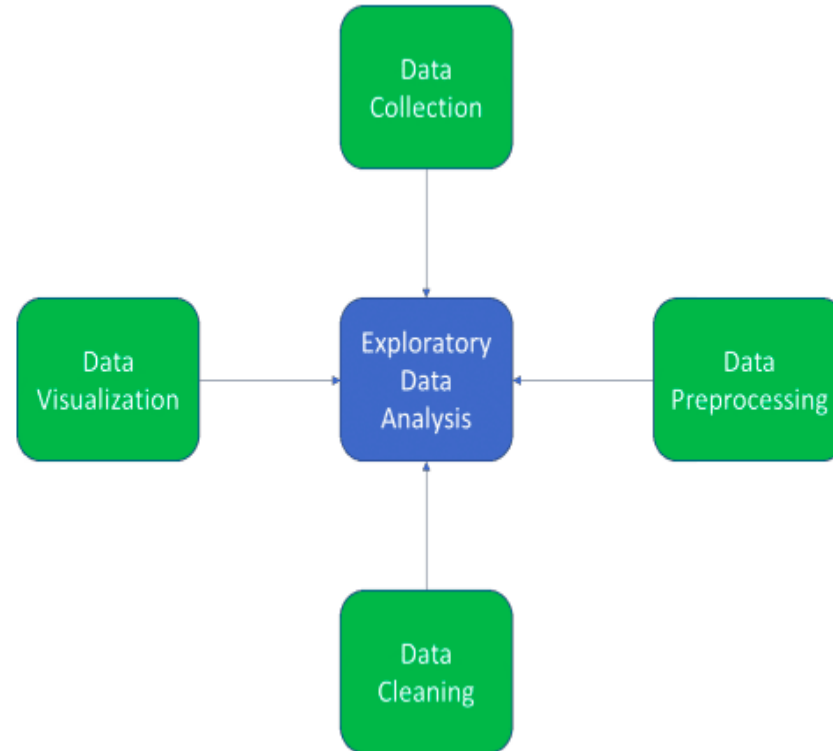
Data Cleaning

1. Fix rows and columns
   - Remove unnecessary columns
   - Split Columns containing Multiple data values
2. Fix missing values
   - Delete row/column if significant number of missing values in a row/column
   - Set the missing values with appropriate values
3. Standardise values
   - Fix non-stand values to correct standards (lbs to kg etc.)
   - Precision, suffix/prefix etc.
   - Remove outliers
4. Fix invalid values
   - Fix the data types
   - Delete rows with invalid data
5. Filter data
   - Filter duplicate data

Analysis

- Objective of the this case study to analyze and figure out the various consumer and loan attributes which most influence the Charge Off of an approved loan.

- Following has been carried out in the loan data set to clean and prepare the data for analysis.
    - NA values has been imputed with most appropriate mode values from the same column.
    - New columns created from existing columns
        - eg:-Year and Month columns from loan date column.
    - Unnecessary columns, Invalid columns has been removed.
        - Customer behavioral data which won't be available during loan application.
        - Columns with only one unique value and columns with high percentage of NA/Null data.

- **Univariate** analysis carried out with.
    - Histograms and Bar charts to identify distributions.
    - Box plot to detect outliers.

- **Multivariate** and **Bivariate** analysis carried out to study the correlation between the attributes and their influence on loan status attribute.
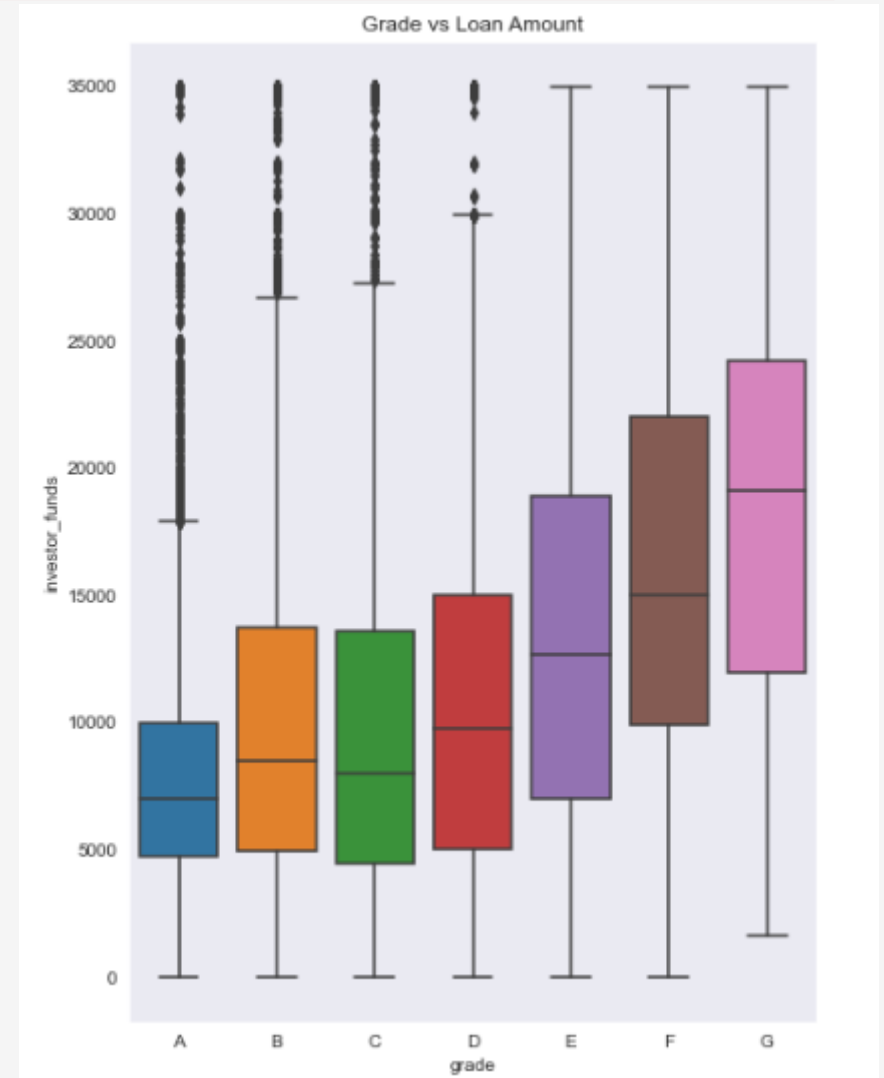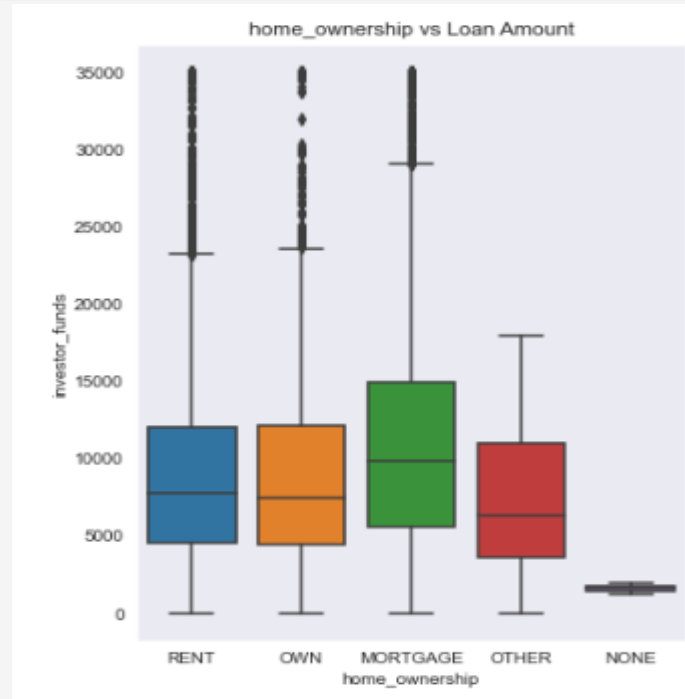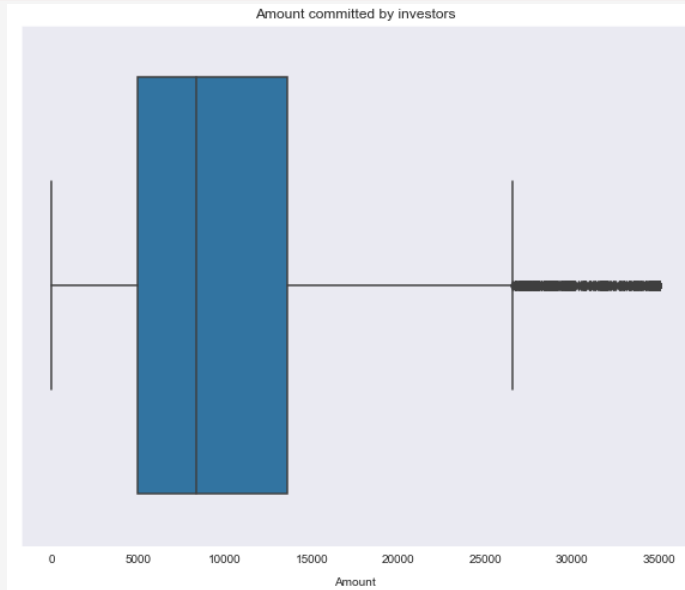
Loan Status Univariate Analysis

Status of the completed loans (Percentage)

Year vs Loan Status
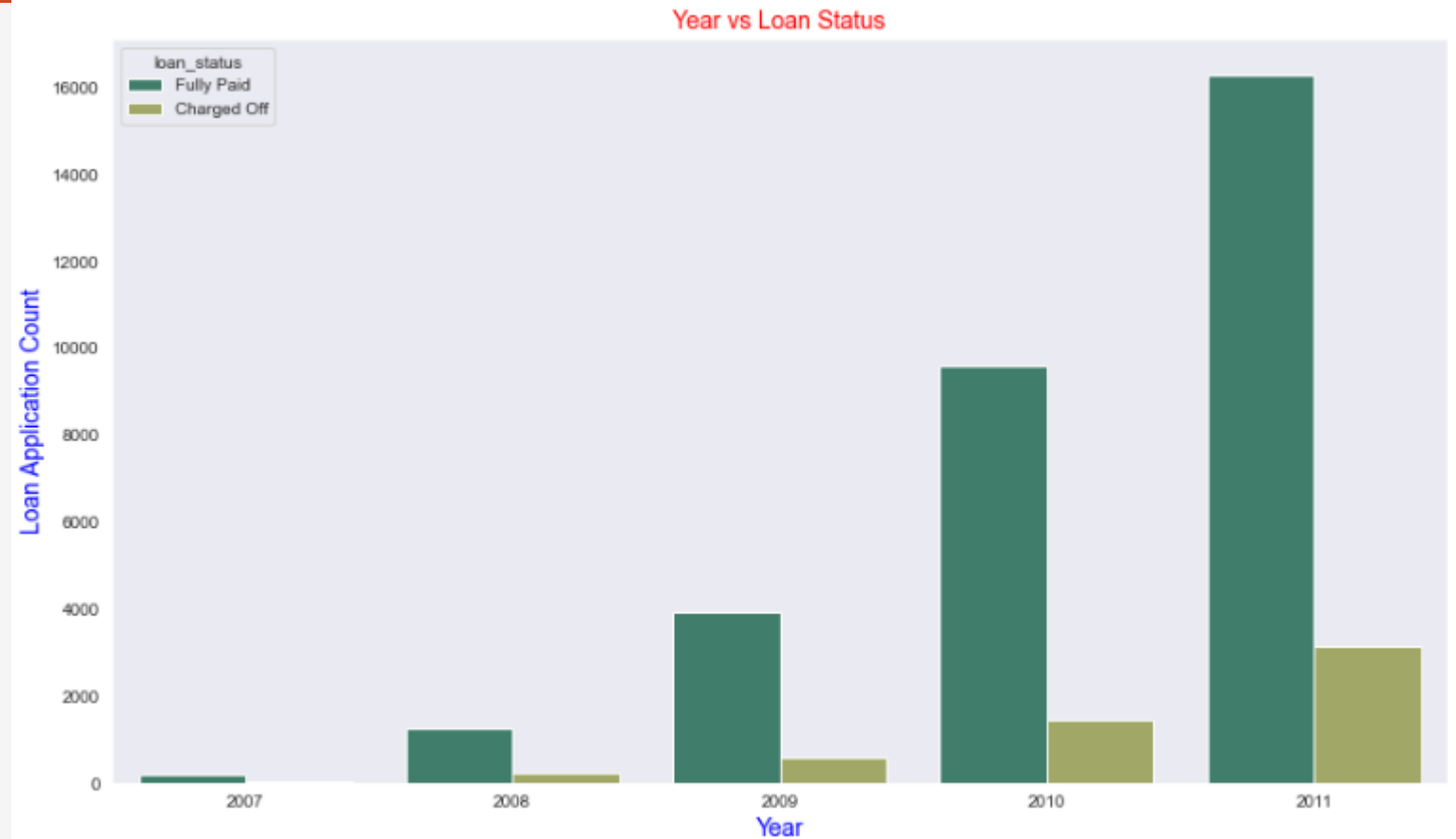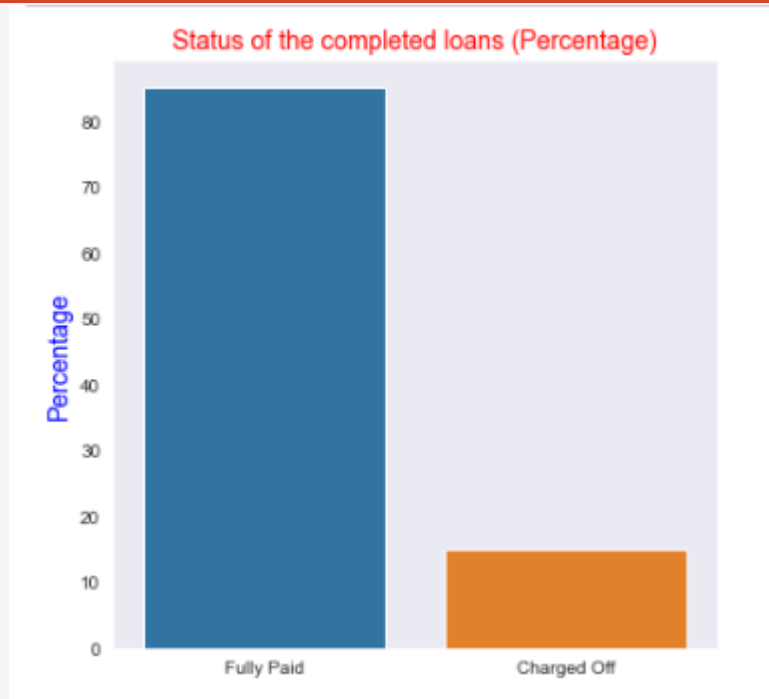
Observations:

1. **85%** of the loans are Fully Paid while **15%** of the loans are defaulted.

2. Number of loans applied are increasing over the years.

Loan Amount analysis

Observations:

•Most of the loans amounts are between 5000 to 20000.

•Loan Grades 'G' and 'H' have the higher loan amounts. Grades are decreasing as the loan amount is increases.

•Small businesses has the more loan amount followed by debt consolidation. Educational loans have the lower loan amounts.

•Borrowers with MORTAGE has higher median compare to other home ownership.

Loan Amount vs Loan Status
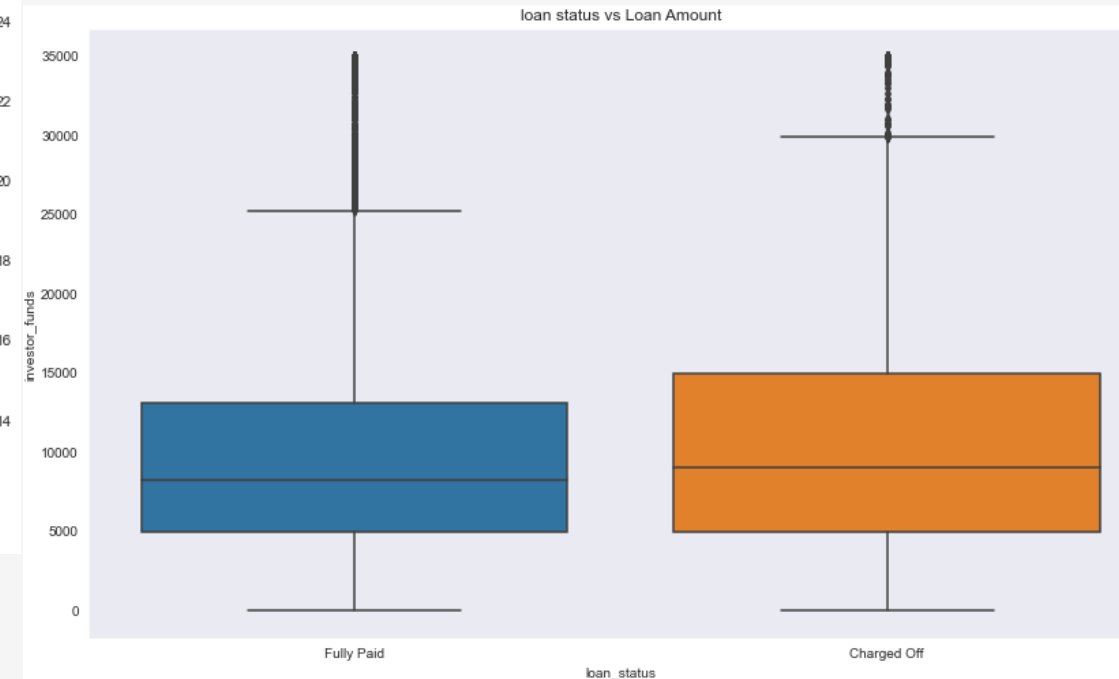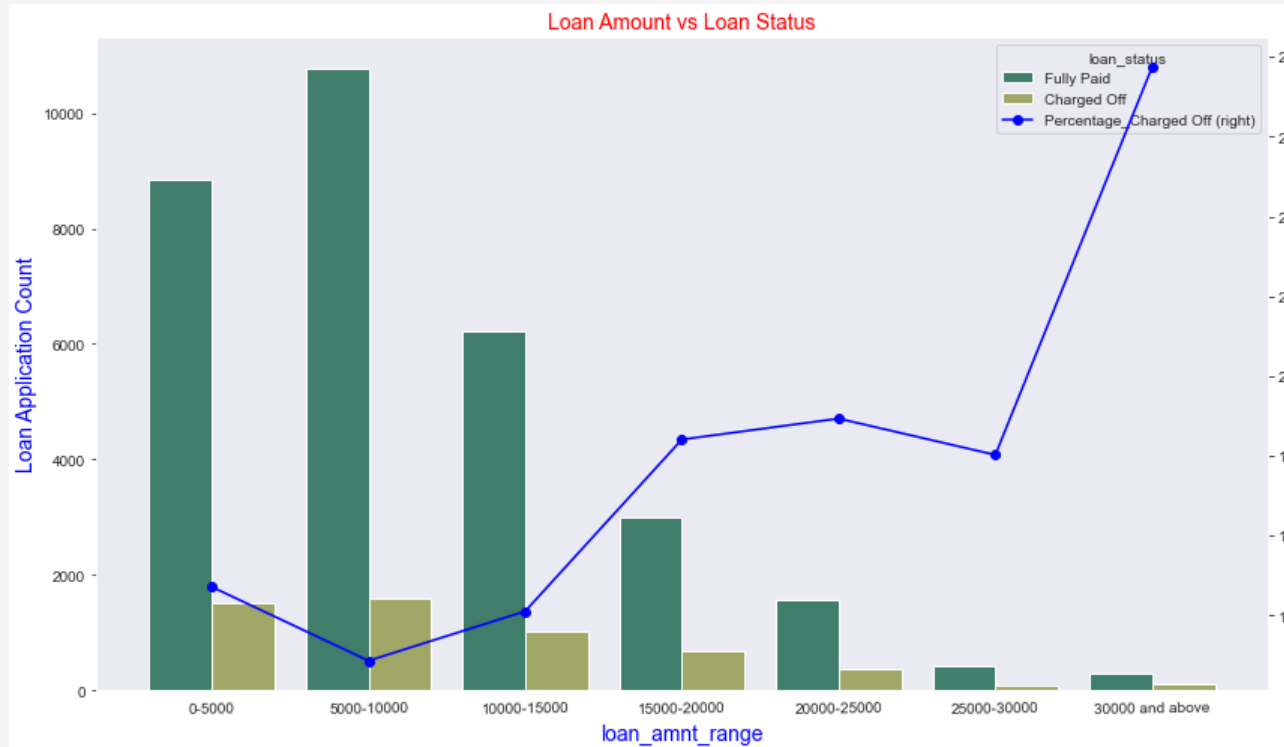
Observations:

- Charge Off Percentage is increasing with the Loan Amount , Loan Amount
  5000-10000 has the lowest Charge off percentage (12.86%) while 30000 and
  above Loan Amount band has highest charge off percentage(27.74%).

Annual Income vs Loan Status

Annual Income - Box Plot


Annual Income vs Loan Status
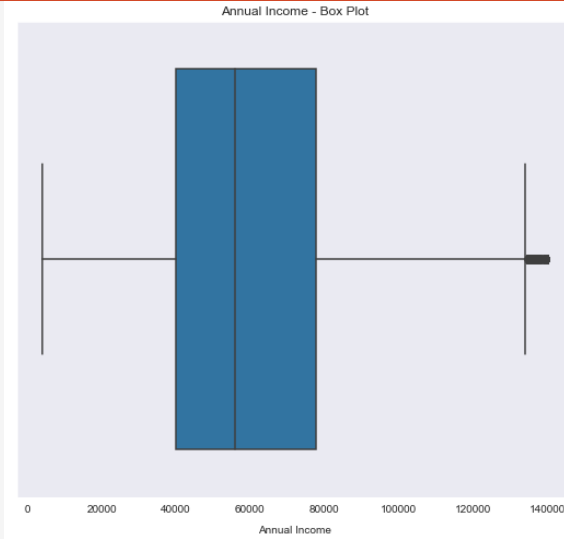
Observations:

- Most of the borrower's Annual incomes are in range of 40000- 78000

- Charge Off Percentage decreases with Annual Income, 100000 and above income band has the lowest Charge Off percentage (10.75%) while annual income below 25000 band has the highest Charge Off Percentage(19.14%).

Annual Income vs Loan Status

Subgrade vs Percentage Charge Off
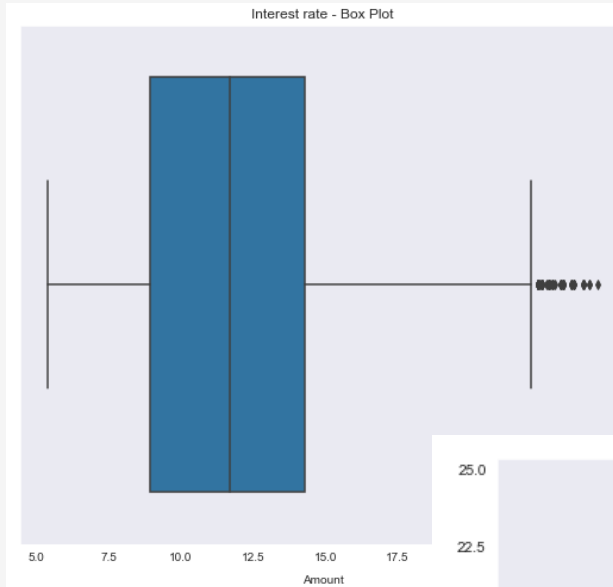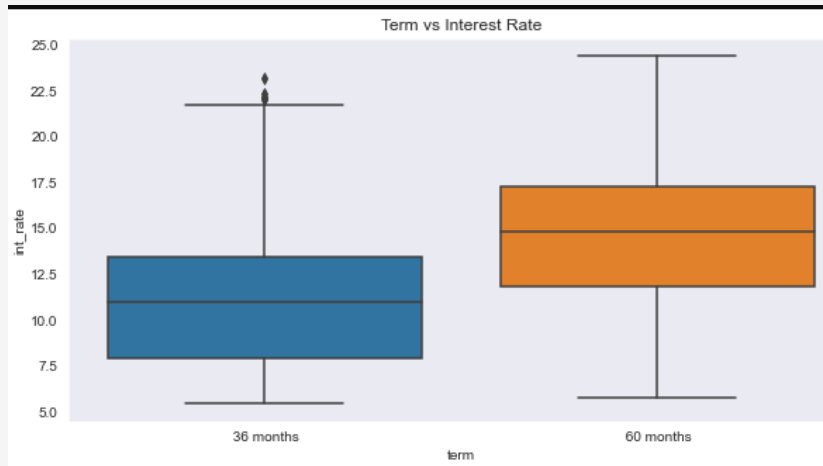

Grade vs Loan Status

Loan Grade
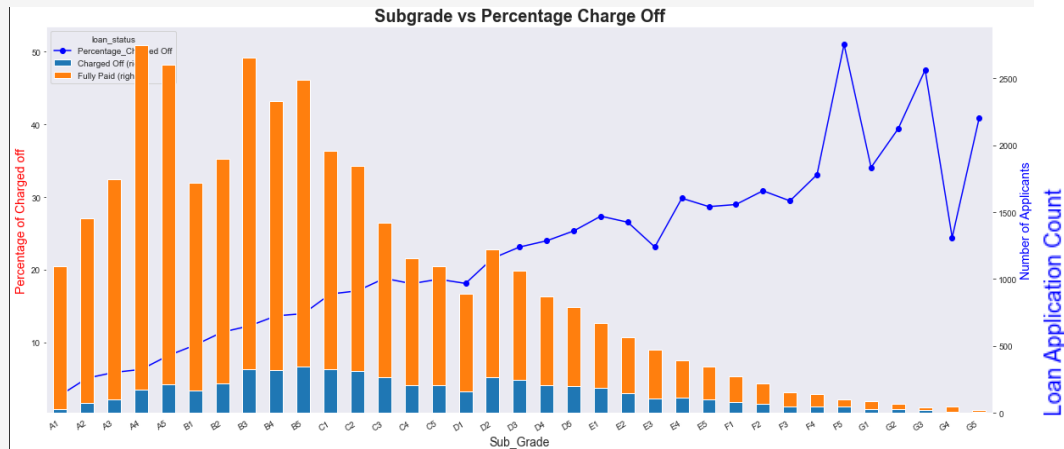
Observations:

- Most of loans taken are of the grade B and A. Most of the loan sub grades are of A4, B3, A5, B5 and B4.

- Loans of Grade A and B has low Charged Off rates and these seems to be the safe grades while F and G has higher Charge Off rates.

- A1 has the lowest Charge Off percentage (2.7%) F5 has the highest charge off status (51%)

Interest rate Analysis

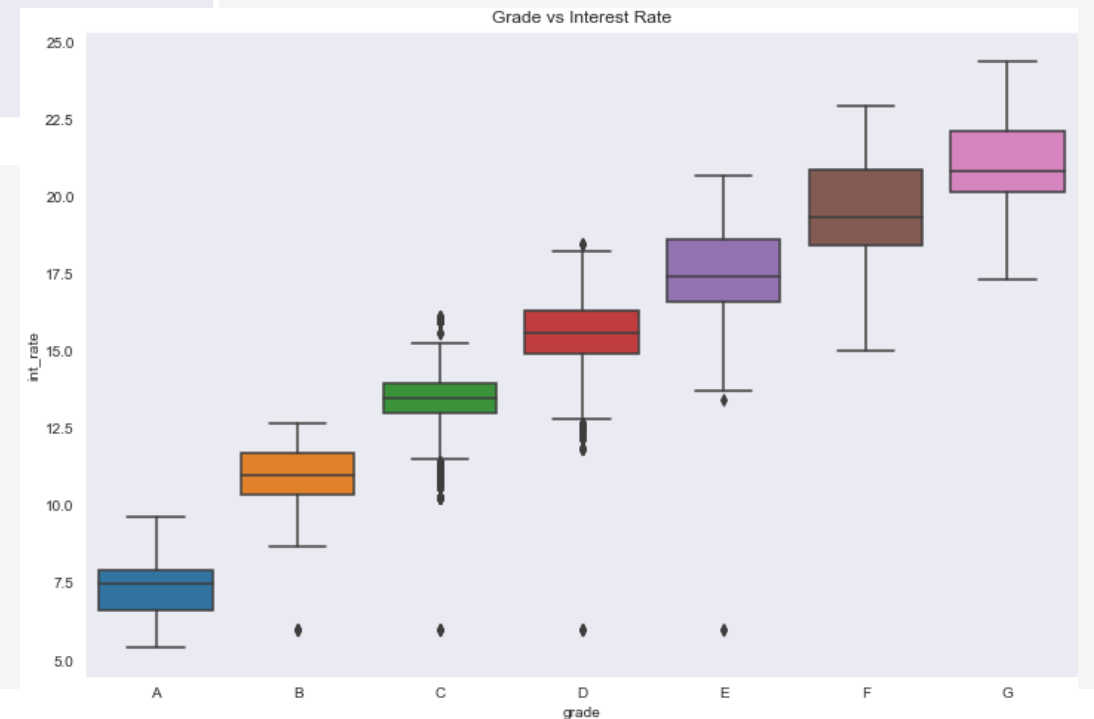Term vs Interest Rate

Interest rate - Box Plot
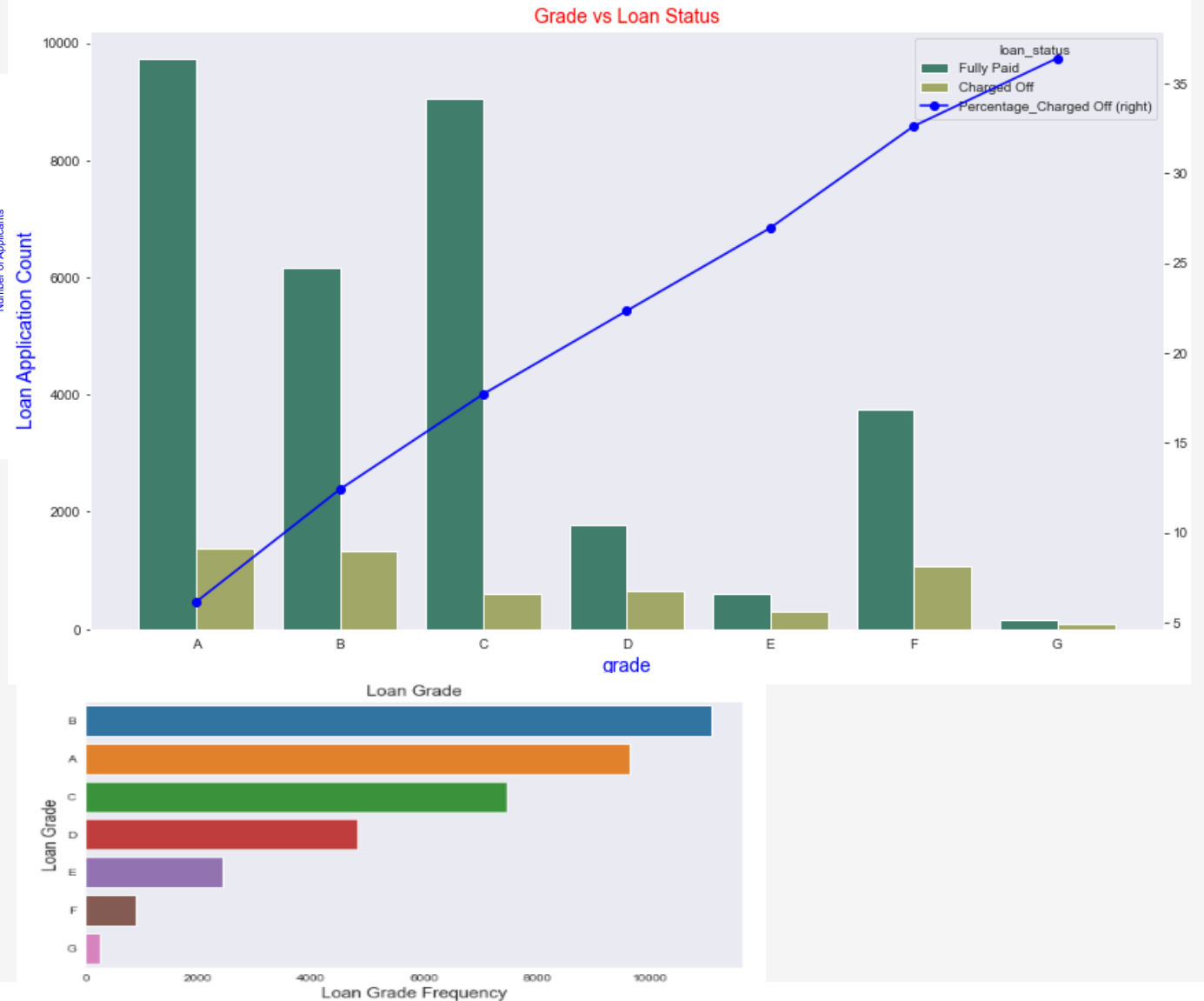
Grade vs Interest Rate

Observations:

- Higher tenure loans has higher interest rates.

- Lower loan grades (towards G) has higher interest rates.

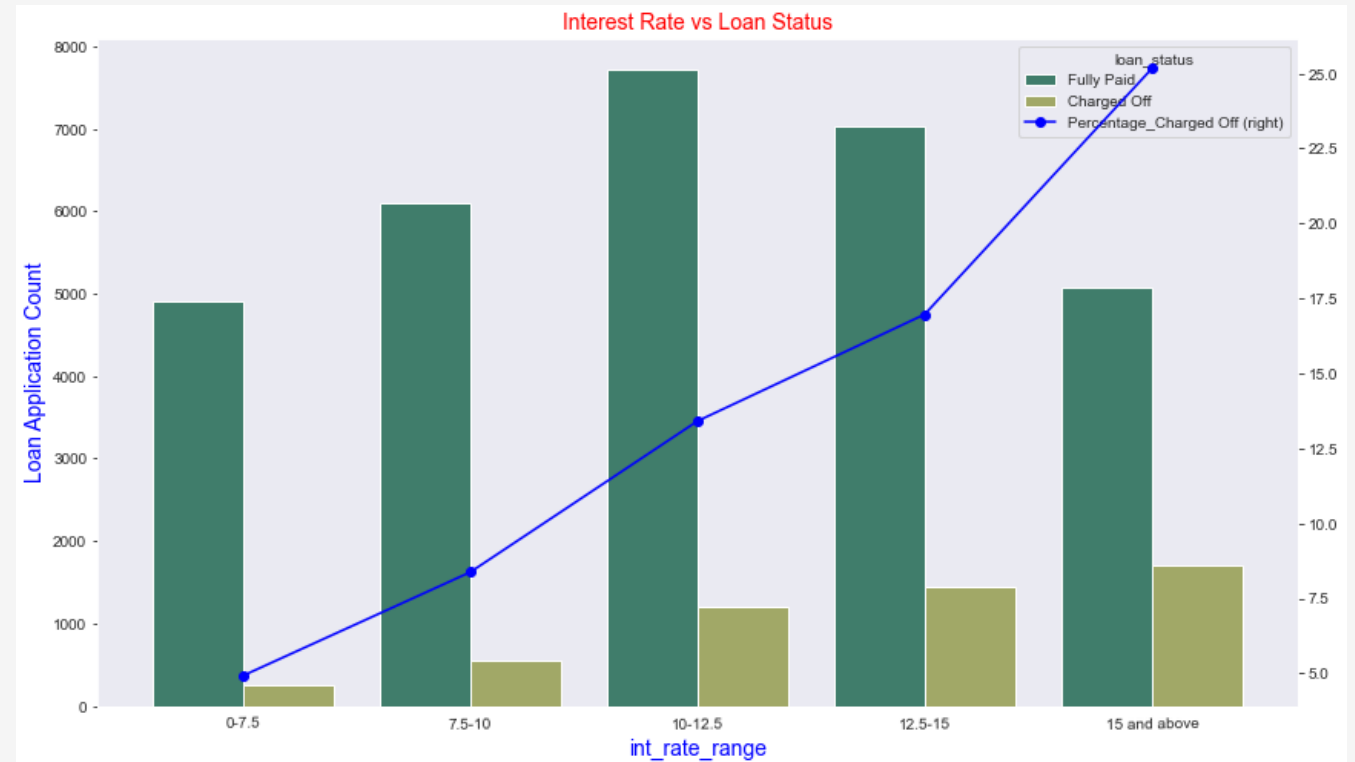- Most of the Interest Rates on loans are in range of 9% - 14.5%

Interest rate vs Loan Status
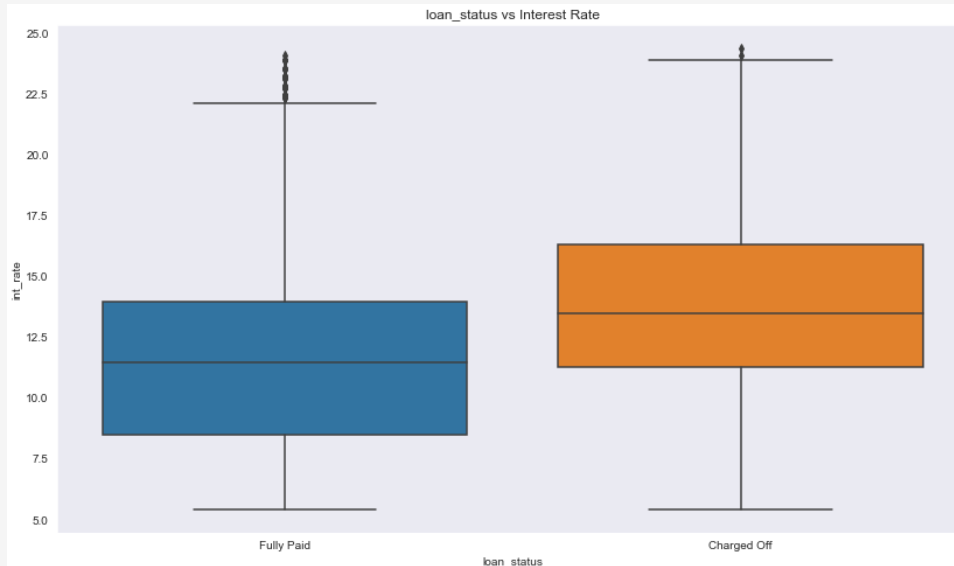

Observations:

- Charge Off Percentage is increasing with the Interest Rate , Interest rate below 7.5% has the lowest Charge off percentage (4.92%) while 15% and above Interest rates band has highest charge off percentage(16.32%).

Purpose of the loan vs Loan Status

Observations:

- Most of the loans were taken for the purpose of debt consolidation & paying credit card bill.

- 28% of the small business loans are defaulted which is the highest default rate among all loan purpose categories.

- wedding loans the most successfully Full Paid loan type with 10.3% followed by Major Purchase and Credit Card loans with 10.6% and 10.9% default rates.

- Mean default rate is around 15.3% which is very close to the default ratio of the Debt Consolidations loans which is the major loan purpose category.

Purpose of Loans vs Loan Status
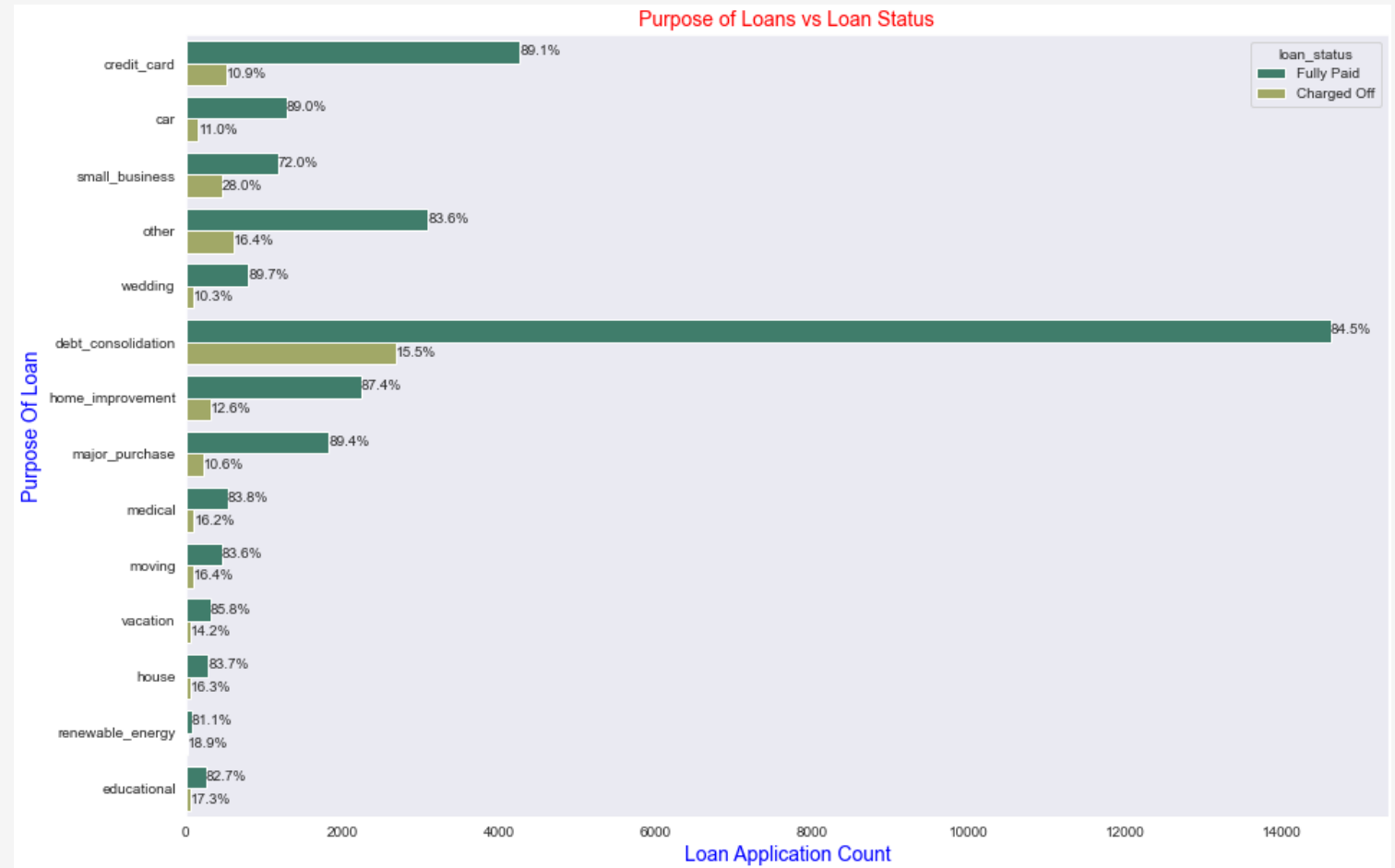
Recommendations

- Borrowers with annual income greater than 100000 has lower charge off percentage (10.75%) hence Lending Club should consider approve more loan of the applicants with this income band.

- Loan grades F and G has higher Charge Off rates, especially loan grade F5 has about 51% charge Off rates. Lending Club should be cautious in approving these loans. On the other hand, Grade A and B loans has lower charge off rates specially sub grade A1 has about 2.7% charge off percentage hence Lending club should consider approving more of these grades.

- 28% of the small business loans are defaulted so Lending Club should be cautious in approving these loans. More Wedding loans, Major Purchase and Credit Card loans can be approved as these has less charge off.

- Loan amounts in the band 5000-10000 has the lower Charge off percentage hence Lending Club should be focusing on approving more loans in this range. On the other hand, loan amount above 30000 has higher Charge off percentage of 27.7% hence Lending club should take precaution in approving these loans.

- Borrowers with the DTI ratio 0-5 has the lowest Charge off percentage (12.61%) while DIT ratio more than 20 leads to higher charge off rates (17.08%) hence Lending Club should be aware of approving applicants with DTI ratio above 20.

Recommendations (Continued)

- Borrowers who are living in rental houses has more Charge Off rates compare to other home ownership applicants, hence Lending club should take extra care while approving loans.

- Interest rate below 7.5% has the lowest Charge off percentage (4.92%) while '15% and above' Interest rates band has highest charge off percentage (16.32%). Lending Club should consider approving more loans with interest rate less than 7.5%.

- 60 Months loan term has higher charge Off percentage (25.8%) compare to 36 Months loan term (11.2%) hence Lending Club should consider approving more loans of 36 Months term.

- Loan application from NV has higher charge Off percentage (22.5%) while DC has the lowest percentage of Charged Off (6.67%).