Lending Club Case Study

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Business Understanding

- 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.

- Like most other lending companies, lending loans to ‘risky’ applicants is the largest source of financial loss (called credit loss). Credit loss is the amount of money lost by the lender when the borrower refuses to pay or runs away with the money owed. In other words, borrowers who default cause the largest amount of loss to the lenders. In this case, the customers labelled as 'charged-off' are the 'defaulters'.

- If one can identify these risky loan applicants, then such loans can be reduced thereby cutting down the amount of credit loss. Identification of such applicants' using EDA is the aim of this case study.

- In other words, 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 utilise this knowledge for its portfolio and risk assessment.

- To develop your understanding of the domain, you are advised to independently research a little about risk analytics (understanding the types of variables and their significance should be enough).

Problem Statement

- In this case study, we need to understand risk of analytics in banking and financial services and understand how data is used to minimise the risk of losing money while lending to customers.

- When a person applies for a loan, two types of decisions could be taken by the company:

1. Loan accepted: If the company approves the loan, there are 3 possible scenarios described below:
    - Fully paid: Applicant has fully paid the loan (the principal and the interest rate)
    - Current: Applicant is in the process of paying the instalments, i.e. the tenure of the loan is not yet completed. These candidates are not labelled as 'defaulted'.
    - Charged-off: Applicant has not paid the instalments in due time for a long period, i.e. he/she has defaulted on the loan

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Data Analysis Methodology

Data Cleaning

Check & Remove

1. Duplicate
2. Nulls columns
3. values, unnecessary variables

Data Understanding

Using Data Dictionary understand about all the columns and their domain

Data Analysis

Univariate Analysis:
Analysing object column with plot distributions .

Bivariate Analysis:
Analysing the two-variable behaviour like term and loan status with respect to loan amount.

Recommendations

Analysing all plots and recommendations for reducing the loss with Loan status

Data Understanding and Analysis

- We will perform data cleansing by applying:
  - Remove duplicates & null values
  - Drop unwanted columns/values Exploratory Data Analysis will be performed by applying:
  - Univariate Analysis
  - Segmented Univariate Analysis
  - Bivariate Analysis
- Recommendations will be given after analysing all plots and metrics.

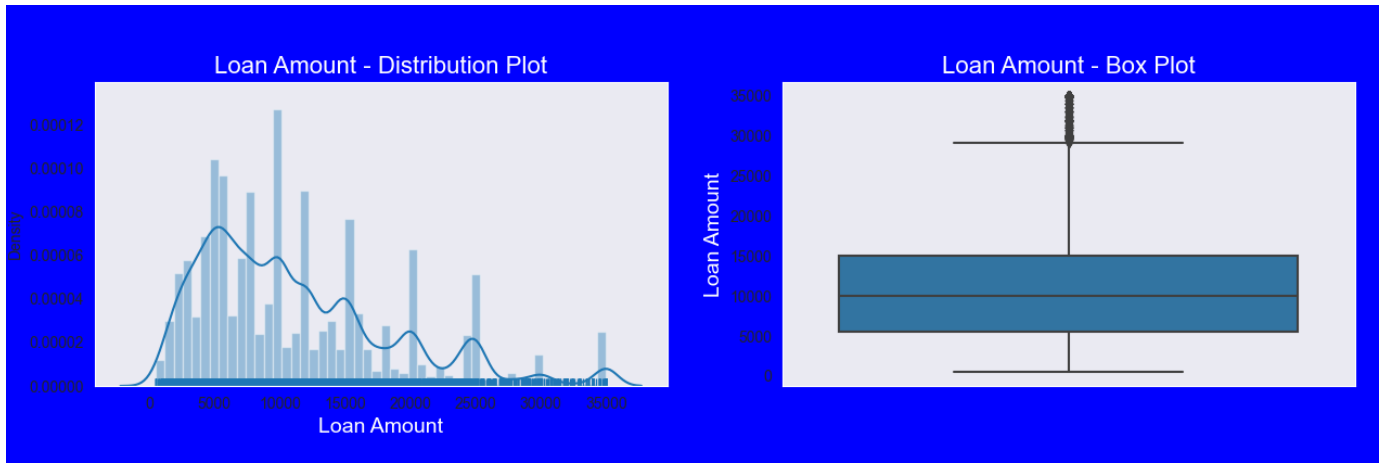
Overview | Alerts 143 | Reproduction

Dataset statistics

Number of variables	111
Number of observations	1000
Missing cells	56343
Missing cells (%)	50.8%
Duplicate rows	0
Duplicate rows (%)	0.0%
Total size in memory	867.3 KiB
Average record size in memory	888.1 B

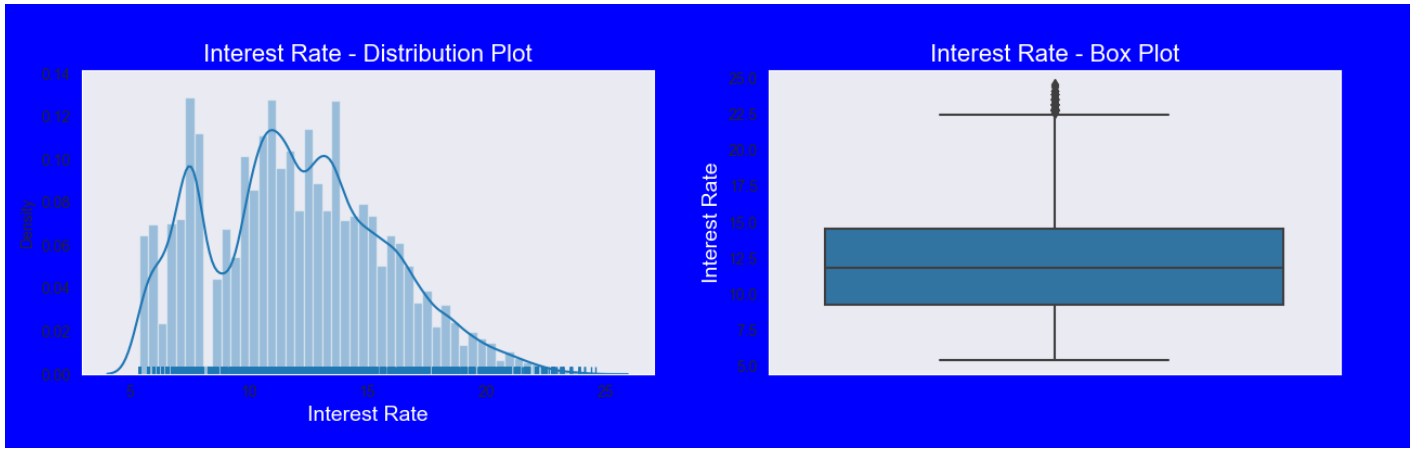
Variable types

Numeric	23
Categorical	21
Text	10
Boolean	2
Unsupported	55



Observations :

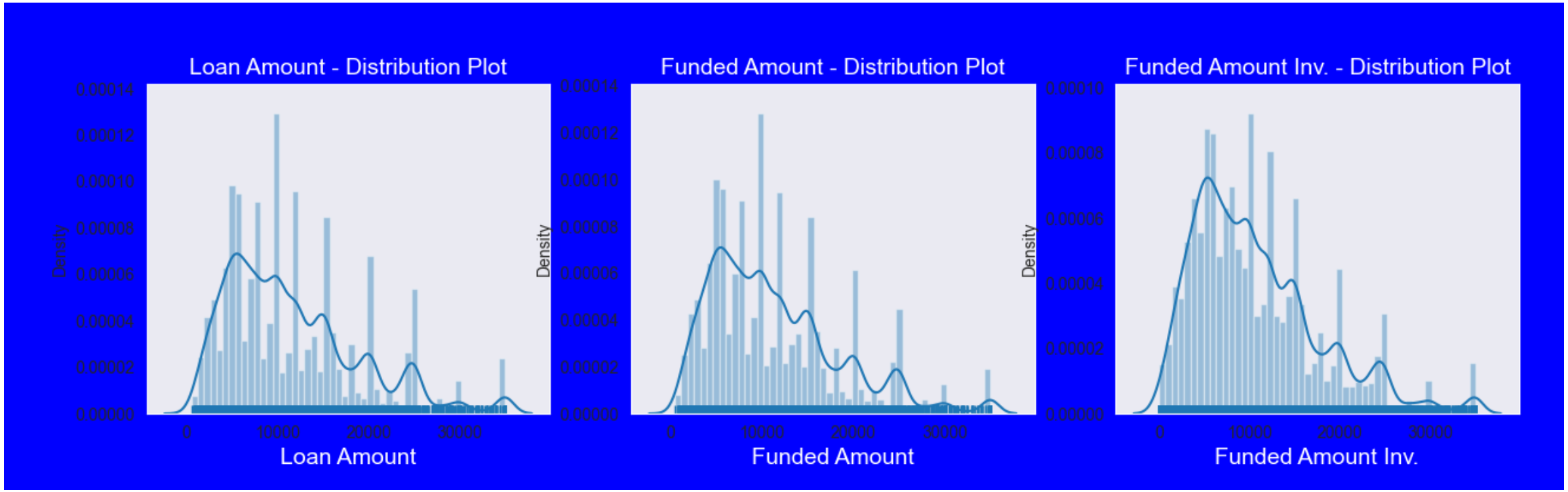
Below plots show that most of the Loan amounts are in range of 5000 - 15000



Observations :

Below plots show that most of the Interest Rates on loans are in range of 10% - 15%

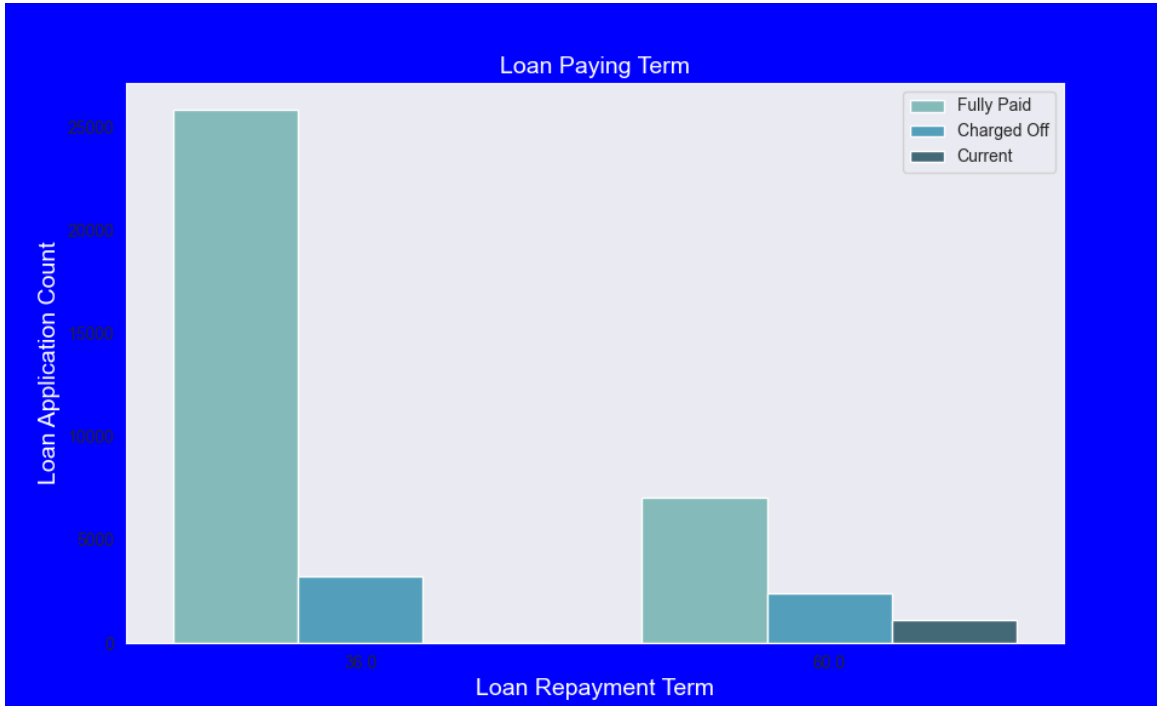
Univariate Analysis - Distribution of three loan amount fields using a distribution plot

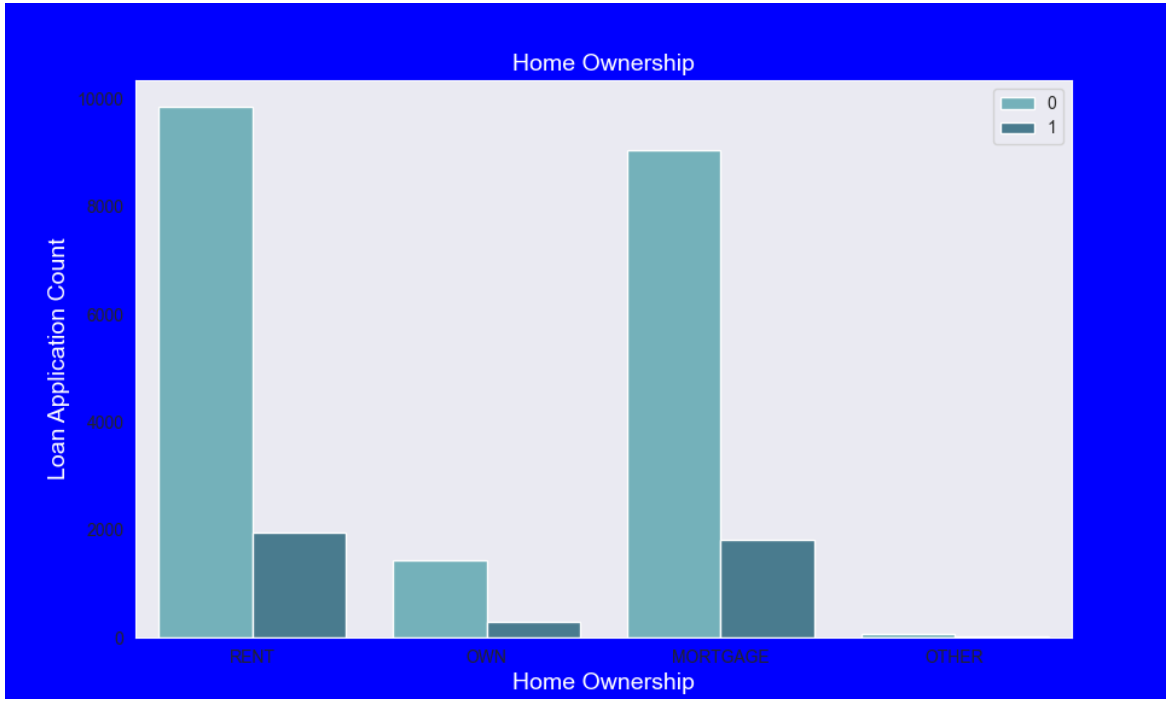


Observation:
Distribution of amounts for all three looks very much similar.
We will work with only loan amount column for rest of our analysis.

Observations :
Below plot shows that those who had taken loan to repay in 60 months had more % of number of applicants getting # charged off as compared to applicants who had taken loan for 36 months.

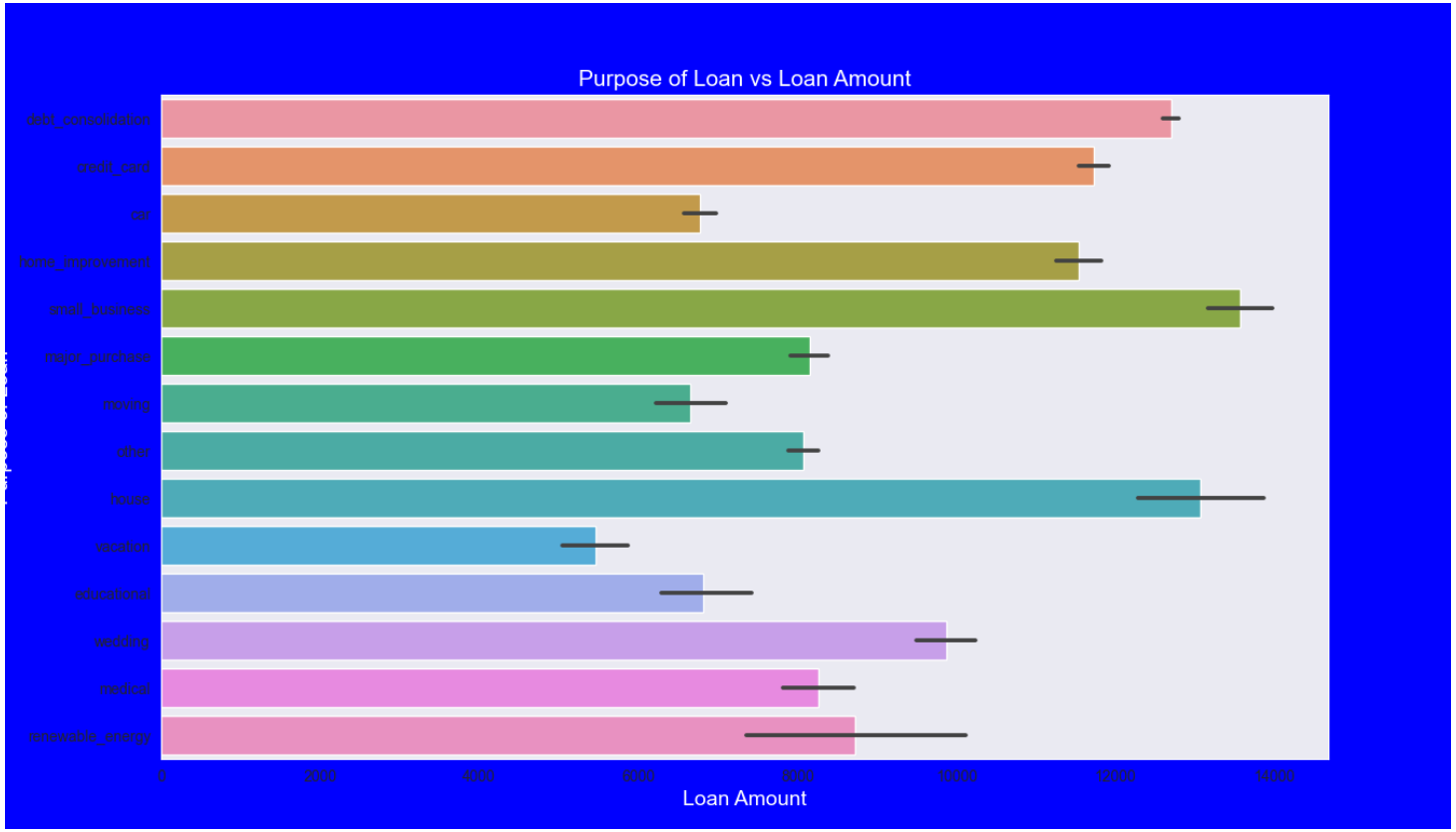
- # Observations :
- # Below plot shows that most of them living in rented home or mortgazed their home.
- # Applicant numbers are high from these categories so charged off is high too.





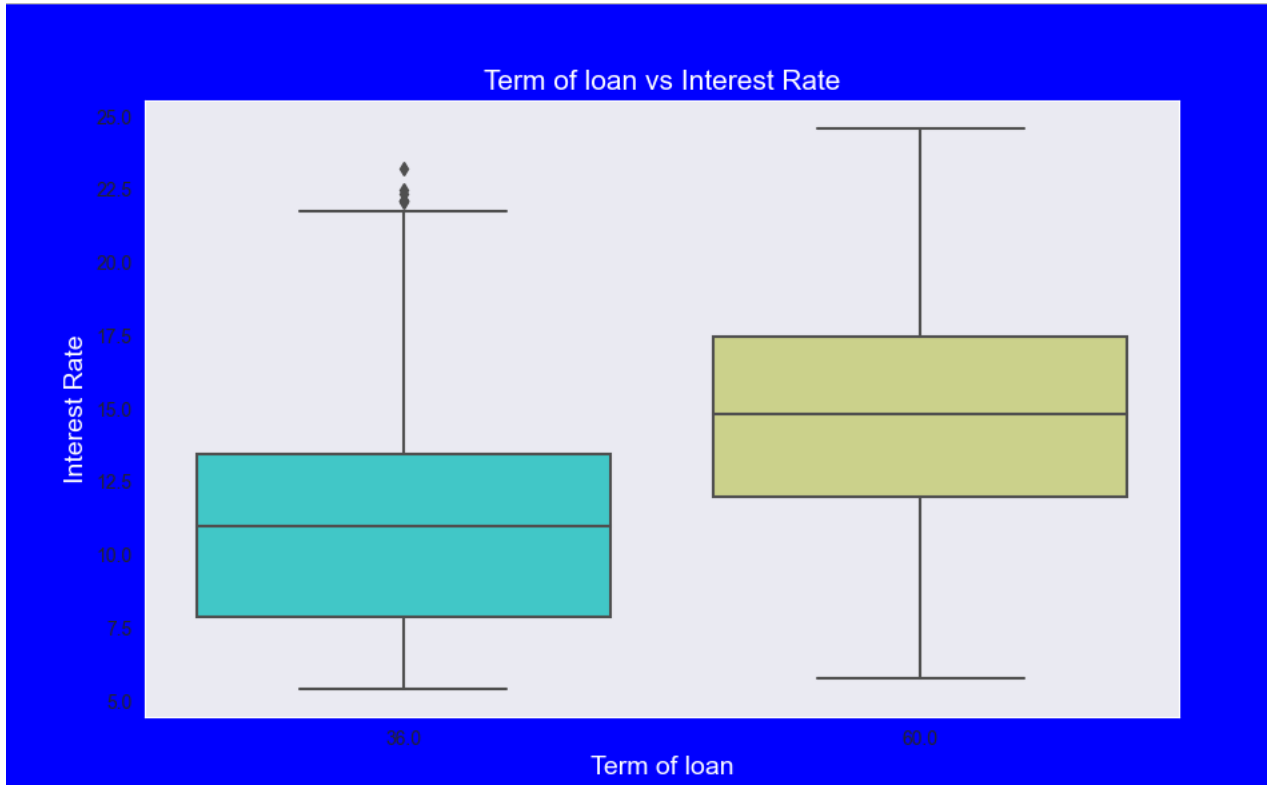
Bi-Variate Analysis

- # Observations:
- # Loan taken for small business purpose, Debt consolidation and Credit card are somewhat evenly distributed
- # as compare to loan taken for other purposes.



Bivariate Analysis - Term of loan vs Interest Rate

Observations:
It is clear that avearge intrest rate is higher for 60 months loan term.
Most of the loans issued for longer term had higher intrest rates for repayement.



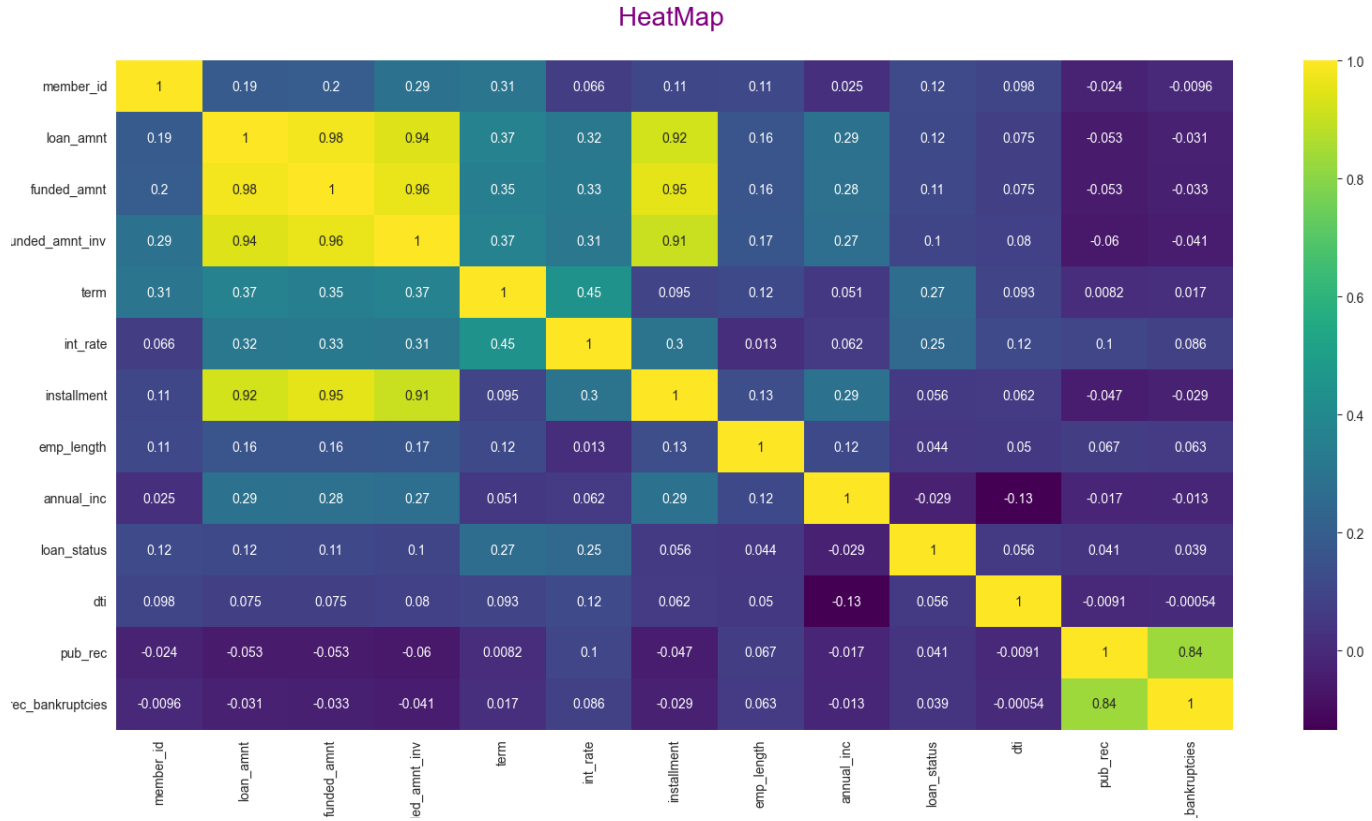
Bi-Variate Analysis - BarPlot to show the variation of annual income across grade for every loan status

 # Observations:
From this we can conclude that the ones getting 'charged off' have lower annual incomes than the ones
who paid fully' for every grade (i.e. at same interest range)

Bi-Variate Analysis - plotting heatmap to see the linear correlation between pairs of variables

Observation:

- Loan amount, investor amount, funding amount are strongly correlated.
- Annual income with DTI(Debt-to-income ratio) is negatively correlated.
- Debt income ratio is the percentage of a consumer's monthly gross income that goes toward paying debts which means when annual income is low DTI is high & vice versa.
- Positive correlation between annual income and employment years which means income increases with work experience ;)



Conclusion

- Grades - good metric for detecting defaulters. Lending Club should examine more information from borrowers before issuing loans to Low grade (G to A).
- Lending Club should control the number of loans issued to borrowers who are from CA, FL and NY to make profits.
- Borrowers with mortgage homeownership are taking higher loans and defaulting on the approved loans.
- The lending club should stop giving loans to the above category when the loan amount requested is more than 12000.
- People with more public derogatory records have more chance of filing a bankruptcy.
- The lending club should make sure there are no public derogatory records for borrowers.