

LENDING CLUB CASE STUDY

SUBMISSION

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Context & Background

Problem Statement:

- 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. Two types of risks are associated with the bank's decision:
 - If the applicant is likely to repay the loan, then not approving the loan results in a loss of business to the company
 - If the applicant is not likely to repay the loan, i.e. he/she is likely to default, then approving the loan may lead to a financial loss for the company

Business Objective:

This company 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). The 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 is able to 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.

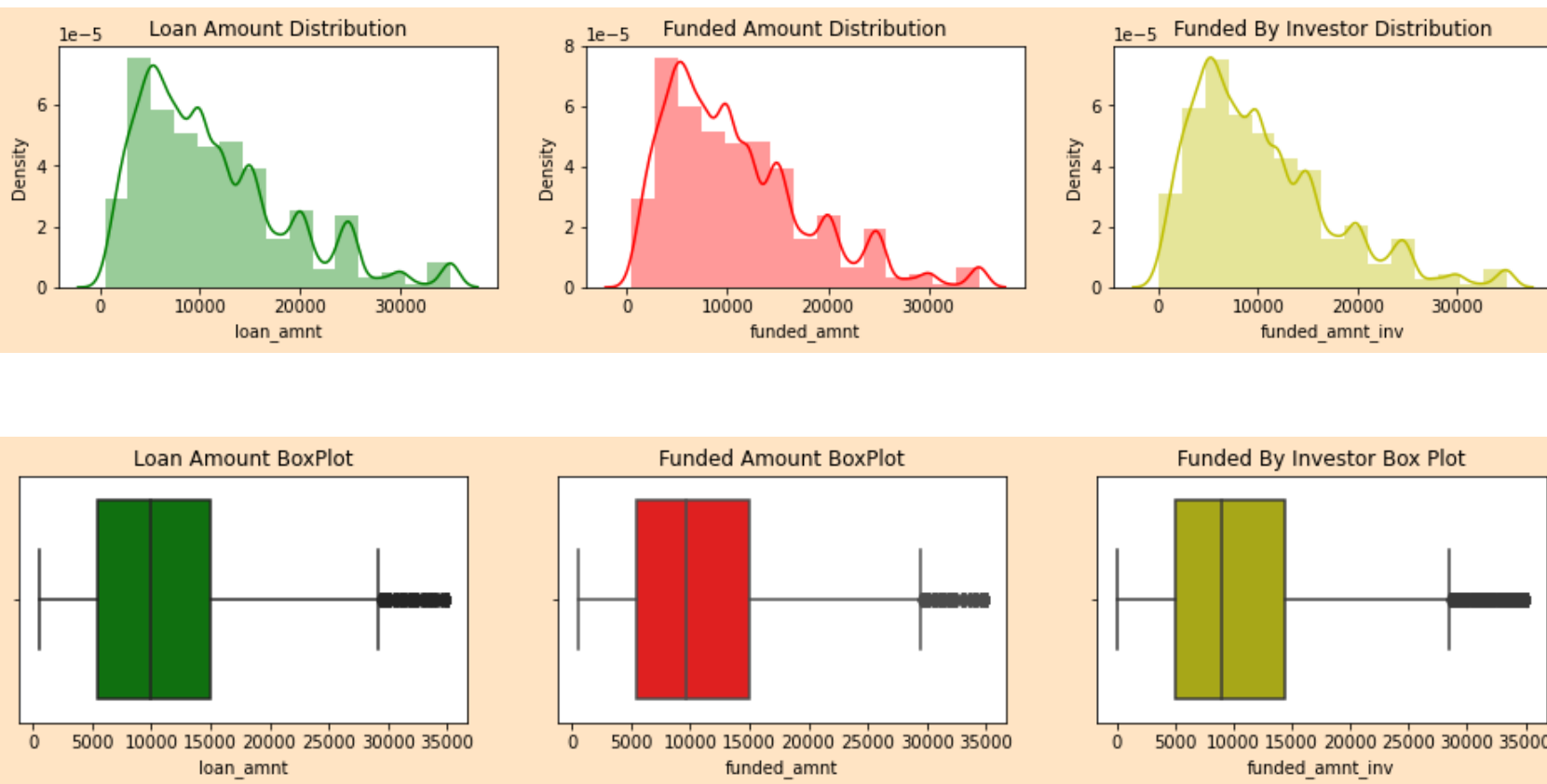
In other words, the company wants to understand the driving factors (or driver variables) behind loan default, i.e. the variables which are strong indicators of default. The company can utilize this knowledge for its portfolio and risk assessment.

Data Understanding:

The data given contains the information about past loan applicants and whether they 'defaulted' or not. The aim is to identify patterns which indicate if a person is likely to default, which may be used for taking actions such as denying the loan, reducing the amount of loan, lending (to risky applicants) at a higher interest rate, etc

Univariate Analysis on Types of Loan amount

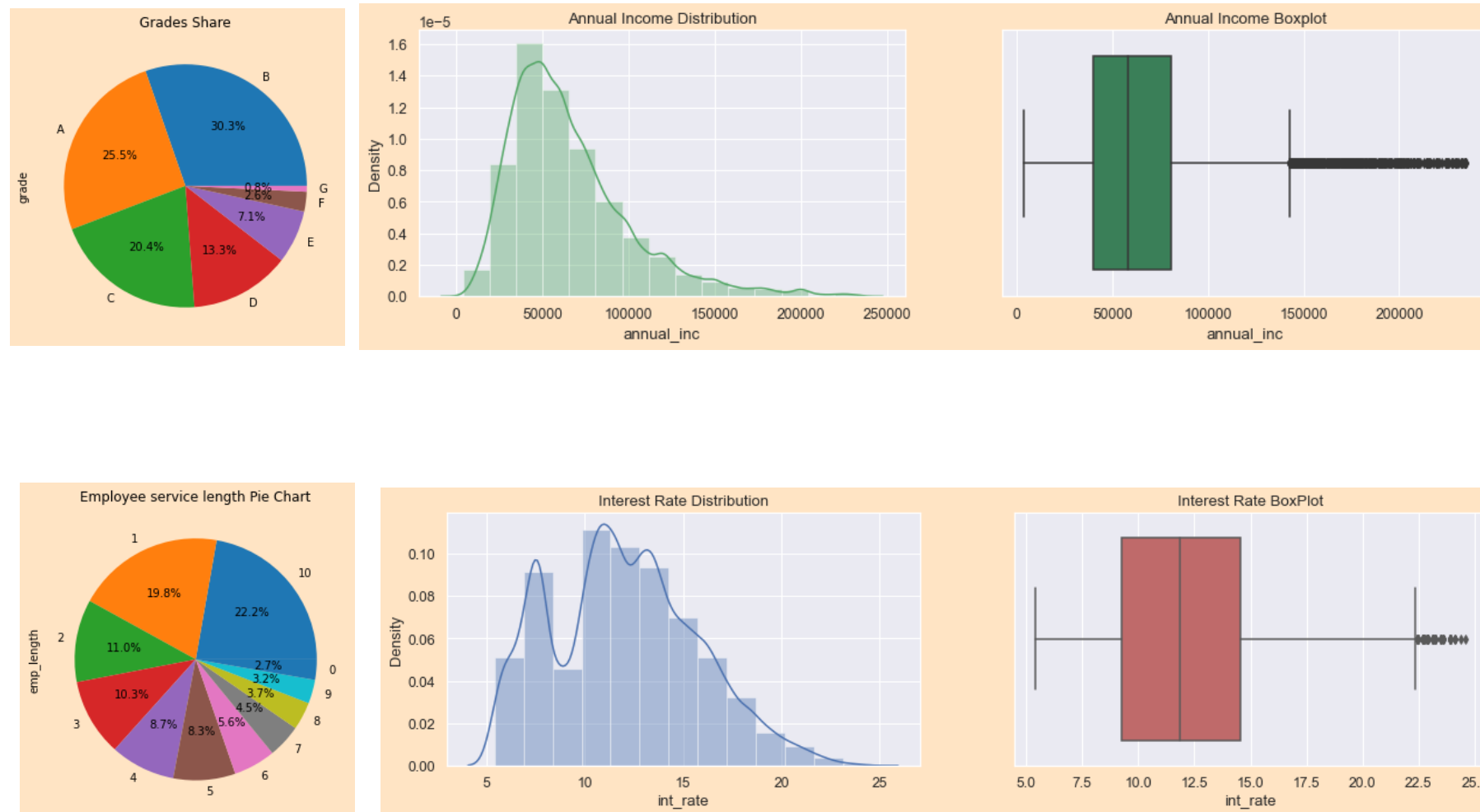
There are 3 Loan columns 1) Loan amount – Loan required by the borrower , 2 Funded _Amount – Loan approved or proposed by Lending club, 3 – Loan Passed by Investor.



Observations

- ☐ Distribution of Loan Amount , Funded amount & funded amount _ Investor looks Very similar.
- ☐ There is no much deviation in Amount passed by the investor once it is Passed by Lending club
- ☐ The most of the amount Range between 5000~15000

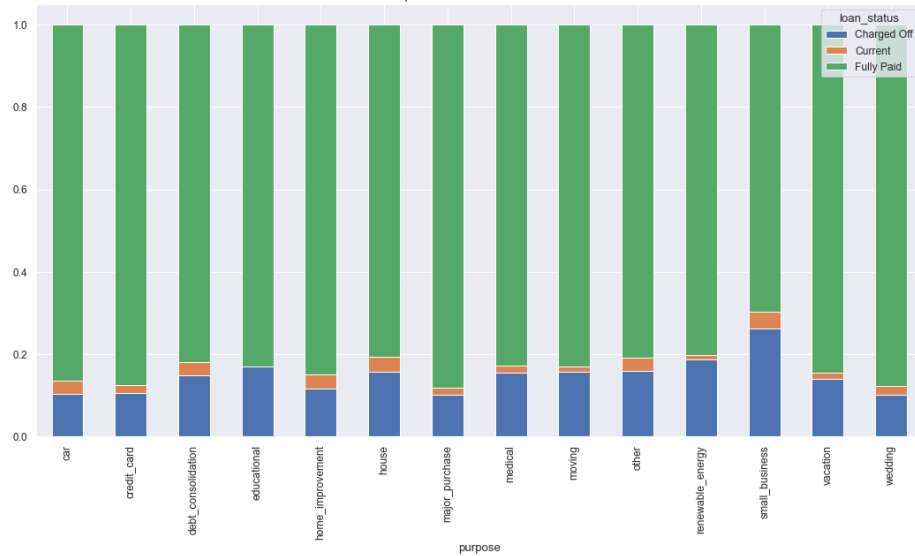
Univariate Analysis on Grades, Annual Income, Employed length & Interest Rate



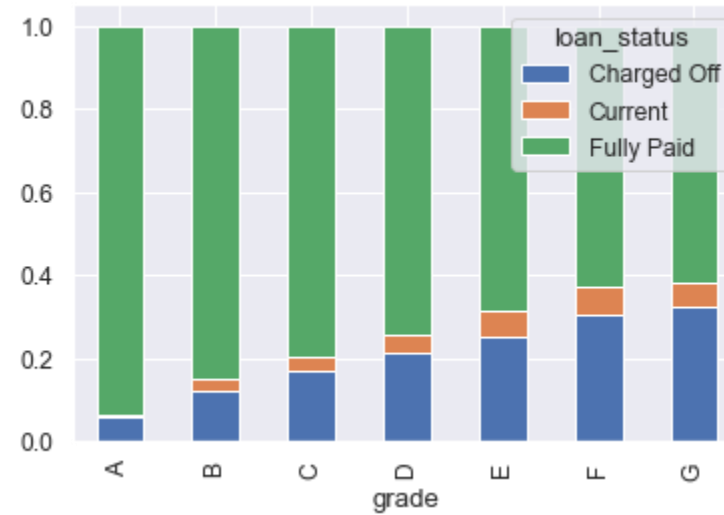
Observations

- ❑ **Grades** -Most of the population lies in Grade B(30.3 %) followed by Grade A(25.4%).
- ❑ **Annual Income**- Except for few Outliers the major population have the salary Bracket in Range 40000~90000
- ❑ **Employed Service Length**-22 % of borrowers are 10+ years of service followed by 19.8 % with 1 Years exp. So around 40% of borrowers are either recently employed or Highly experienced
- ❑ **Interest Rate**-most of the Interest Rates on loans are in range of 9.5% - 14.5%

Purpose of Loan Vs Loan Status



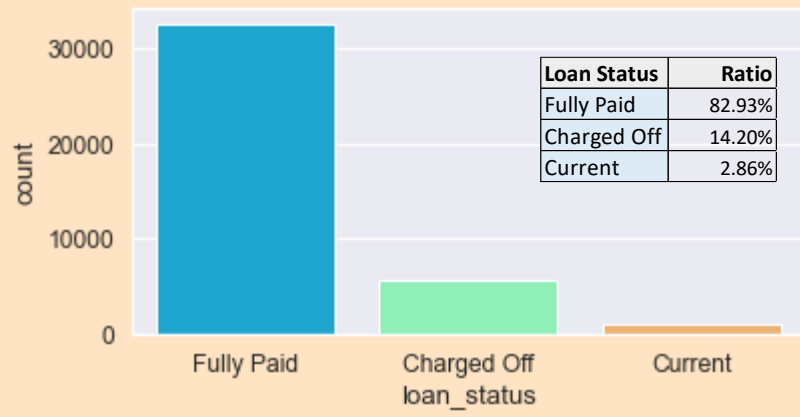
Grades Vs Loan Status



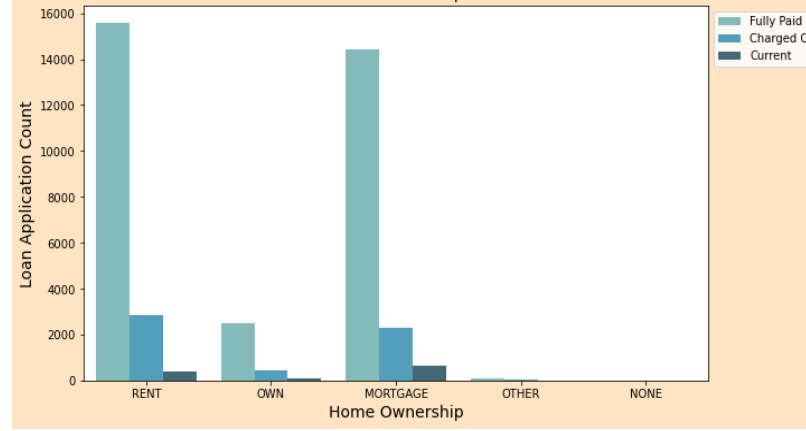
Observations

- ☐ **Purpose Of loan vs Loan status –**
 - Charged Off Proportion for small Business Is Highest.
 - Charged off proportion for short term Goal oriented Purpose like Marriage, car loan , vacation is lowest
- ☐ **Grades-** Moving from A grade to G grade Charged off ratio is increasing
- ☐ **Loan Status** -83 % Laons are fully paid while 14.20 % are Default
- ☐ **Homeownership-** borrowers having Home Ownership is more like to Repay the Loan & charged off proportion is less

Loan Status



Home Ownership



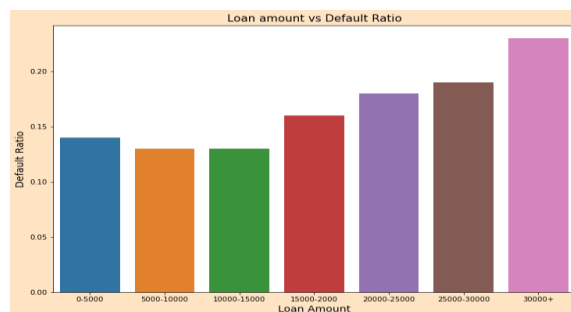
Recommendations

- ☐ Since Chances of paying Back is higher in cases where Borrower is Borrowing for Goal oriented short term Purpose like wedding , car there is opportunity to increase revenue probably by offering rebate on interest rate.
- ☐ Grades Is clear indicator of Default probabilities , Lower the Grade higher the Risk , Needs to be Cautious in terms of disbursement of Loan

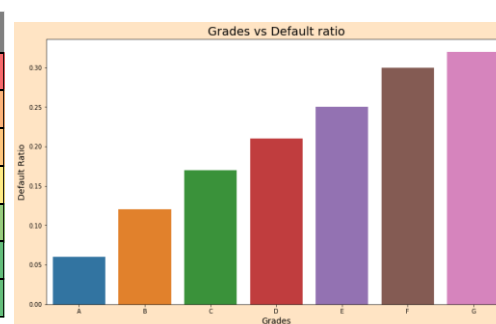
Bivariate Analysis on Loan Amount , Grades, Annual Income & Emp length with Default ratio

Default ratio is derived Variable which is quite Important as it clearly indicates the Ratio of Default in their specific Categories

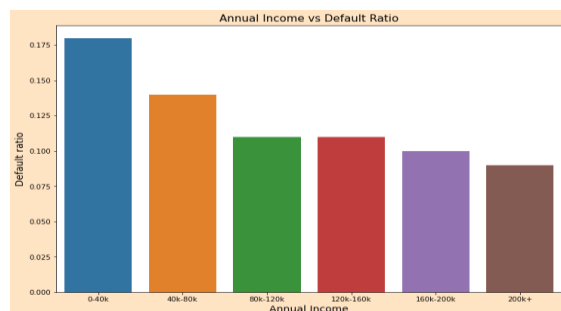
Default ratio= Charged off Loans /(Total loans – charged off+ paid+ Current).



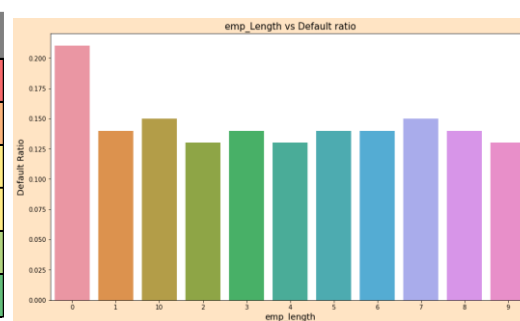
loan_amt_cat	Default Ratio
30000+	0.23
25000-30000	0.19
20000-25000	0.18
15000-20000	0.16
0-5000	0.14
5000-10000	0.13
10000-15000	0.13



Grade	Default Ratio
G	0.32
F	0.3
E	0.25
D	0.21
C	0.17
B	0.12
A	0.06



annual_inc_cat	Default Ratio
0-40k	0.18
40k-80k	0.14
80k-120k	0.11
120k-160k	0.11
160k-200k	0.1
200k+	0.09



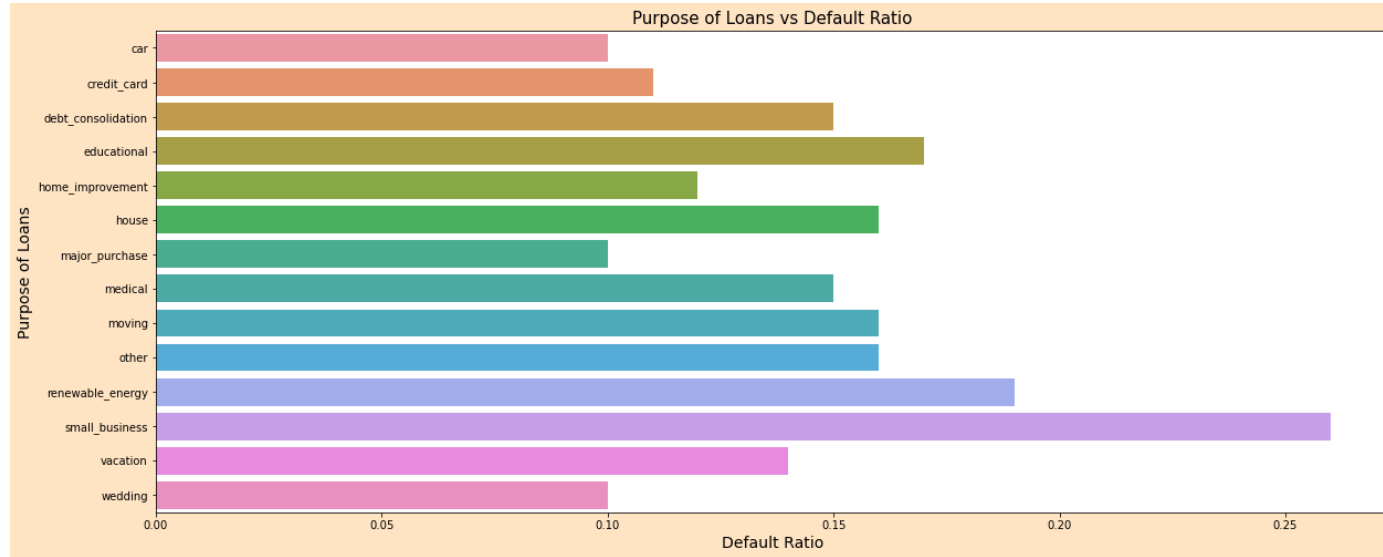
emp_length_In Years	Default Ratio
0	0.21
10	0.15
7	0.15
1	0.14
3	0.14
5	0.14
6	0.14
8	0.14
2	0.13
4	0.13
9	0.13

Observations

- ☐ **Loan Amount Vs Default ratio**–Default Ratio in Loan amount range 5000 ~15000 is least , while for Large amounts >30000 default ratio is Highest
- ☐ **Grades Vs default ratio**-Moving from A grade to G grade Default ratio is Increasing .
- ☐ **Annual Income Vs default ratio**- Borrowers having Annual income more than 200K are least Risky , while less than 1 years are most risky
- ☐ **Employee Length vs Default ratio**- borrowers having less than 1 Years of experience are riskiest

Recommendations

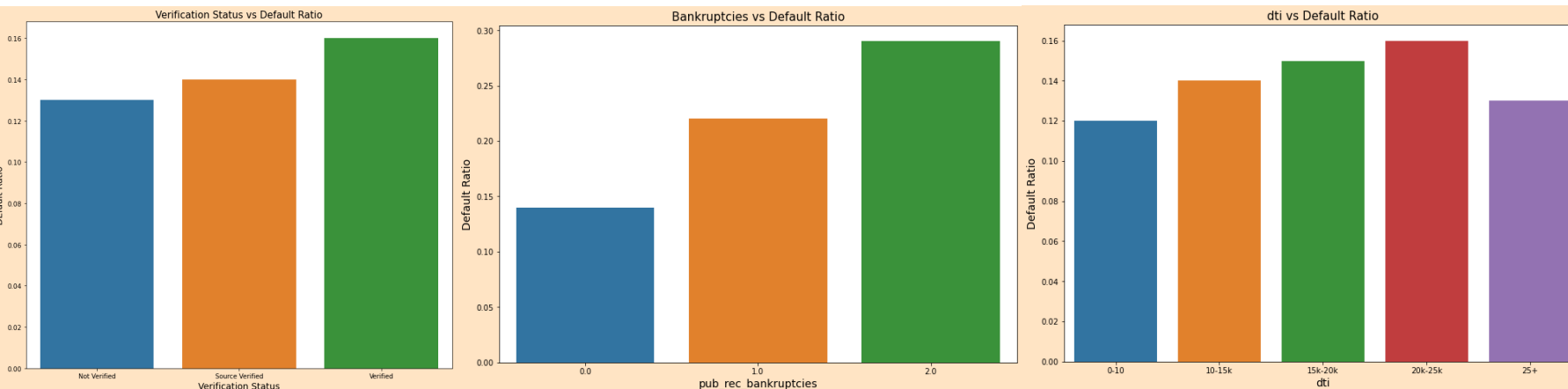
- ☐ people with less than 1 year of exp asking for loan can be approved with reduced amount and high interest rate
- ☐ people having more than 10 years of exp are safe and can be given the complete loan with moderate interest rate, to not lose the customer



purpose	Default Ratio
small_business	0.26
renewable_energy	0.19
educational	0.17
house	0.16
moving	0.16
other	0.16
debt_consolidation	0.15
medical	0.15
vacation	0.14
home_improvement	0.12
credit_card	0.11
car	0.10
major_purchase	0.10
wedding	0.10

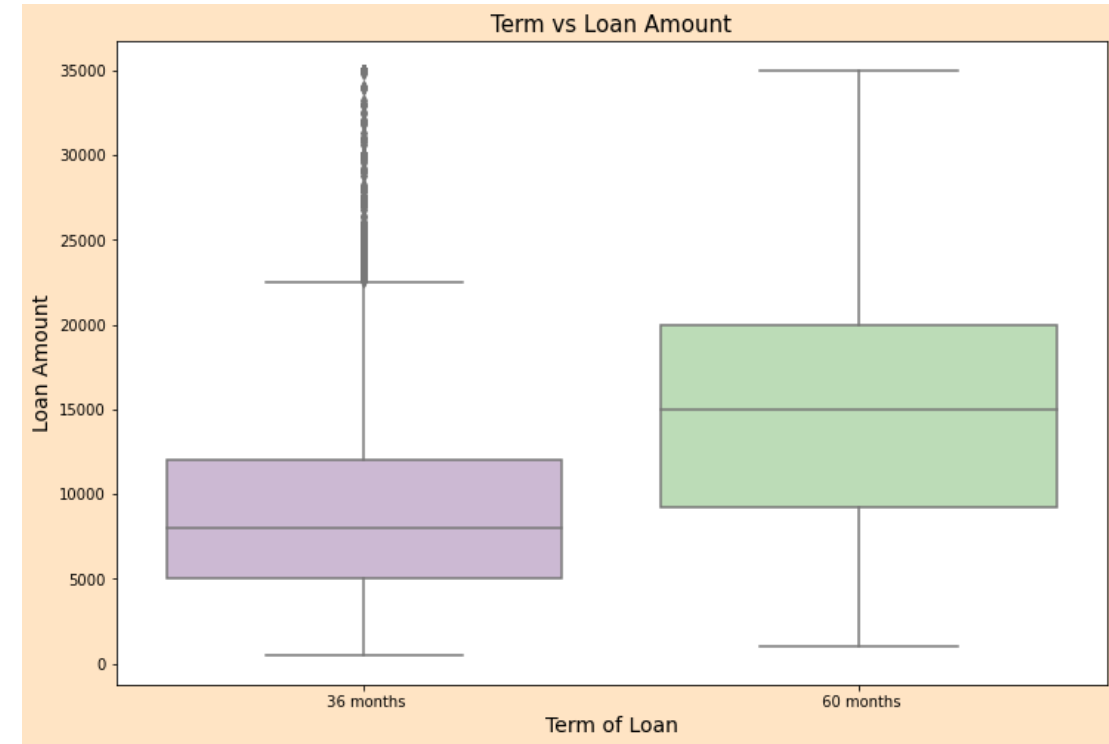
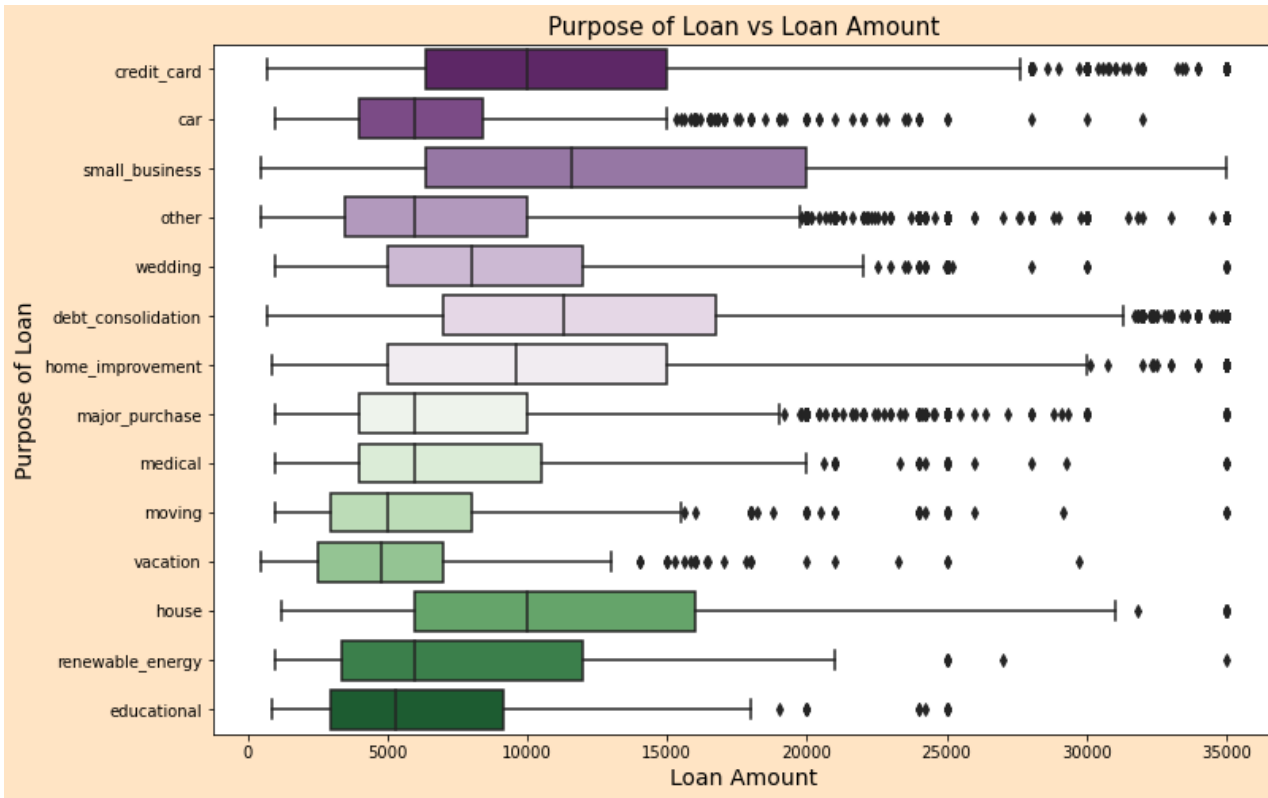
Observations

- ❑ **Purpose of Loan Vs Default ratio**—Default ratio is Highest in Small Business loan while its Least in Wedding & car
- ❑ **Verification Status Vs Default ratio**—Moving from A grade to G grade Default ratio is Increasing .
- ❑ **bankruptcies Vs default ratio**- Borrowers with no Bankruptcies are less riskier
- ❑ **DTI vs Default ratio**- No Major insight observed



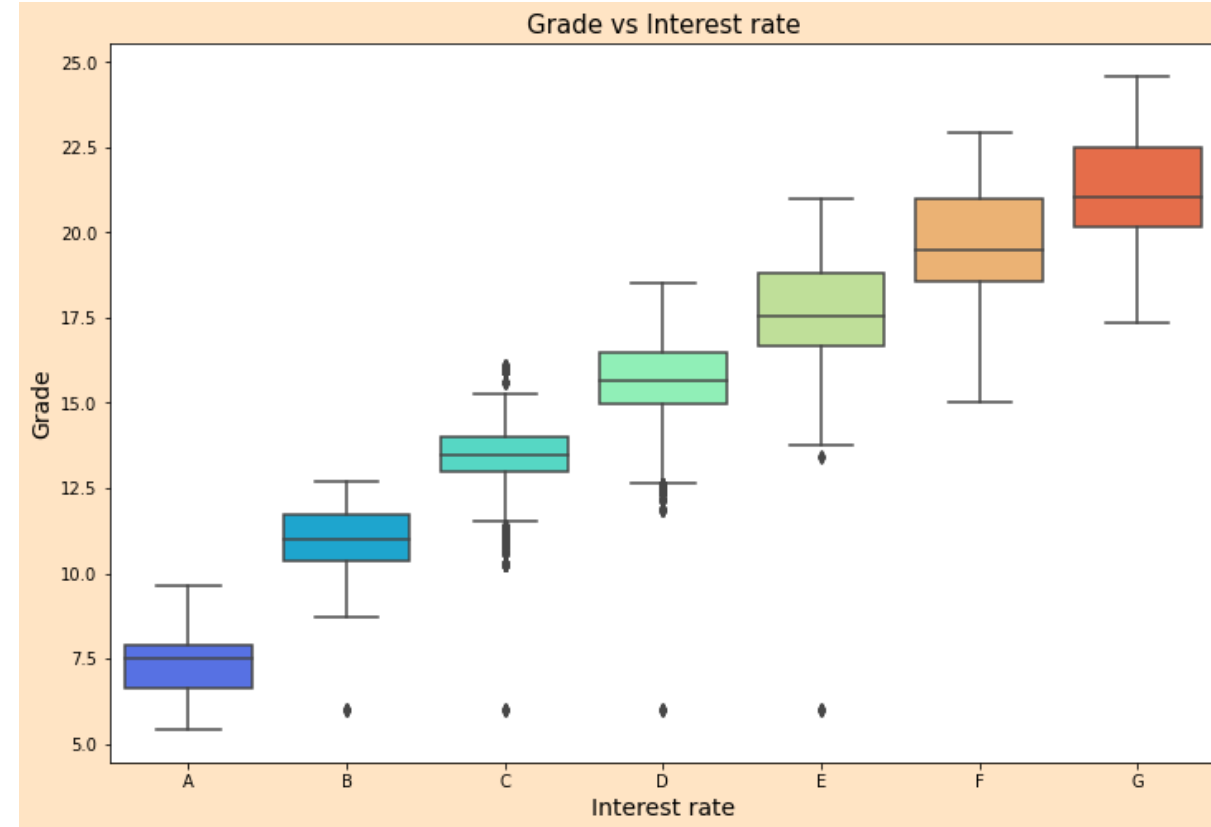
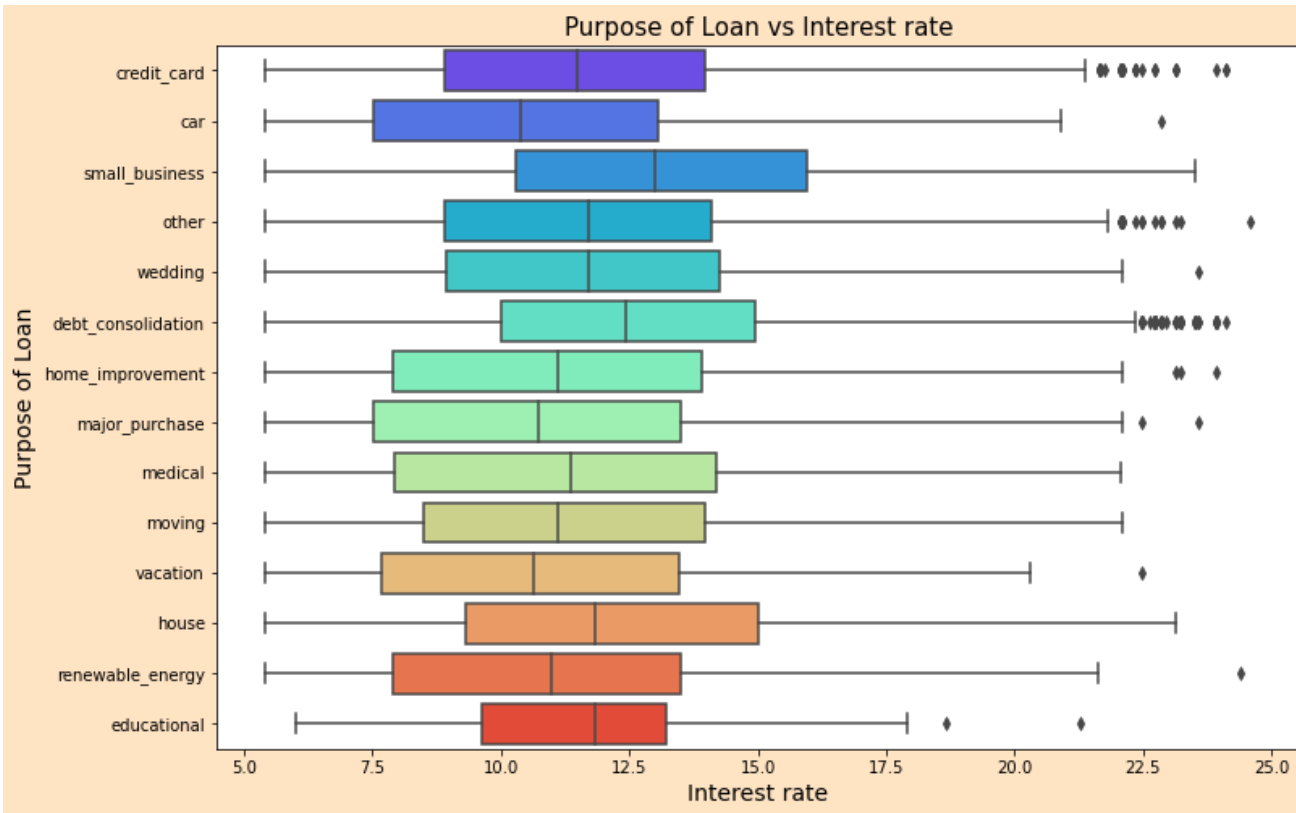
Recommendations

- ❑ Advisable to have more checks & mandatory Verification status to disburse small business loans .
- ❑ Opportunity to Lower Interest rates in Short Purpose Loans to Increase revenue
- ❑ Verified Verification Status to be mandated for F & G Grade to Minimize the Loss on Default



Observations

- ❑ **Purpose of Loan Vs Loan Amount**–Median,95th percentile,75th percentile of loan amount is highest for loan taken for small business purpose among all purposes.
- ❑ Debt consolidation is second and House comes 3rd
- ❑ **Term Vs Loan Amount**- Borrowers opt for Long term Loan for Higher amount of Loan while for loan in the Range of 5~12 K , borrower goes for Short term Loan



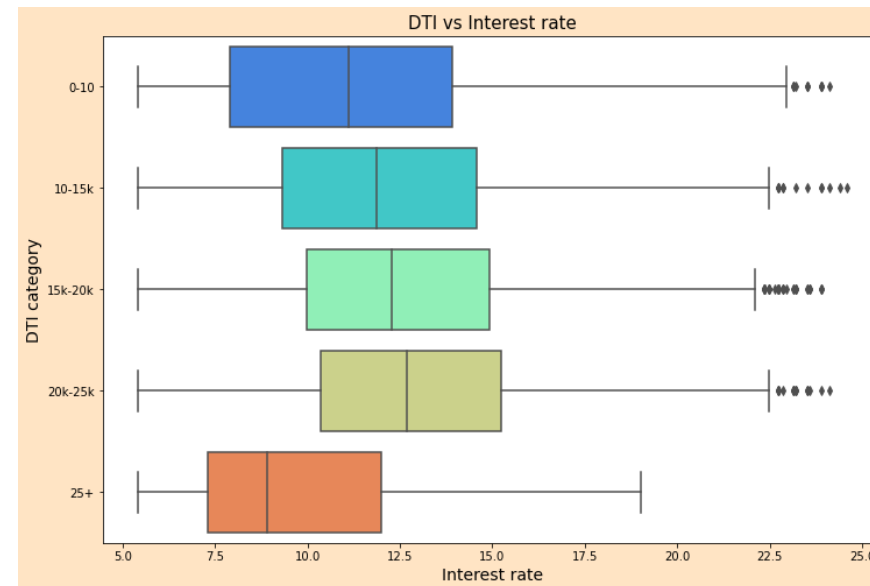
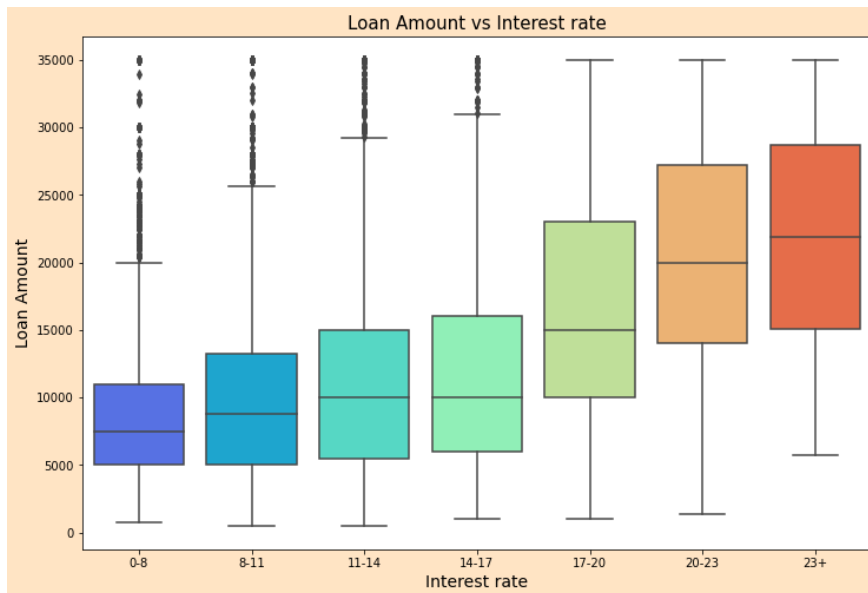
Observations

- ☐ **Purpose of Loan Vs Interest rate**—The Interest rate is Highest for small Business purpose
- ☐ Debt consolidation is second
- ☐ **Term Vs Interest Rate**- Average Interest rate Increases as the Grade changes from A → G

Recommendations

- ☐ Since Default Ratio of B & C grades are similar , there is an opportunity to Increase the Interest rate in B grade.

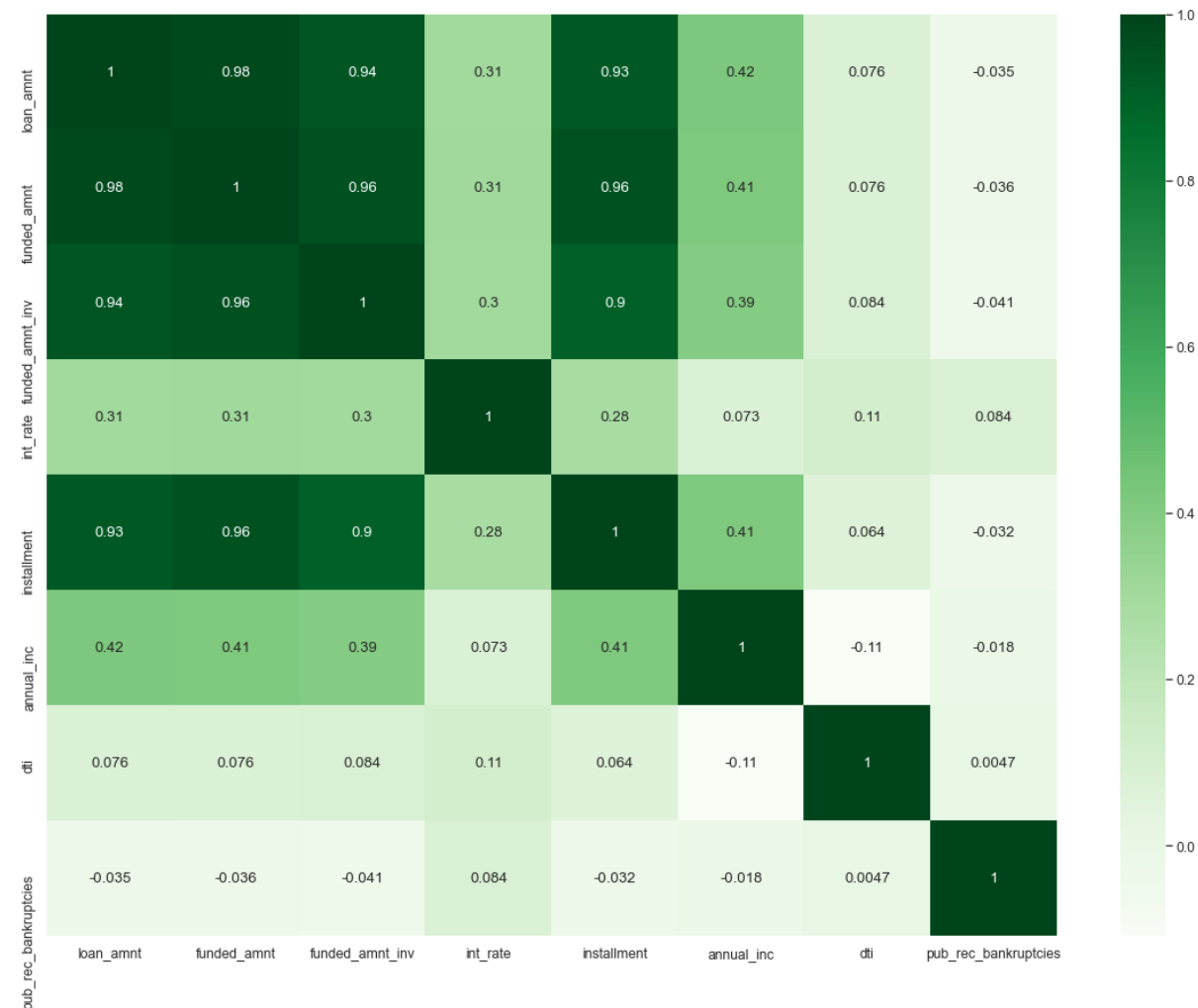
Bivariate Analysis on Loan Amount & DTI vs Interest Rate



Observations

- ☐ **Loan Vs Interest rate**—As the loan Amount increases so increases the Average Interest rate
- ☐ **DTI Vs Interest Rate**- No Major Observation in DTI while mapping it against Interest Rate

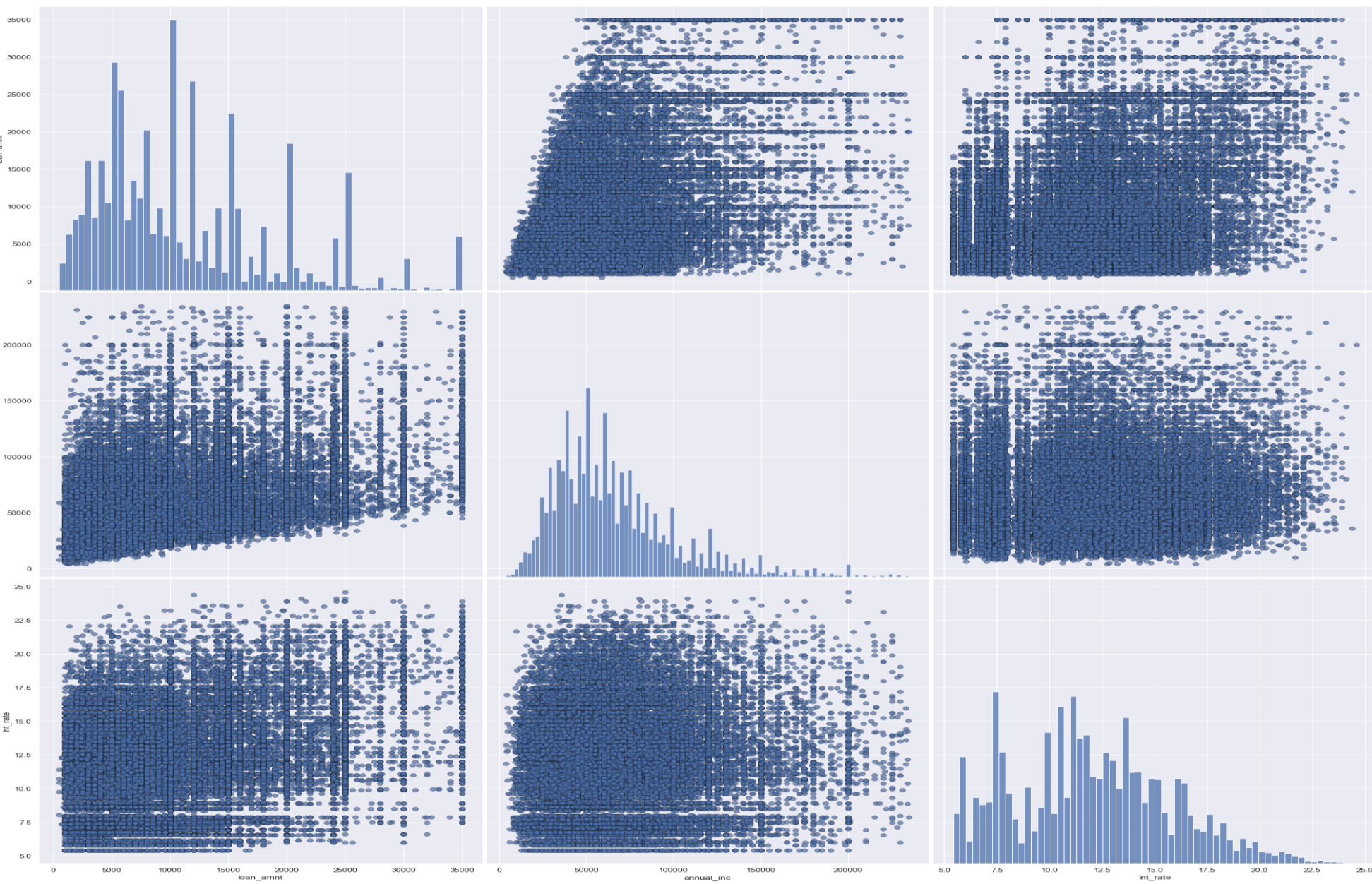
Heat map Analysis on Loan Amount Funded amount ,Int rate annual income , bankruptcies & DTI



Observations

- ☐ Installments are strongly correlated with the Loan Amount
- ☐ DTI is strongly correlated with loan amount & Negatively Correlated with Annual Income.
- ☐ Bankruptcies are negatively correlated with Loan Amount

Pair Plot between Loan amount annual income & Interest rate



Opportunities

- ☐ **Purpose of Loan_ Goal Oriented Loans**– Since Chances of paying Back is higher in cases where Borrower is Borrowing for Goal oriented short term Purpose like wedding , car there is opportunity to increase revenue probably by offering rebate on interest rate.
- ☐ people having more than 10 years of exp are safe and can be given the complete loan with moderate interest rate, to not lose the customer
- ☐ small purpose loan can be approved with high interest rate to draw maximum return.
- ☐ Since Default Ratio of B & C grades are similar , there is an opportunity to Increase the Interest rate in B grade
- ☐ Loans for Wedding & Car are safest & can be disburse faster

Risk

- ☐ F & G Grades are most risky in terms of Default ,Grades Is clear indicator of Default probabilities , Lower the Grade higher the Risk , Needs to be Cautious in terms of disbursement of Loan, Verification Status should be mandated for these Grades
- ☐ people with less than 1 year of exp asking for loan can be approved with reduced amount an high interest rate
- ☐ More Cautiousness is required in disbursing large Loans >30000+



THANKS