LENDING CLUB CASE STUDY

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Problem Statement

The company wants to understand the driving factors (or driver variables) behind loan default, i.e. the variables which are strong indicators of default

- *Analyse the Lending applicants data of Lending Club from 2007 to 2011*
- *Minimise the risk of losing money while lending to urban customers*
- *Avoid Financial loss by not lending to applicants likely to default*
- *Identify the Patterns for applicants likely to default*

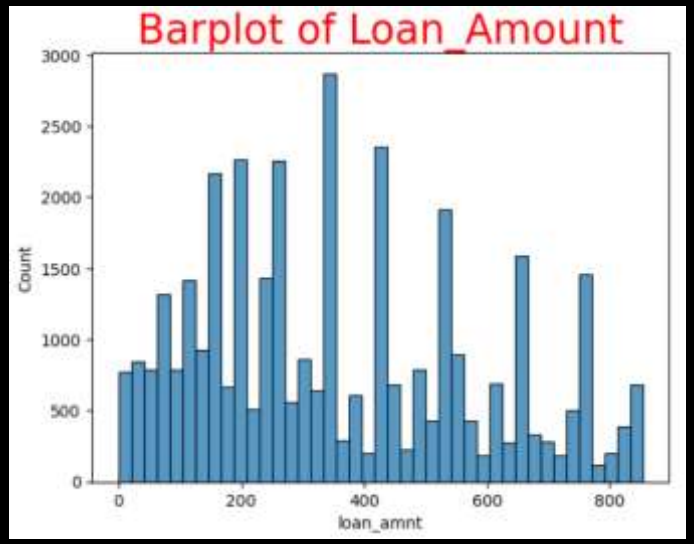
Objective

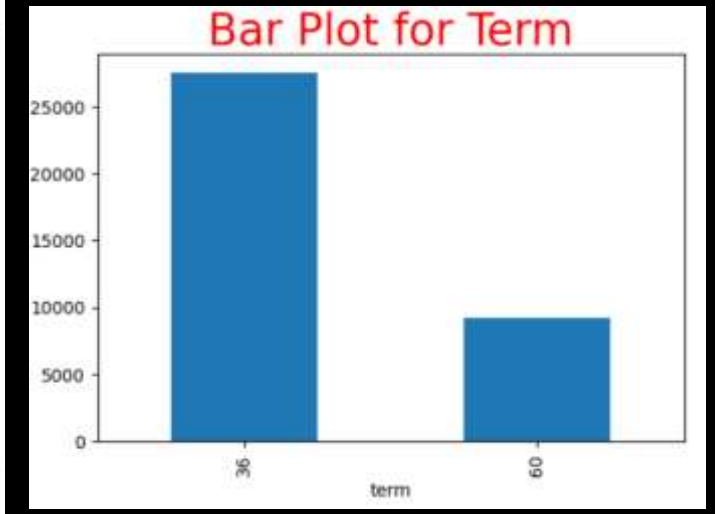
- *Avoid Business loss by lending to applicants who likely to repay the loan*
- *Avoid Financial Loss by rejecting applicants who are likely to default*

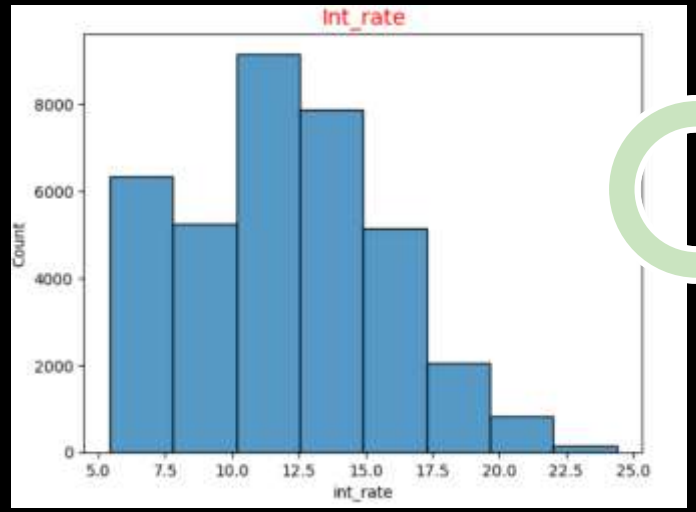
Approach

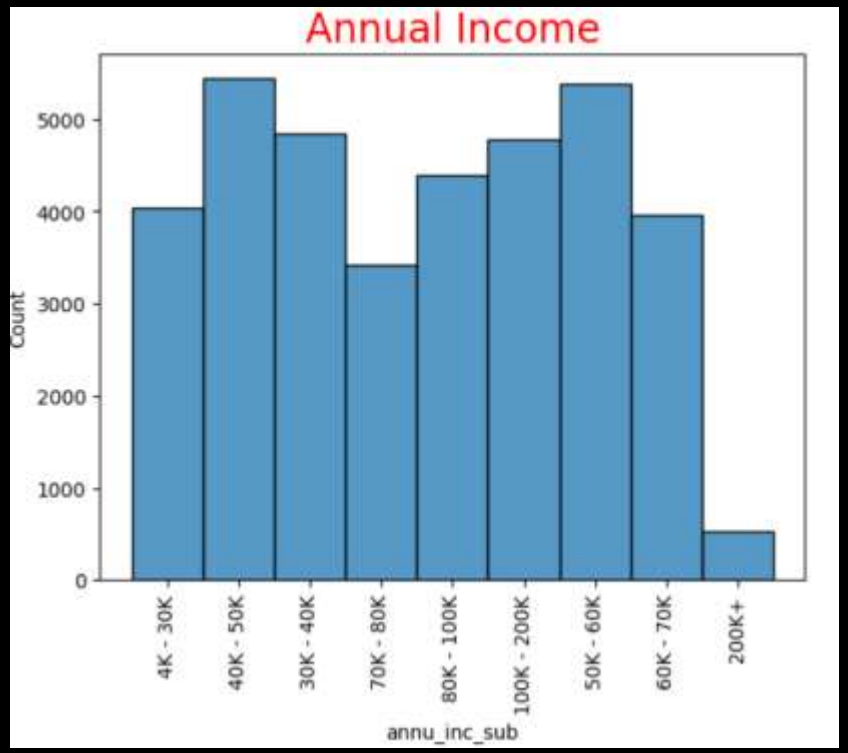
- Data Understanding
- Data Cleansing
- Data transformation
- Analysis
- Business Recommendation

Univariate Analysis

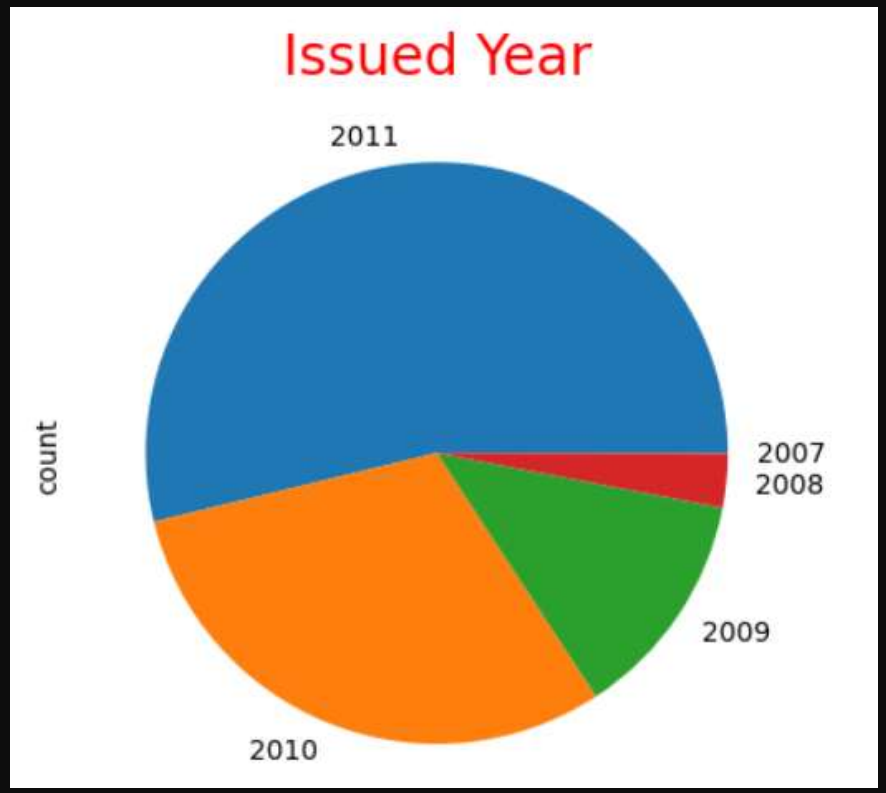


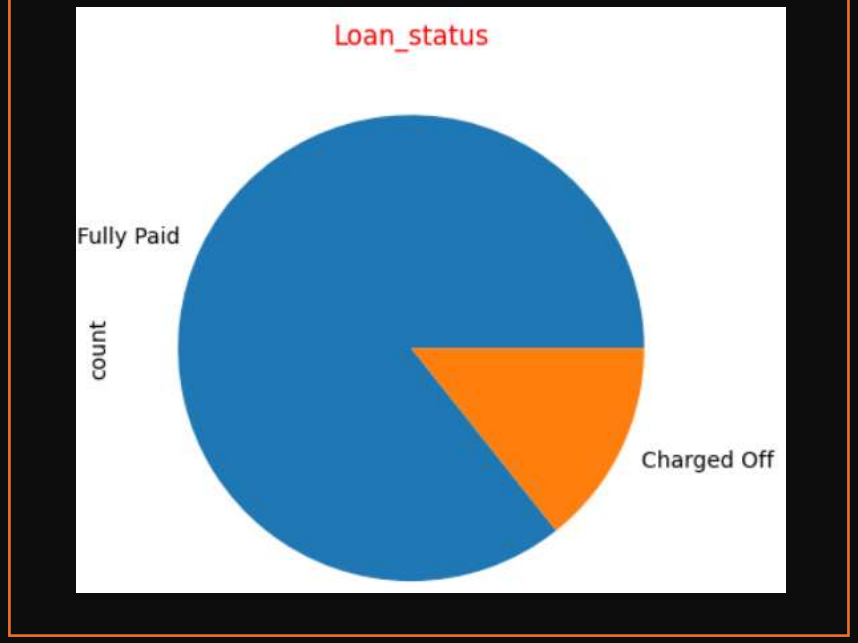


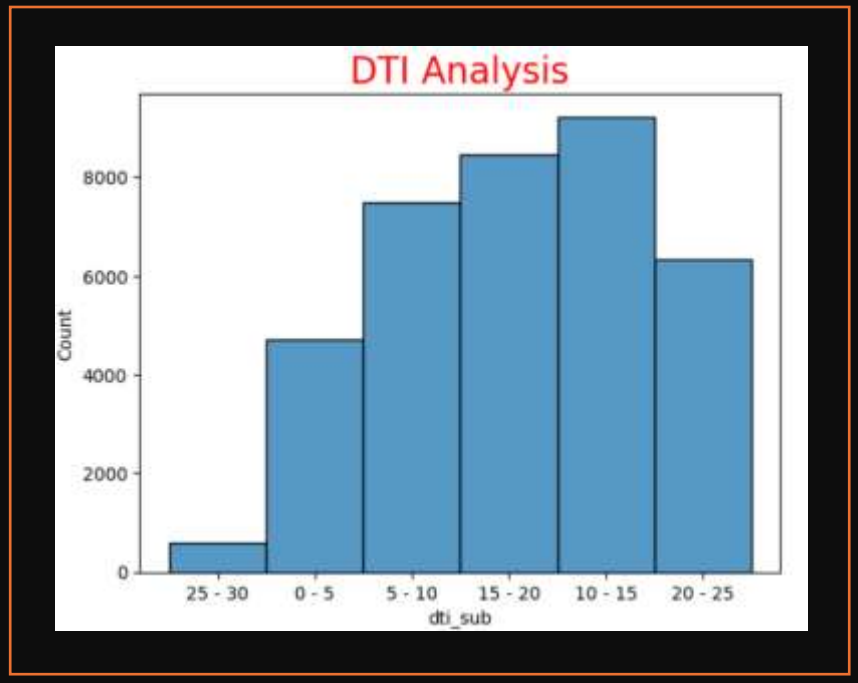




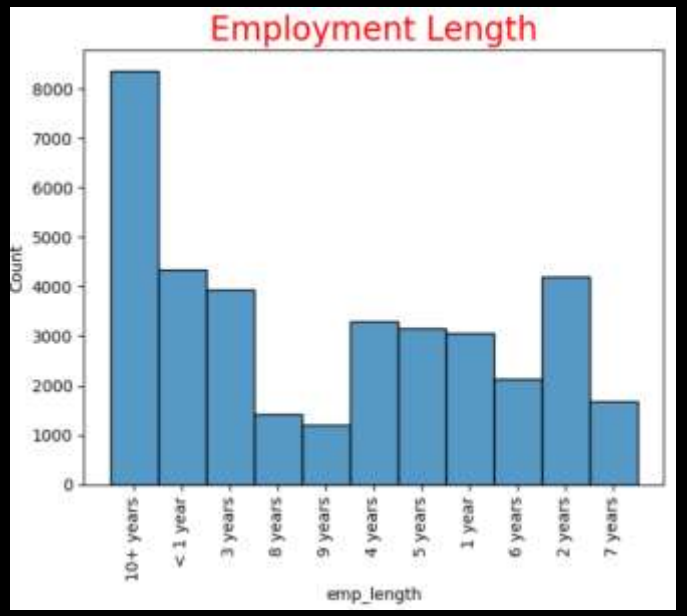
Univariate Analysis

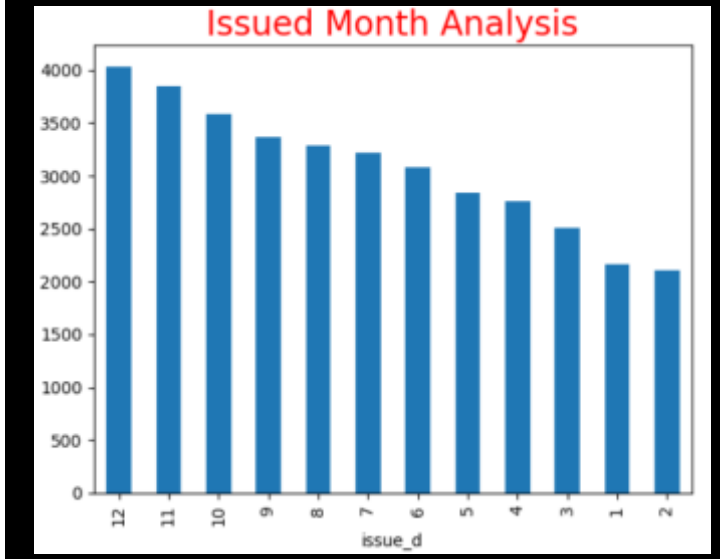


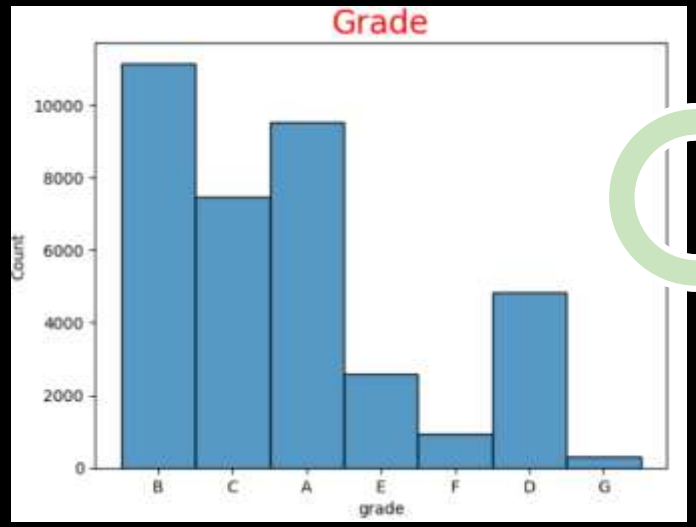


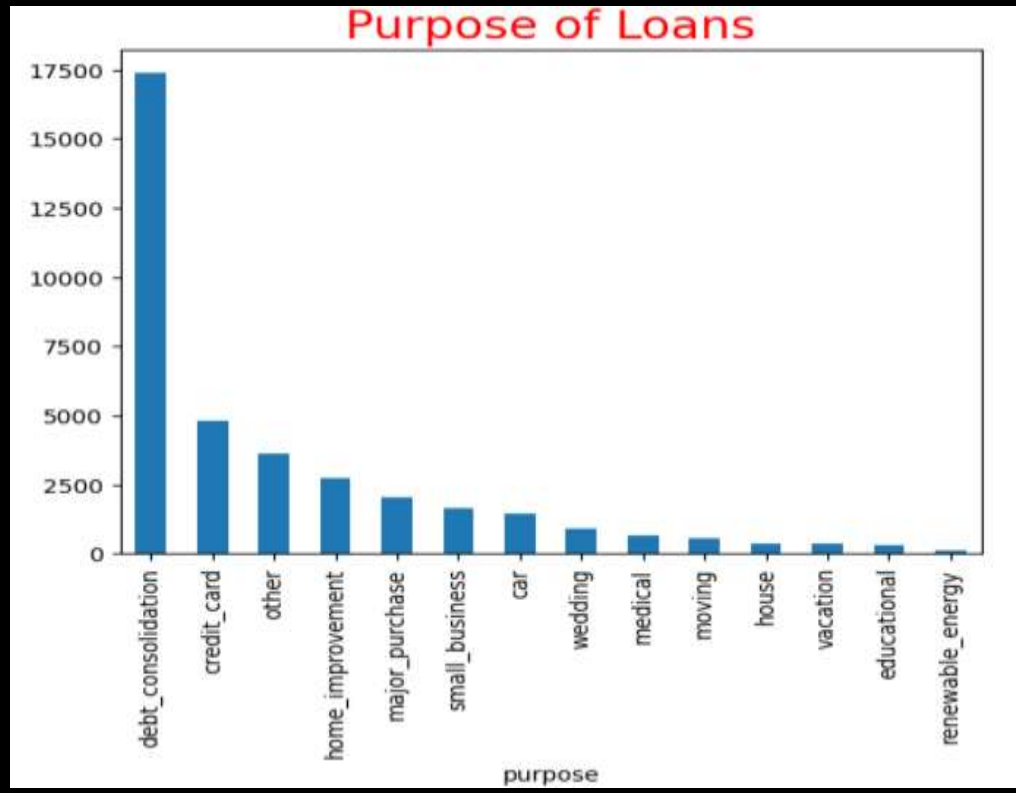


Univariate Analysis





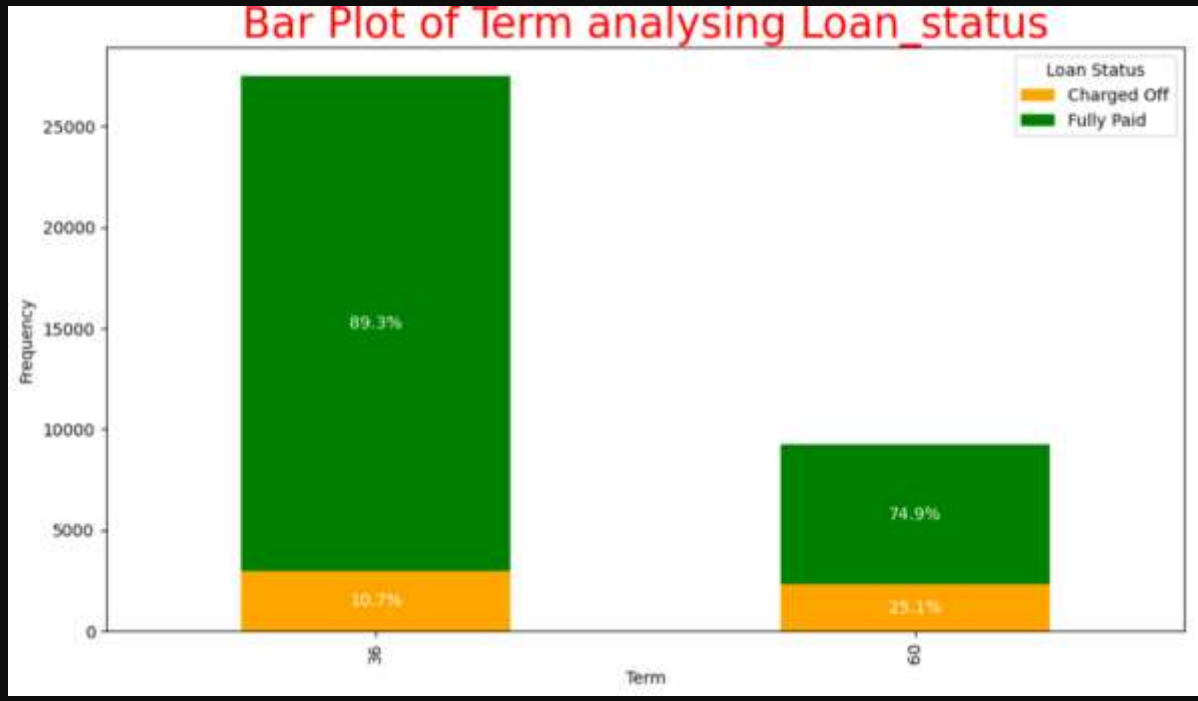




Bivariate Analysis

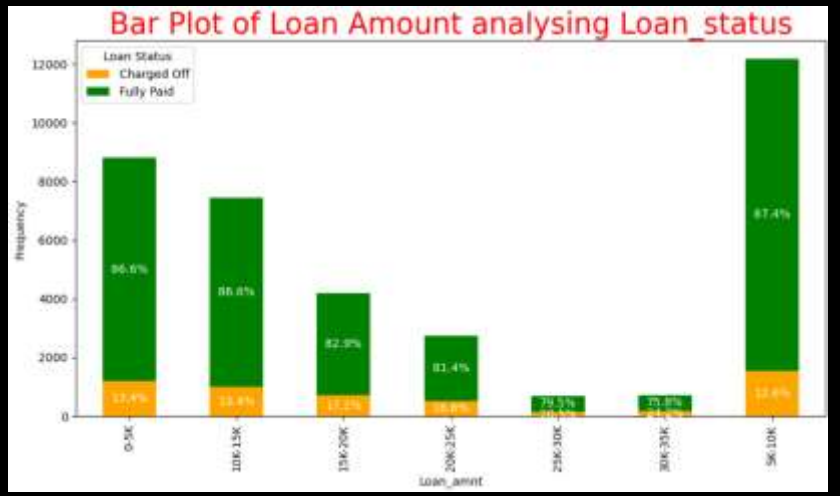
Bivariate Analysis

- Here we can observe that if the term is 36 months, there is only 10.7% charged off loans, but if 60 months, ther is 25.1% charged off loans.
- we can recommend now that approving loans with short term 36 months can reduce the risk of loan defaulters.

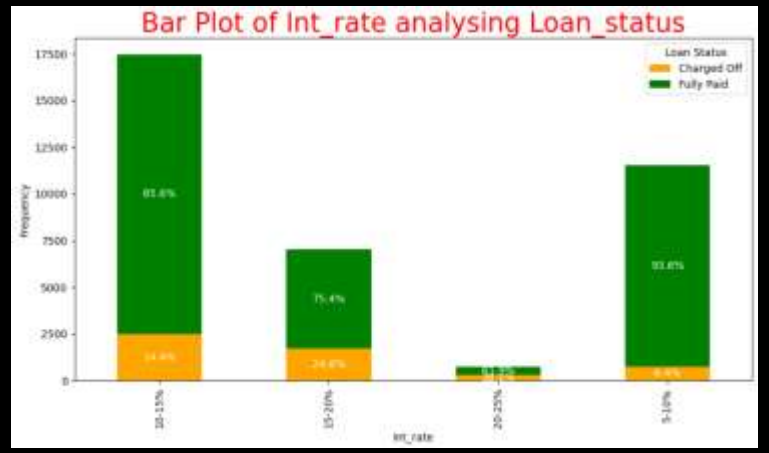


Loan Amount vs Loan_status

we can conclude that if loan amount is more, then there is high chances of being defaulters.



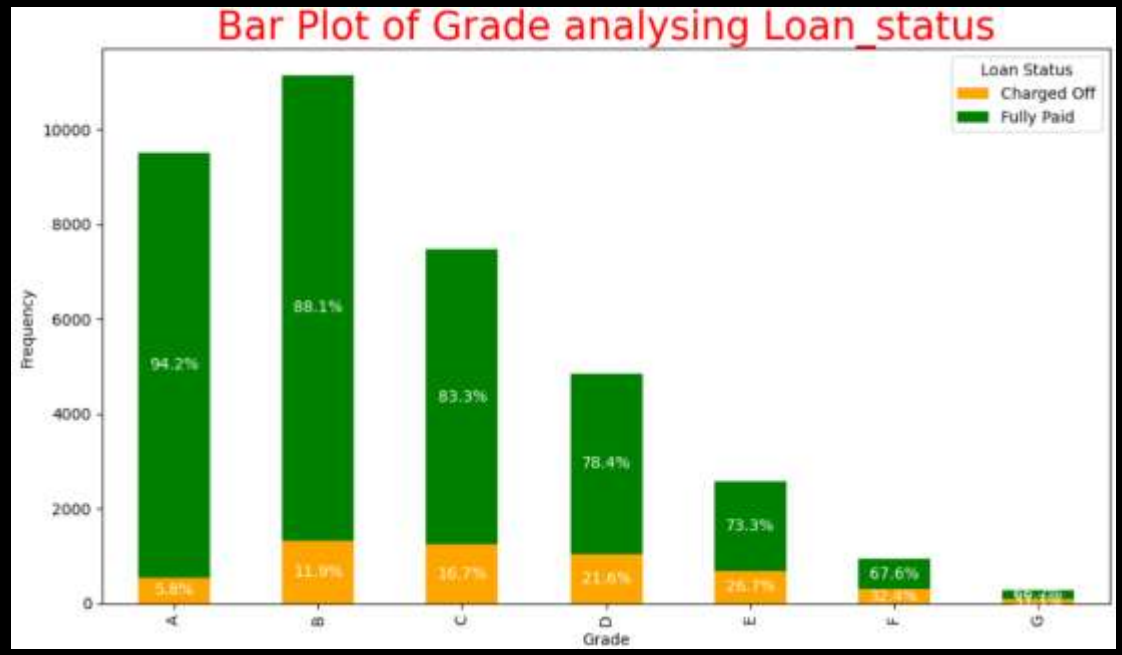
Int_rate vs Loan_status



- From the bar chart, we can infer that higher the interest rate higher is the amount of defaulters.
- We can strongly tell that Loan_status is directly proportional to Int_rate.

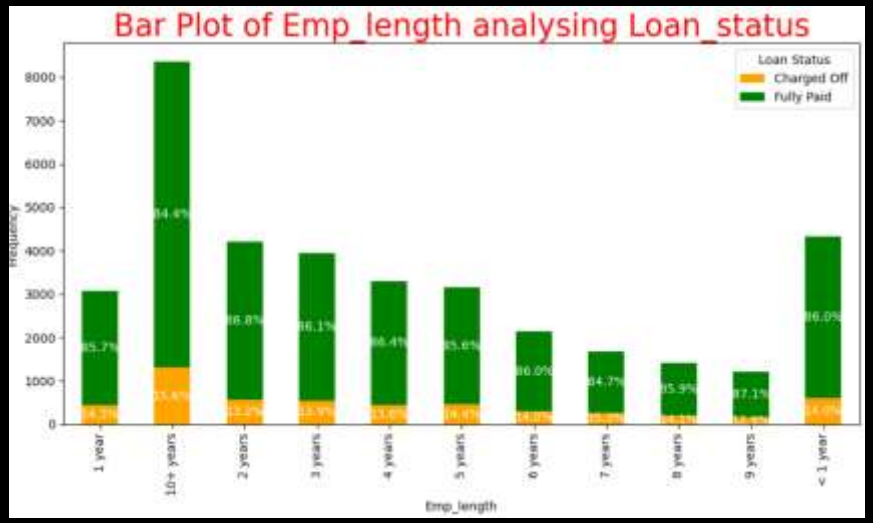
Grade vs Loan Status

- From the graph, we can understand that if Grade is considered increasing in alphabetical order, defaulters are also increasing in the same way.
- It is understandable that loans with lower grade have less chances of defaulting, while with higher grade - defaulters are also higher.



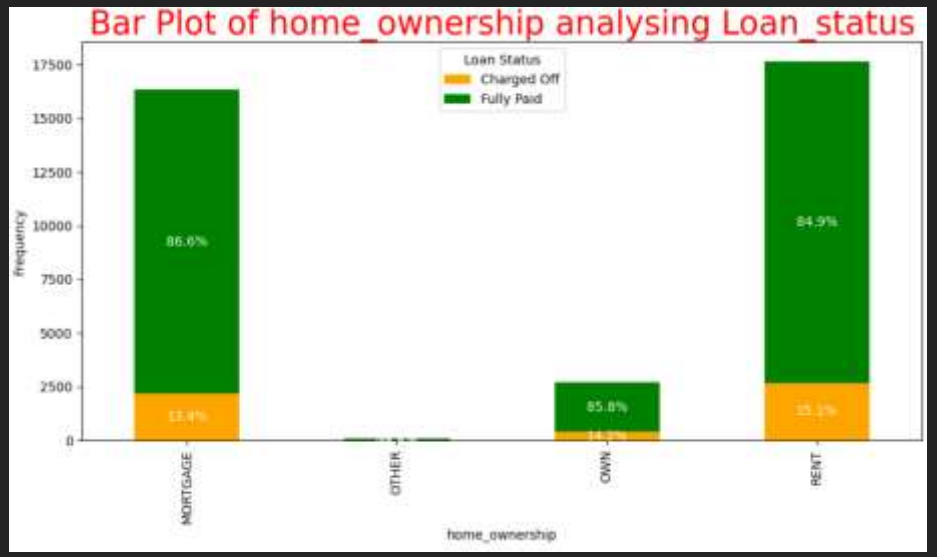
Emp_Length vs Loan_status

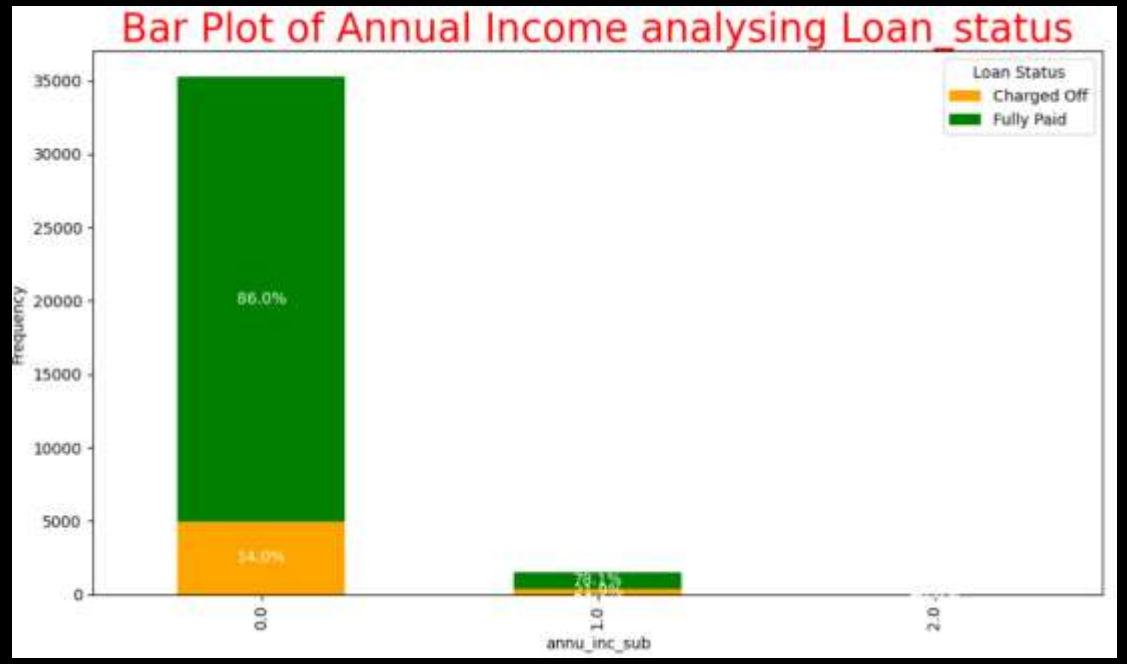
- From here, we can infer that defaulters are almost constant irrespective of Emp_length.
- This shows that emp_length has very less influence on Loan_status.



Home Ownership vs Loan_Status

- From here, it can be understood that around 14% of defaulters are present irrespective of home ownership.
- This shows that home_ownership has less influence on why there are defaulters.



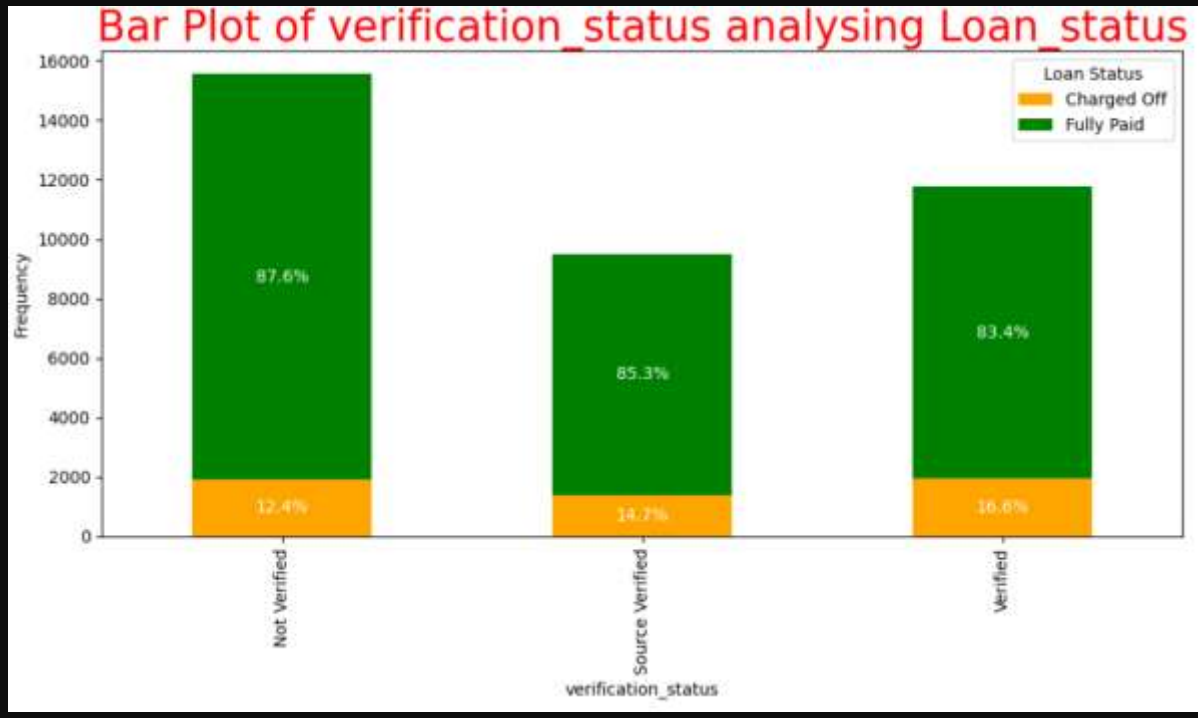


Annual Income vs Loan Status

- This shows that higher the annual income, lesses the defaulters.
- This means Loan_status is inversely proportional to Annual Income.

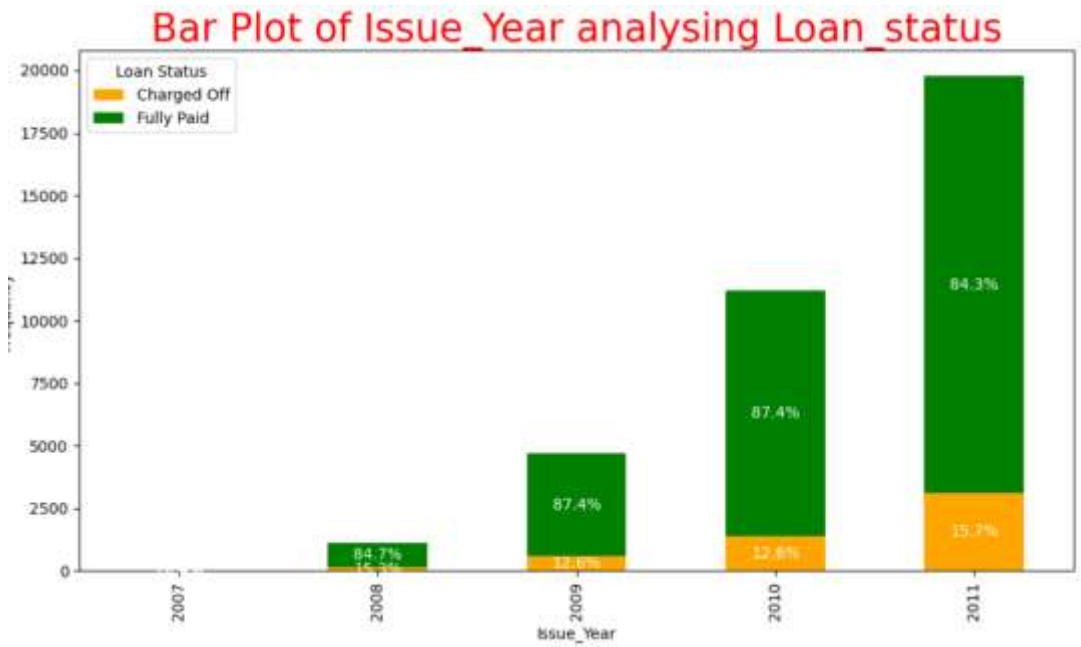
Verification Status vs Loan Status

- We can infer that if Verfication status is verified, there are more defaulters compared to Source Verified and Not verified.
- But the difference is significantly low, this means Verification status has minimum effect on Loan_status.

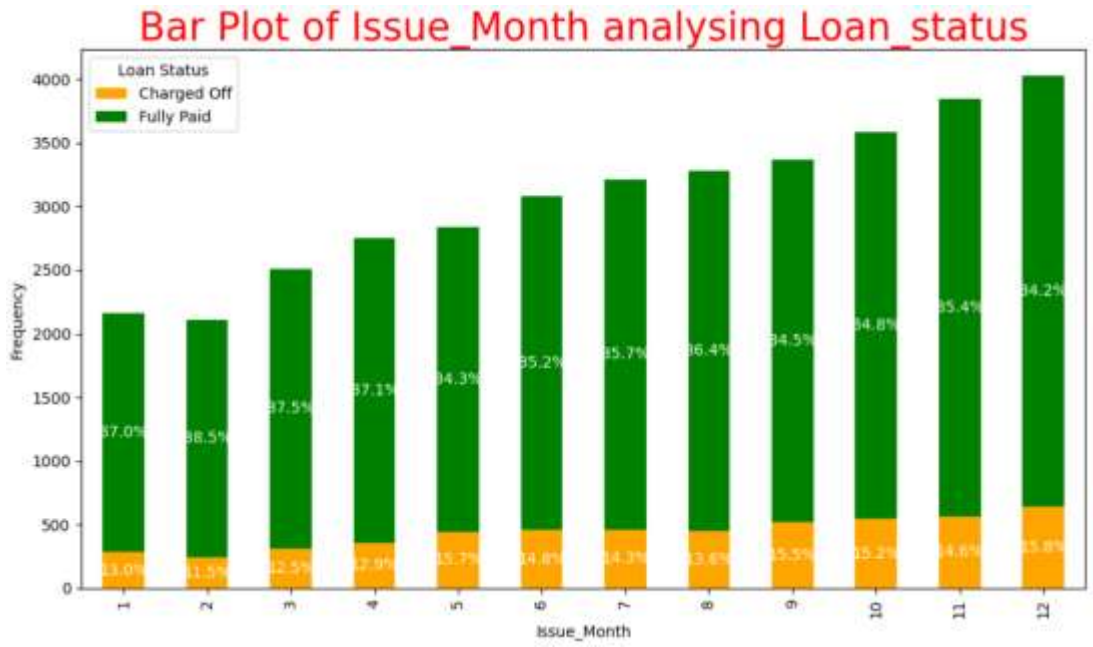


Issued Year & Month vs Loan Status

Issued Year



Issued Month



Issued Year & Month vs Loan Status

Issued Year

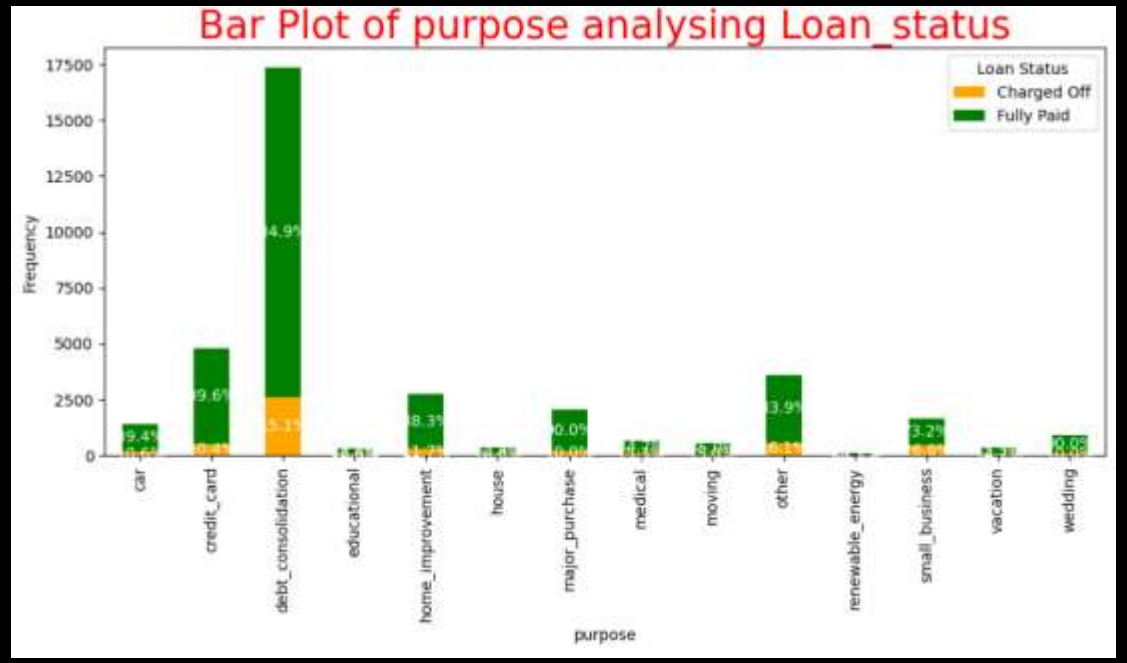
- From the graph, we infer that number of defaulters is almost similar in every year.
- It is safe to assume that Year does not have much influence.

Issued Month

- From the gragh, we can infer that from January - April defaulters are less when compared to other months.
- # Also, we can understand at the end of year, from september - December there are more number of defaulters.
- # This we can recommend that defaulters will be less when loans are approved in the beginning of year, but in the end this difference is not much.

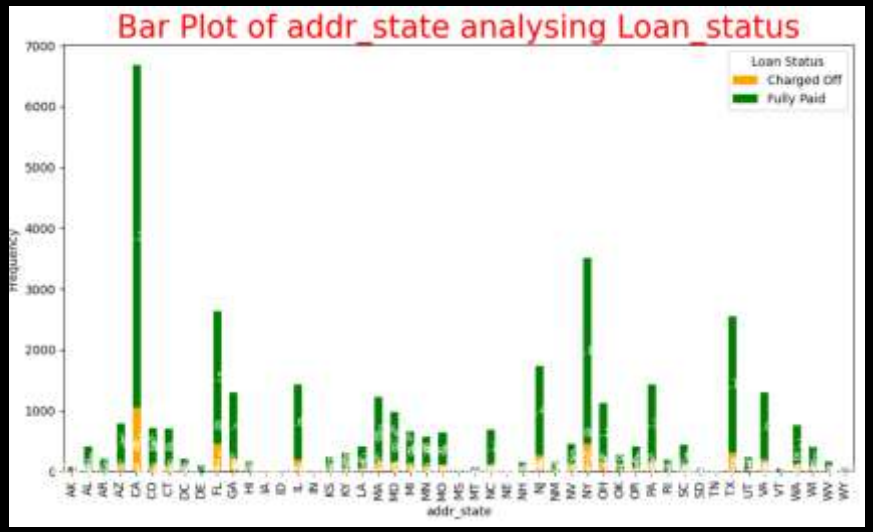
Purpose vs Loan Status

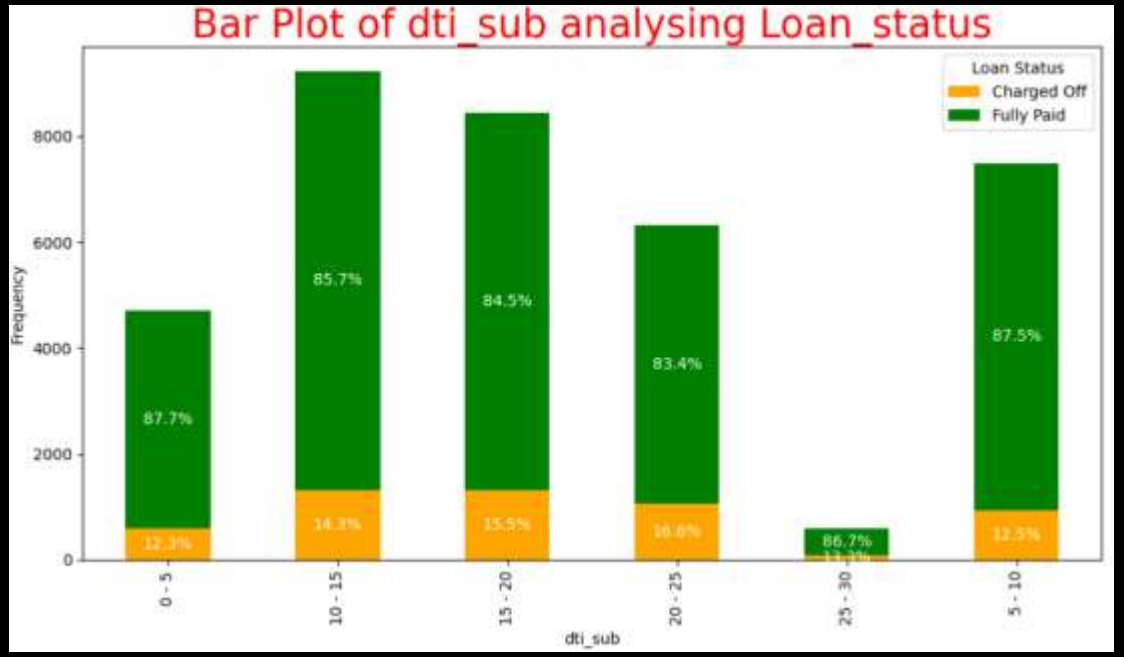
- From here, we can understand that people who take loans on Small_business and renewable_energy will default the most.



Addr_state vs Loan State

- From here, we can understand that there are more people from CA who defaulted much.
- And this change doesn't affect much I understand as the proportion of people who takes loans form each state is different and it doesnt matter much.



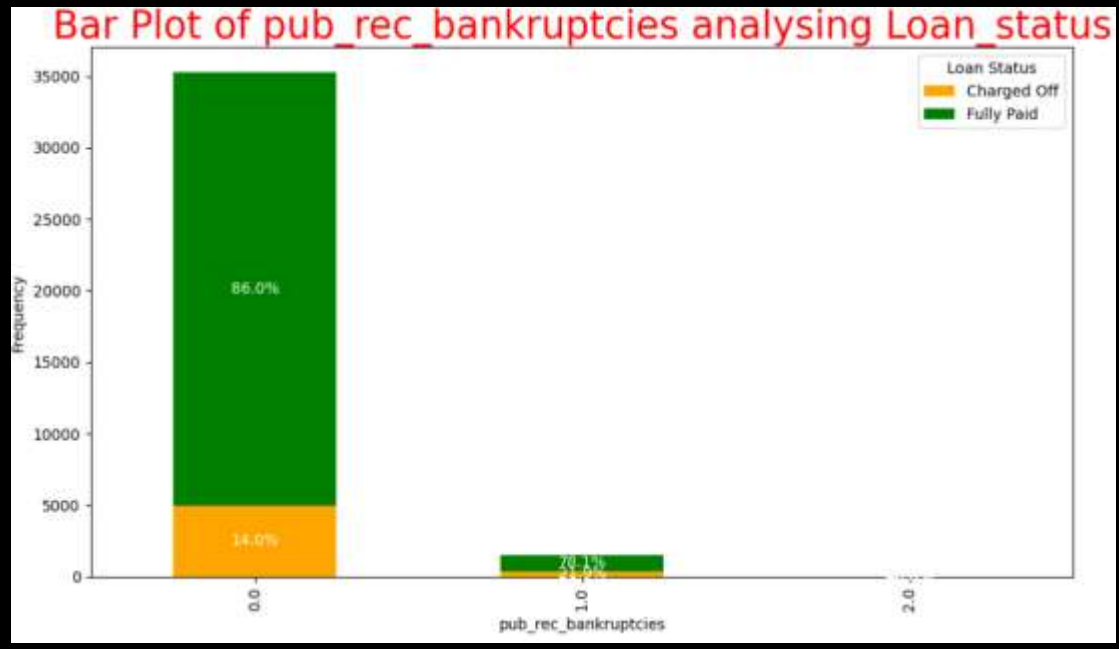


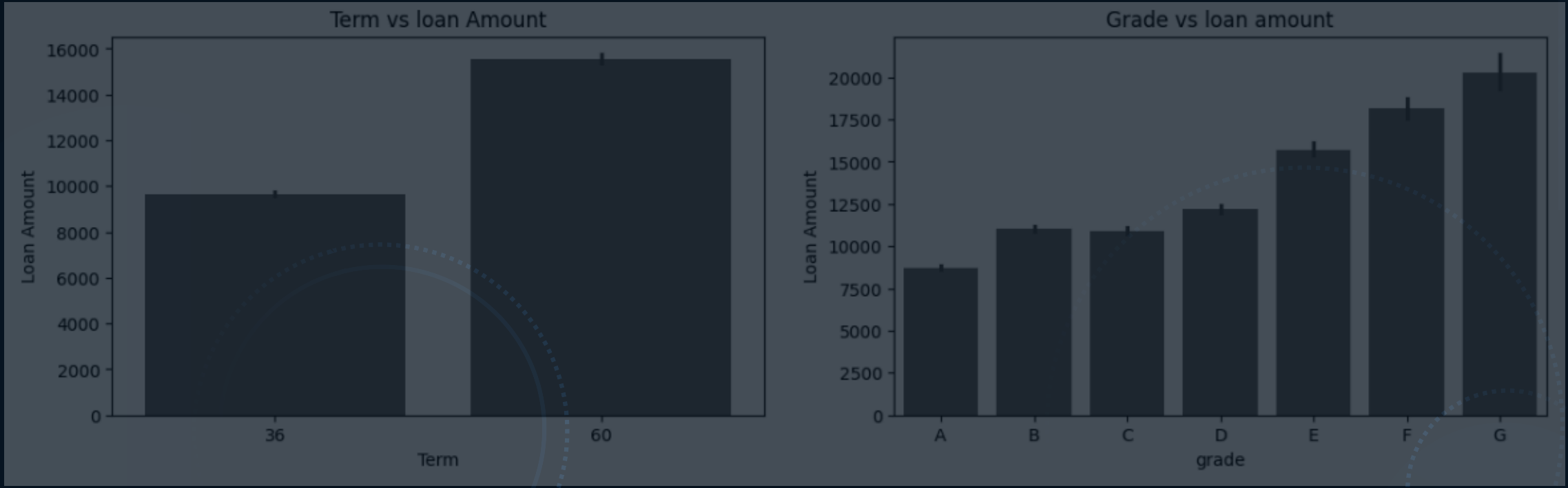
DTI vs Loan status

- This infers that if DTI is more, defaulters are also more and if dti is less, defaulters are less.
- #This shows that DTI is directly proportional to loan_status

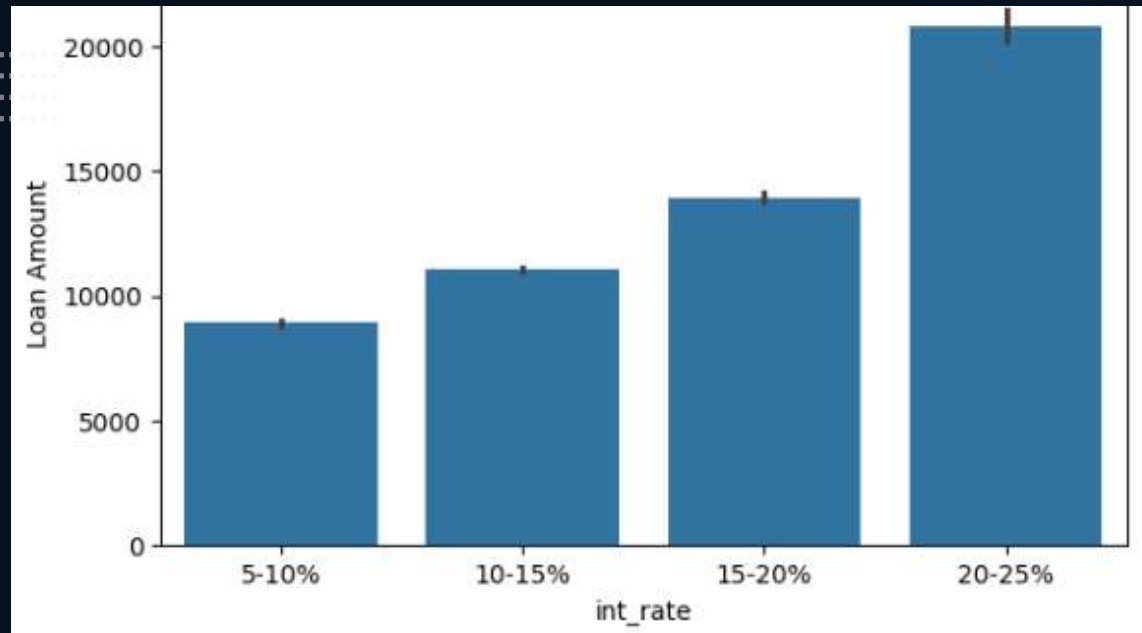
Pub Rec Bankruptcies vs Loan_status

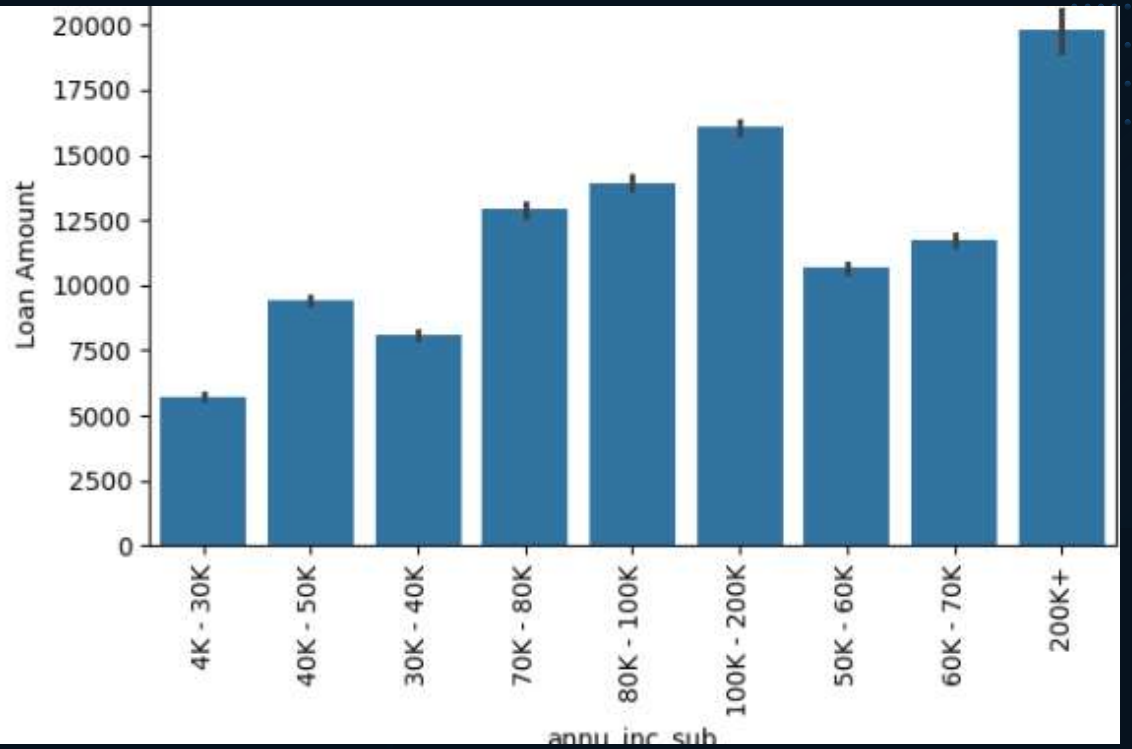
- From here, we can infer that defaulters increase when pub_rec_bankruptcies are more.
- It is directly Proportional.





Loan Amount vs Term and Grade

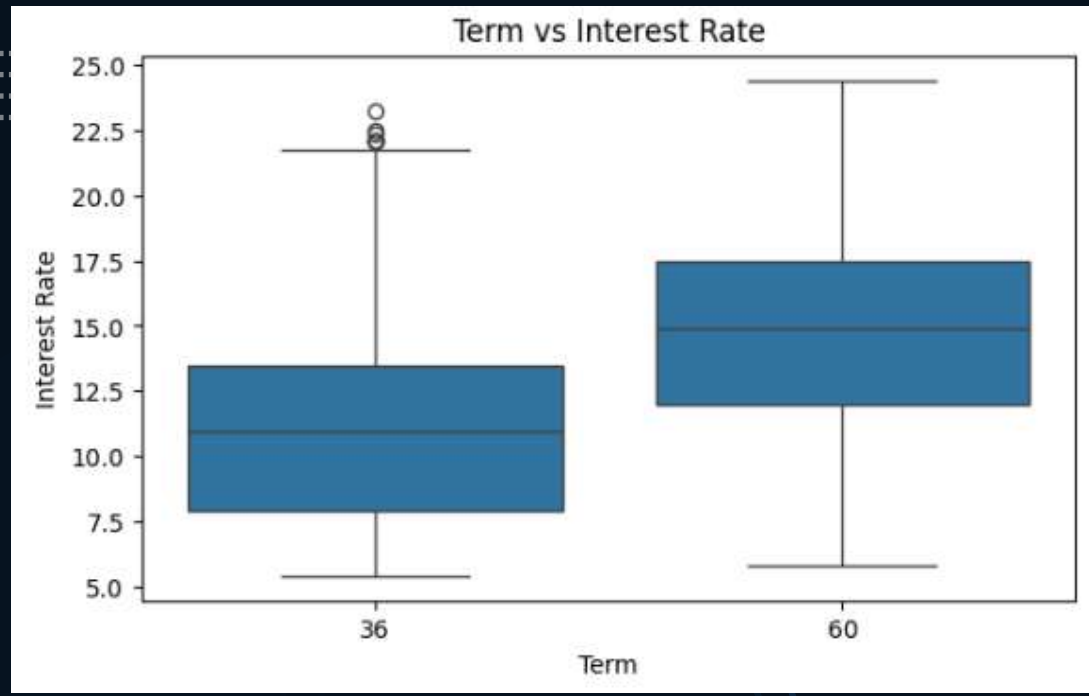


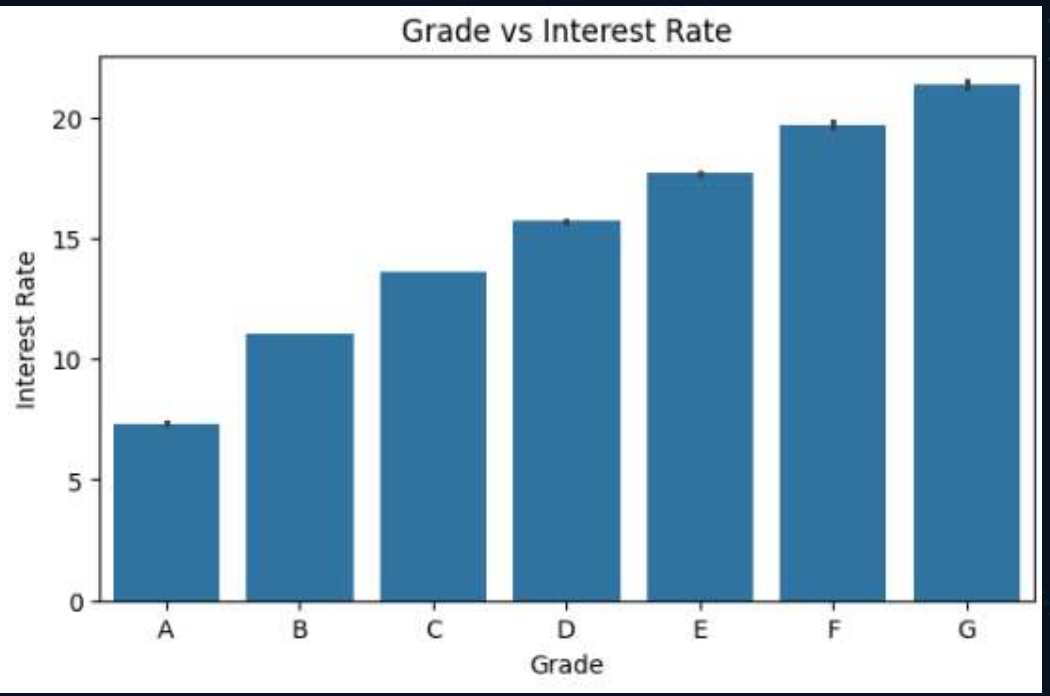


Loan Amount vs Interest rate & Annual Income

From here, we can infer that

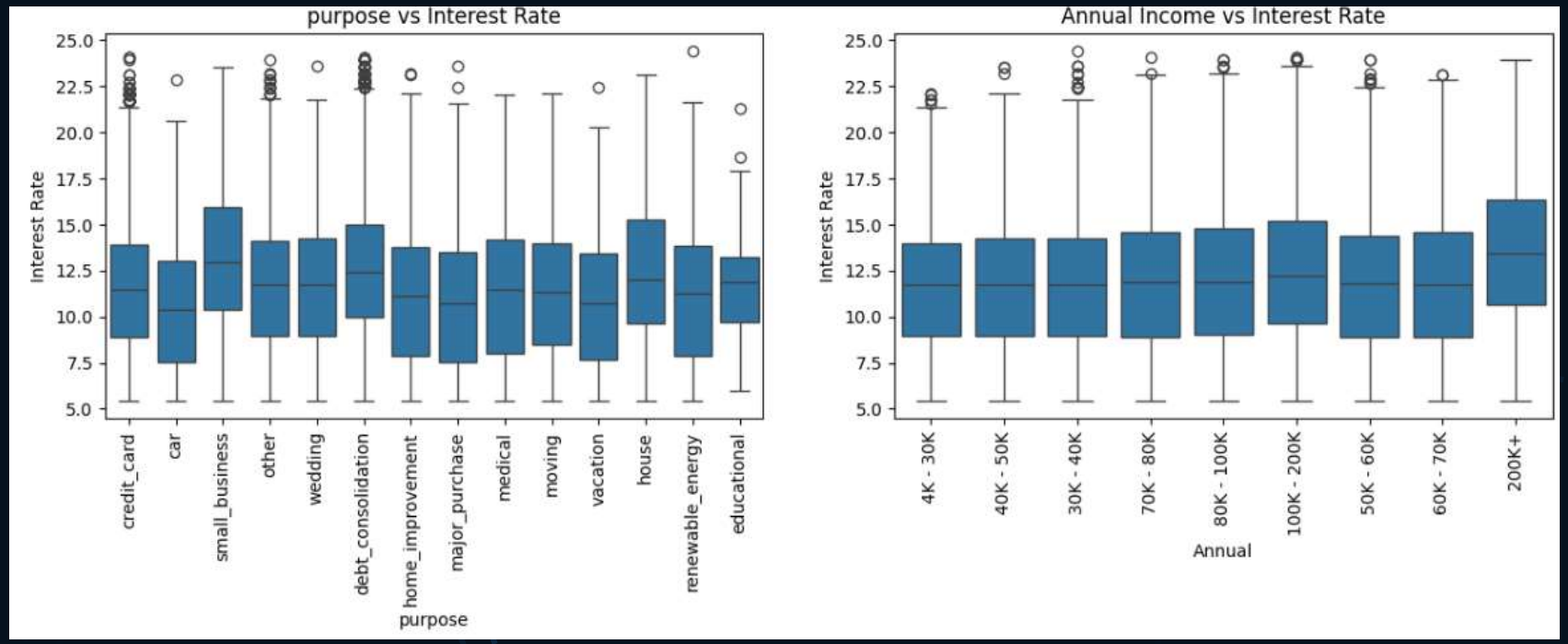
- Interest rate is directly proportional to Loan Amount.
- Annual Income is directly proportional to Loan Amount.





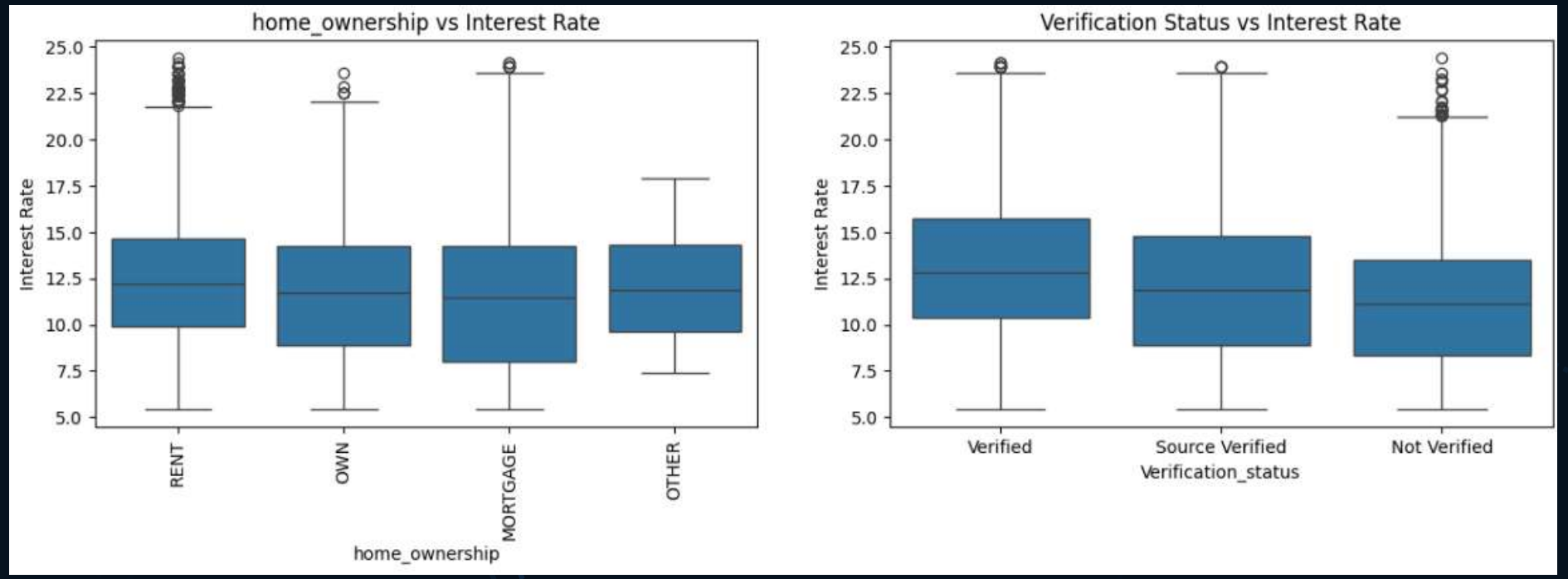
Interest rate vs Term and Grade

- Here, Interest Rate is directly Proportional to Term.
- Interest Rate is directly Proportional to Grade.



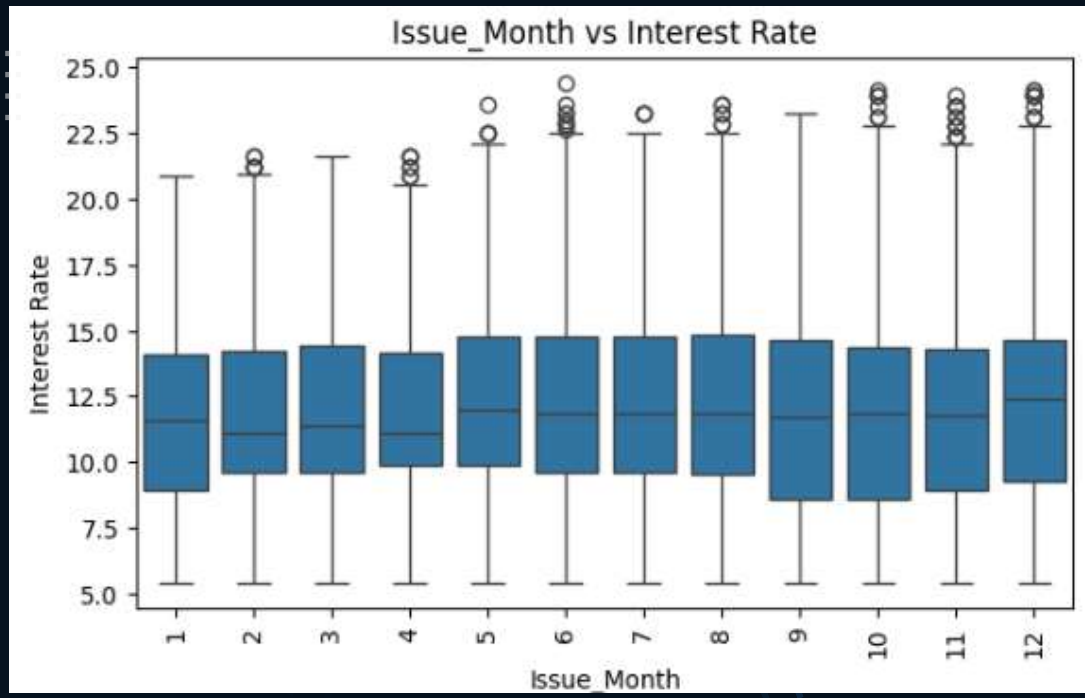
Interest Rate vs Purpose & Annual Income

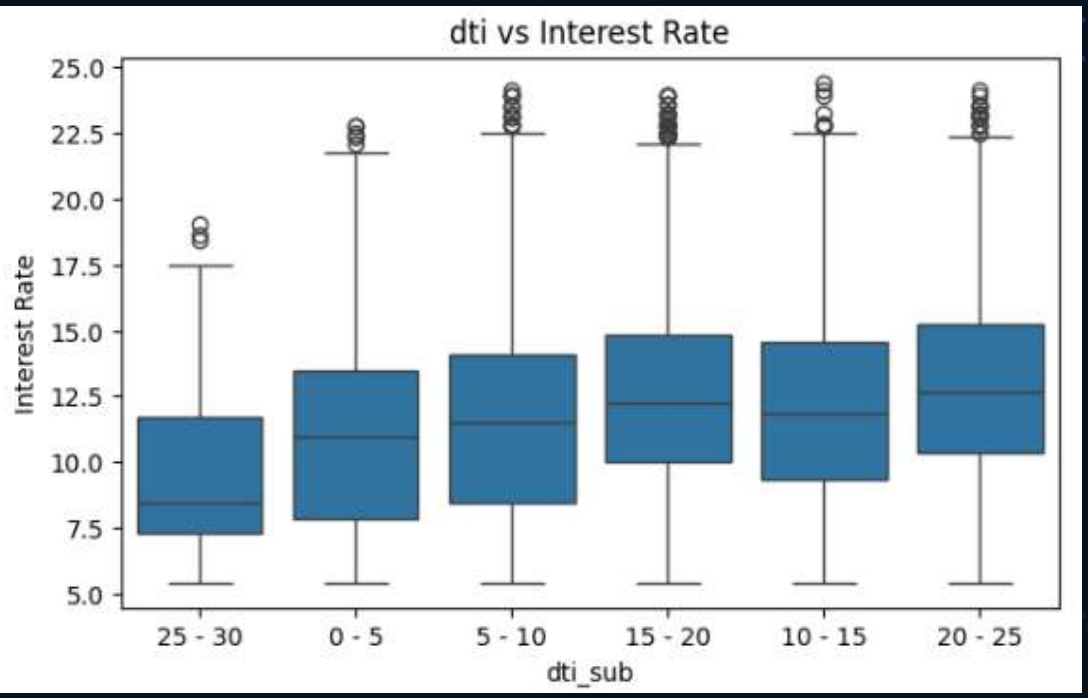
- We can infer that for small_business, house and debt_consolidation, Interest rate is higher.
- Also Interest rate is higher for people with 200K+ income level. For all others, it is almost similar.



Interest Rate vs Home Ownership and Verification Status

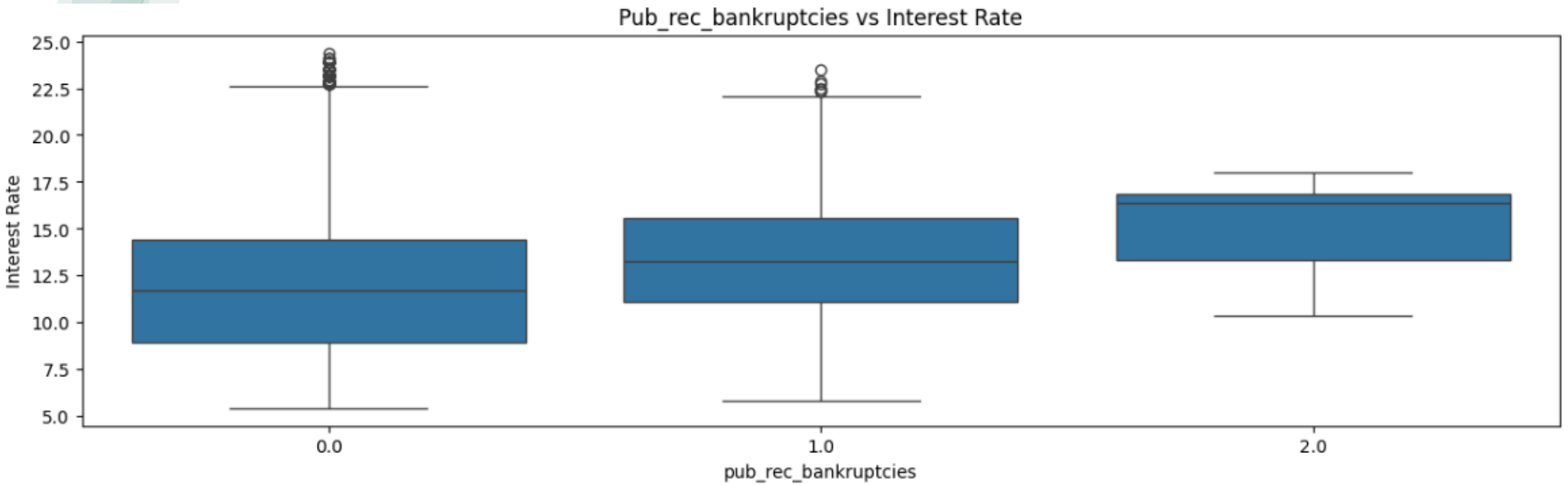
- Here we can infer that home_ownership doesnot have much effect on Interest rate.
- Interest rate is directly proportional to Verification_status.





Interest Rate vs Issue_month & DTI

- Interest Rate does not have relation with Issue_Month.
- As DTI increases, Int_rate also increases but for DTI with 25-30, interest rate is less.



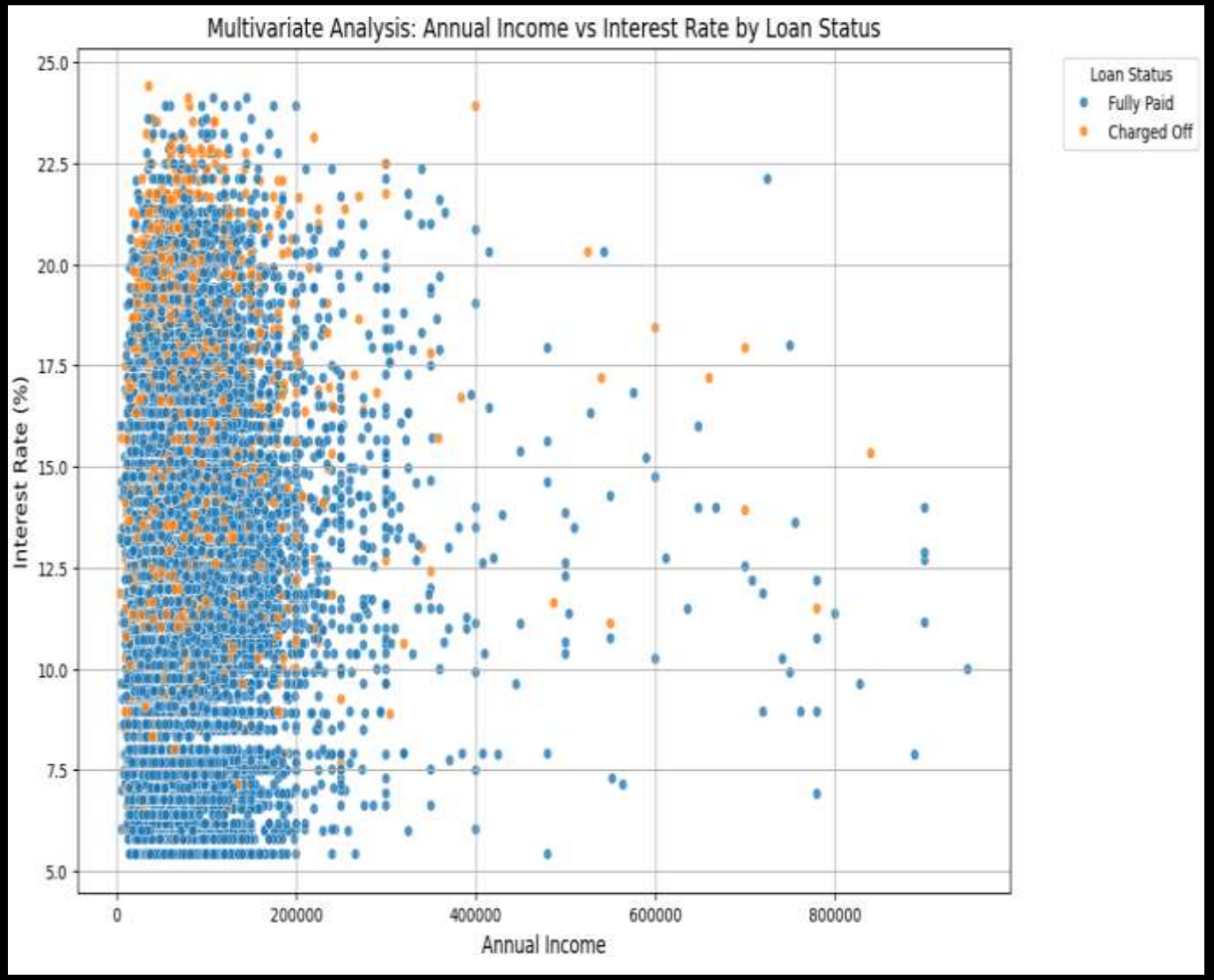
Interest rate is directly proportional to pub_rec_banruptcies.

Pub bankruptcies vs Interest Rate

Multivariate Analysis

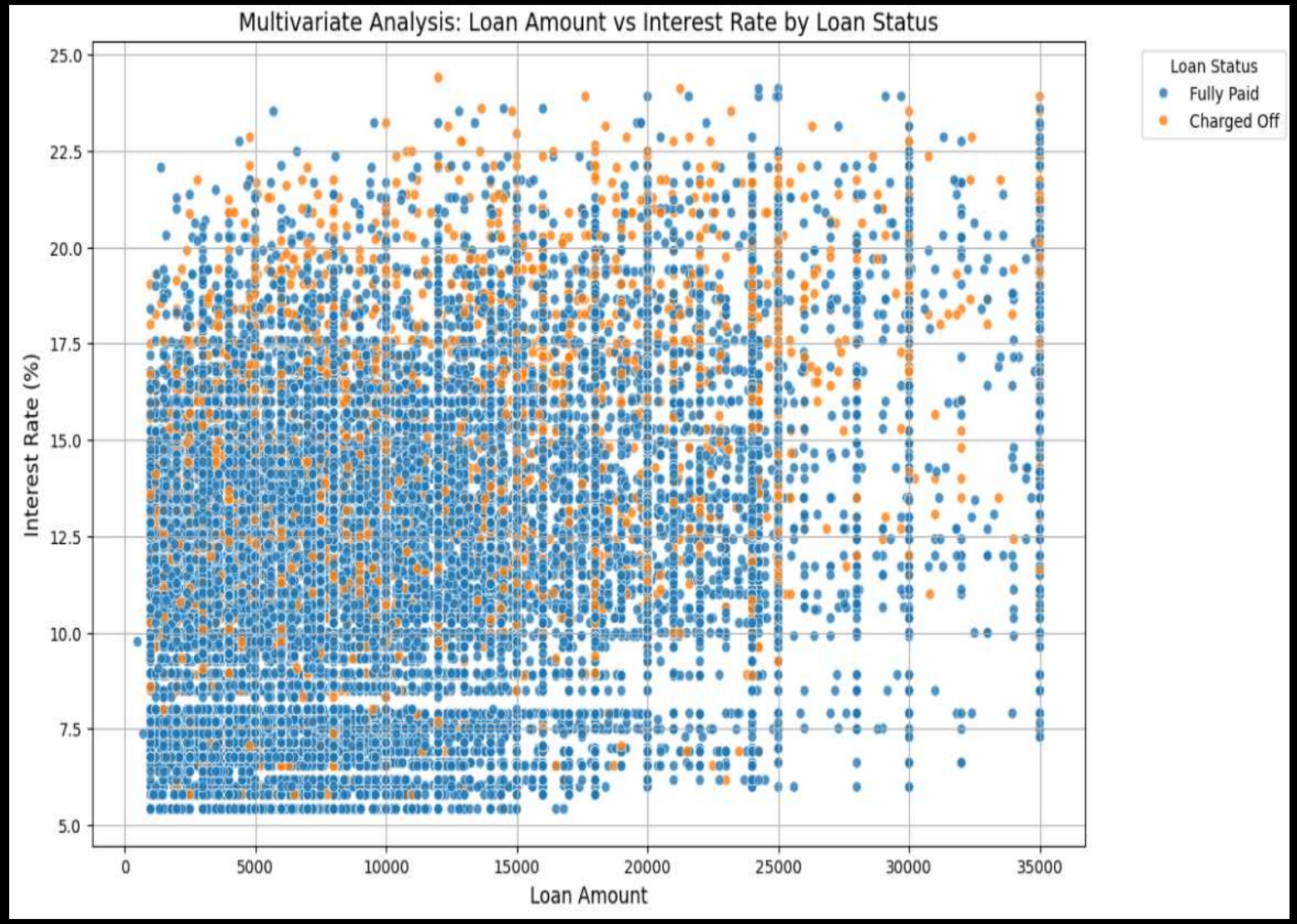
Annual Income vs Interest rate by loan_status

- Here we can understand that higher the annual income, higher the loans are paid off.
- We can understand that Interest rate is directly proportional to loan status.
- That is if interest rate is less, loans are paid off and if the interest rate is more, there are more chances for loan to be charged off.



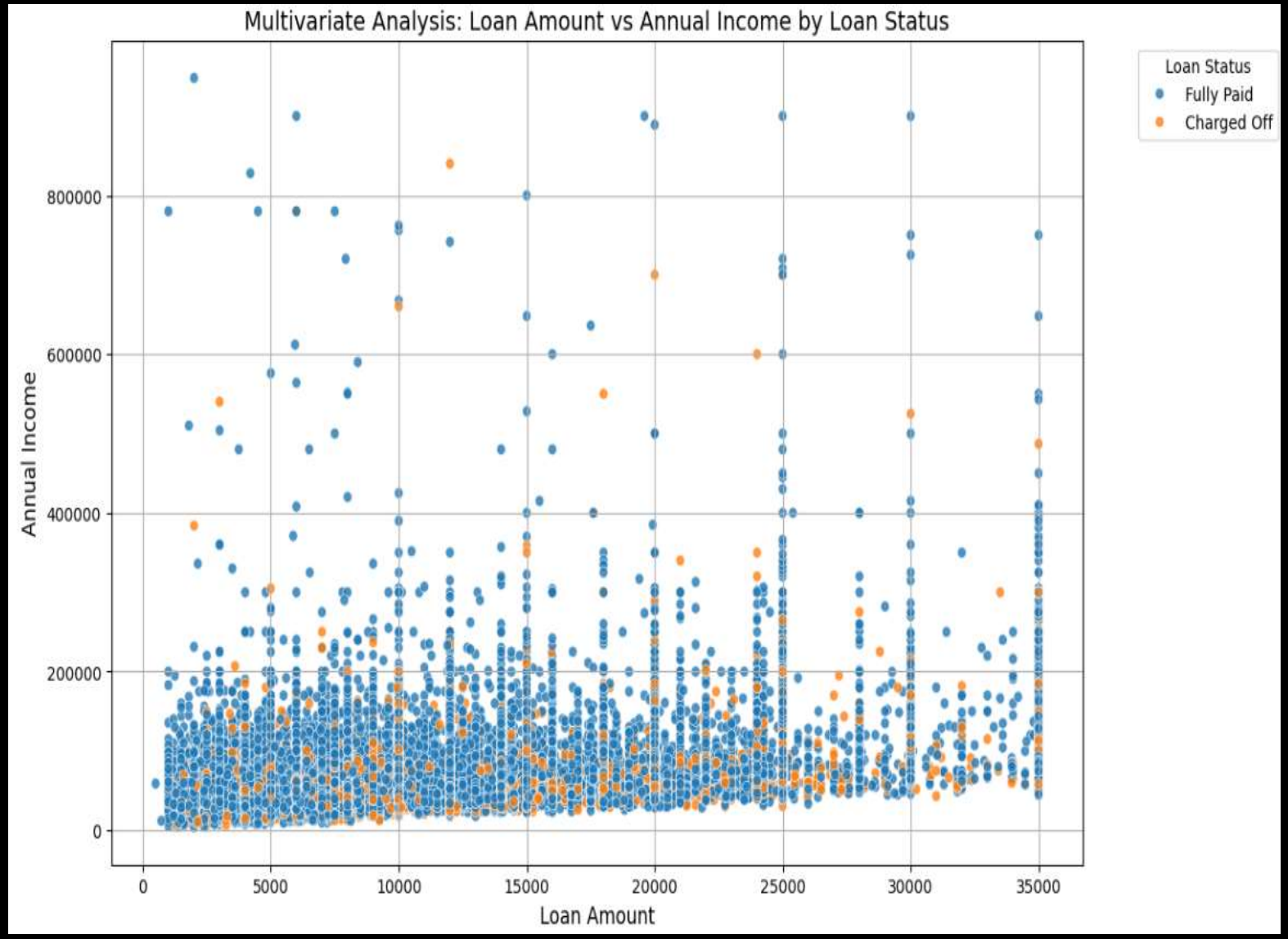
Loan Amount vs Interest rate by loan_status

- Here we can get that if the loan amount and interest rate is less, there are less charged off cases.
- As if interest rate increases and loan amount increases, charged off loans increases proportionally.



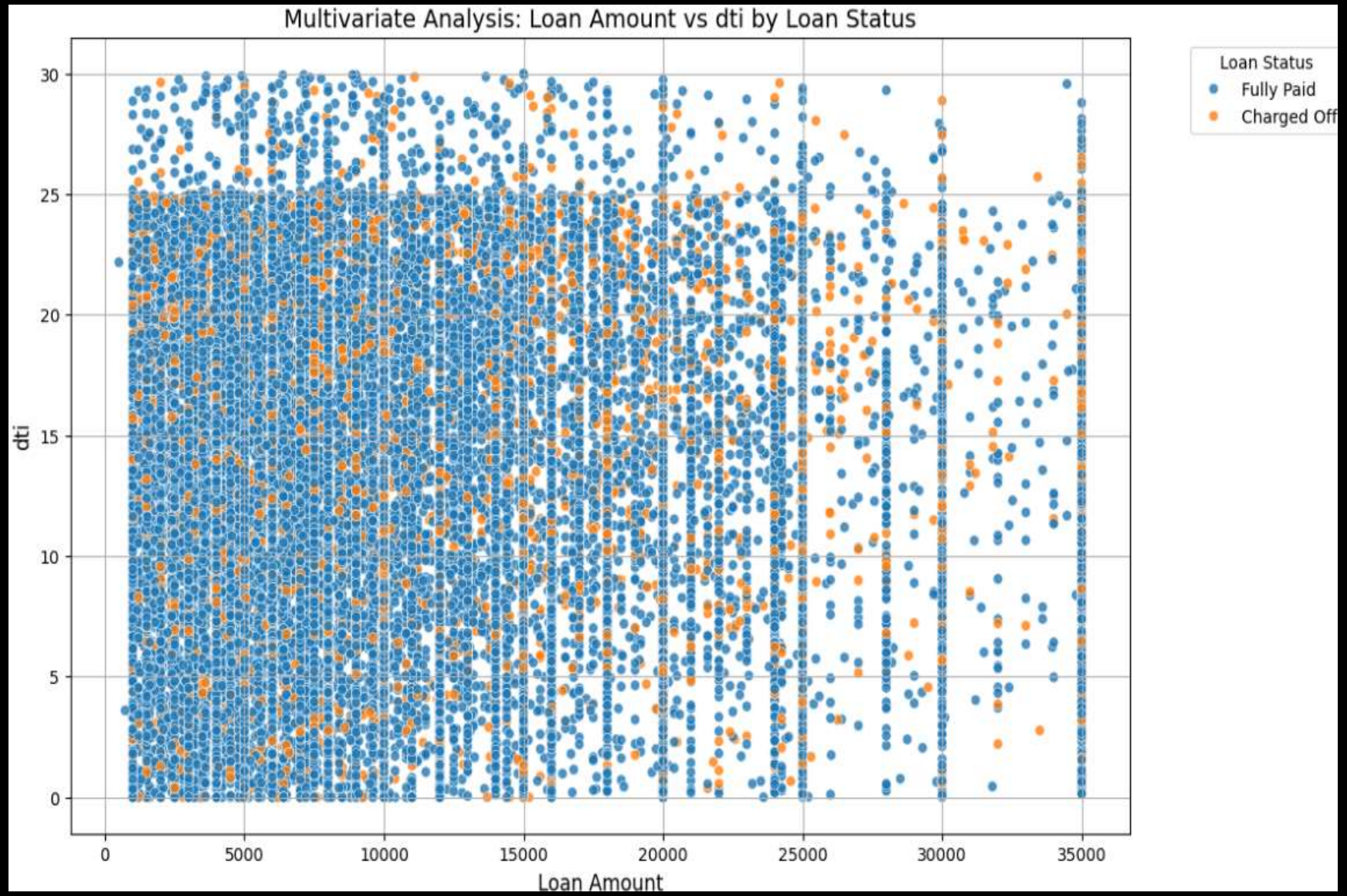
Loan Amount vs Annual Income by loan_status

- If loan amount is less and annual income is also less, people pay off loans faster.
- For loan amount more, people will start charging off loans with lesser annual income.



Loan Amount vs DTI by loan_status

- If DTI is less and loan amount is less, people tend to pay off loans.
- Similarly if Loan amount is more, people tend to charge off loans.



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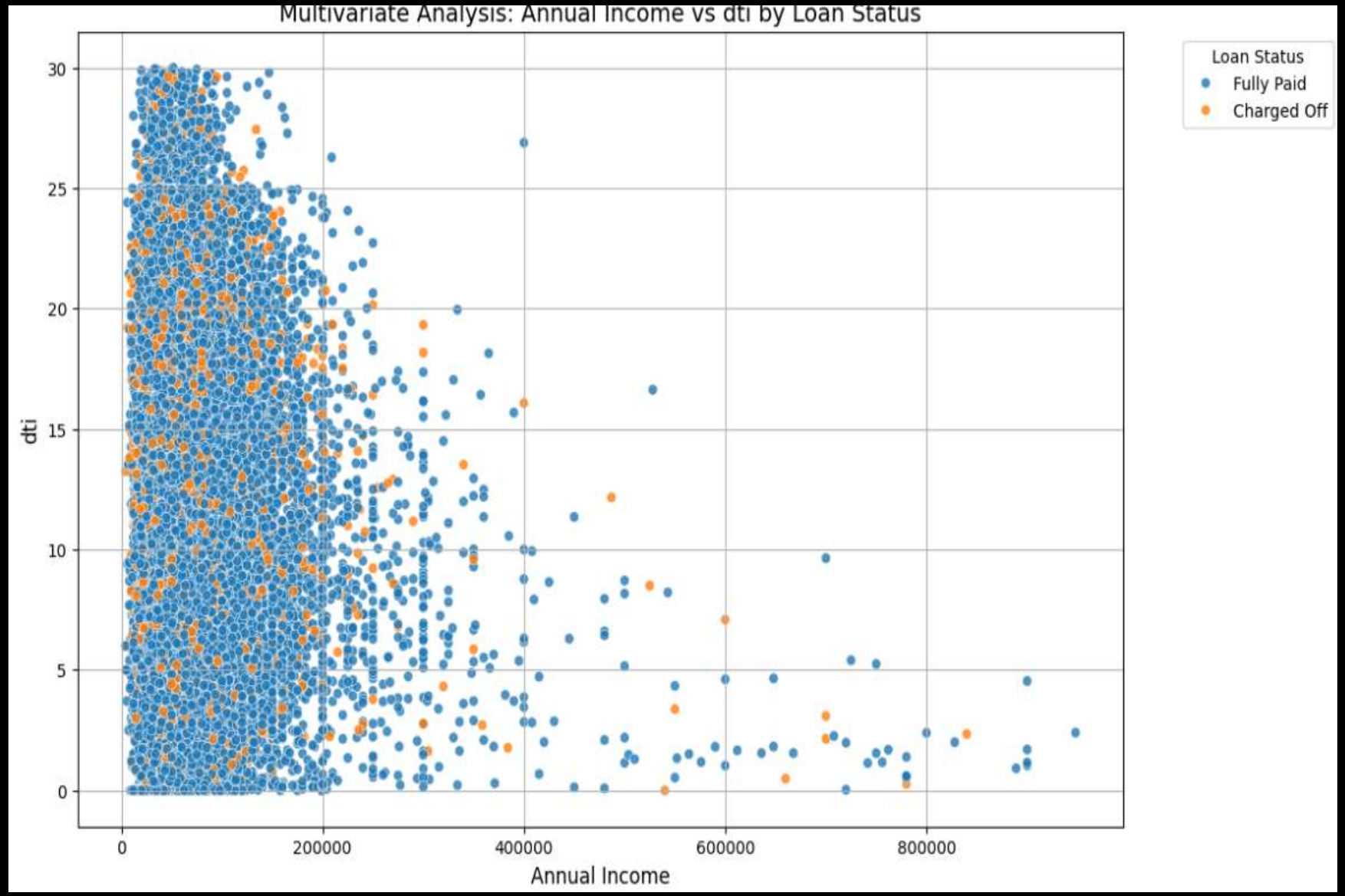
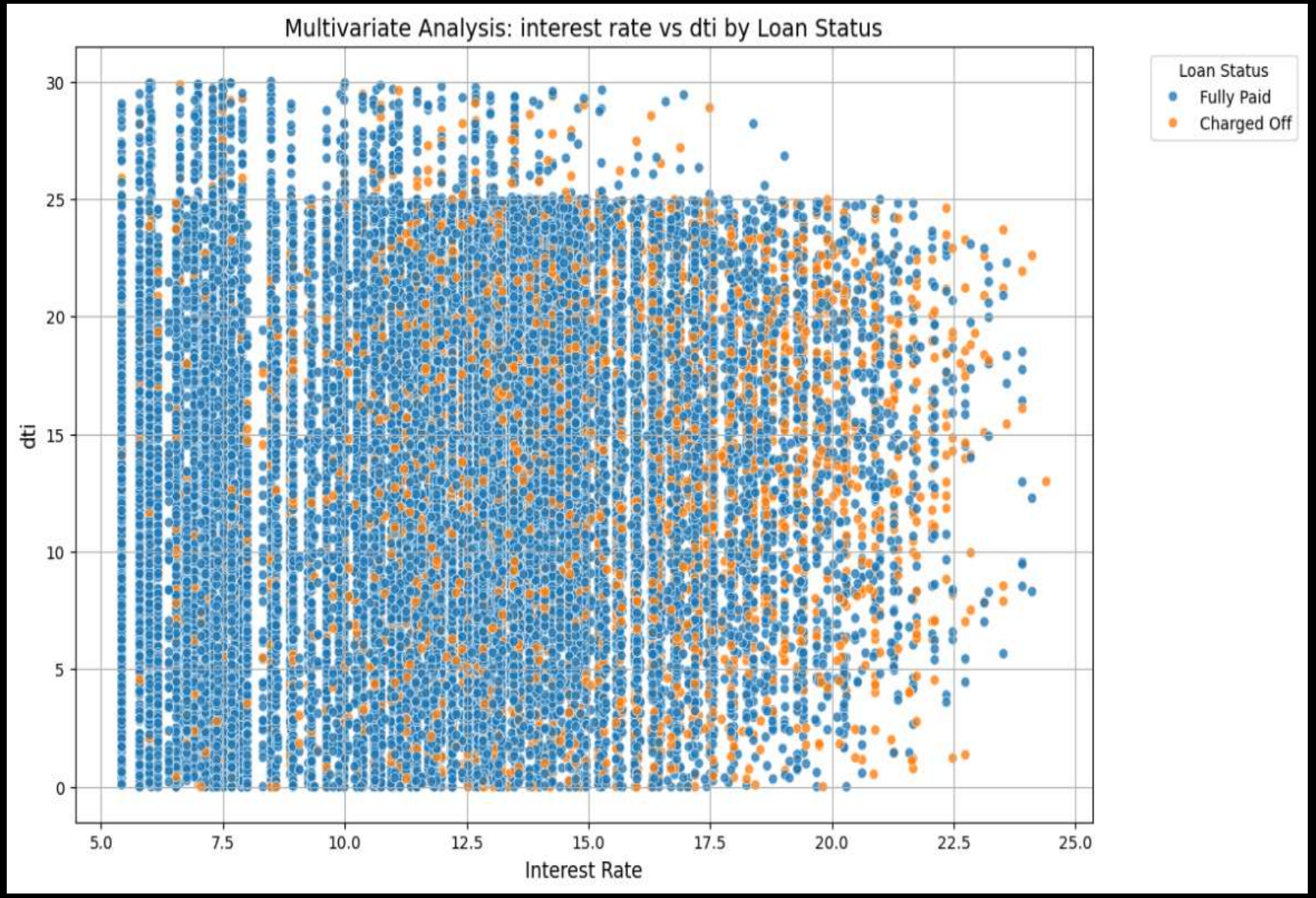
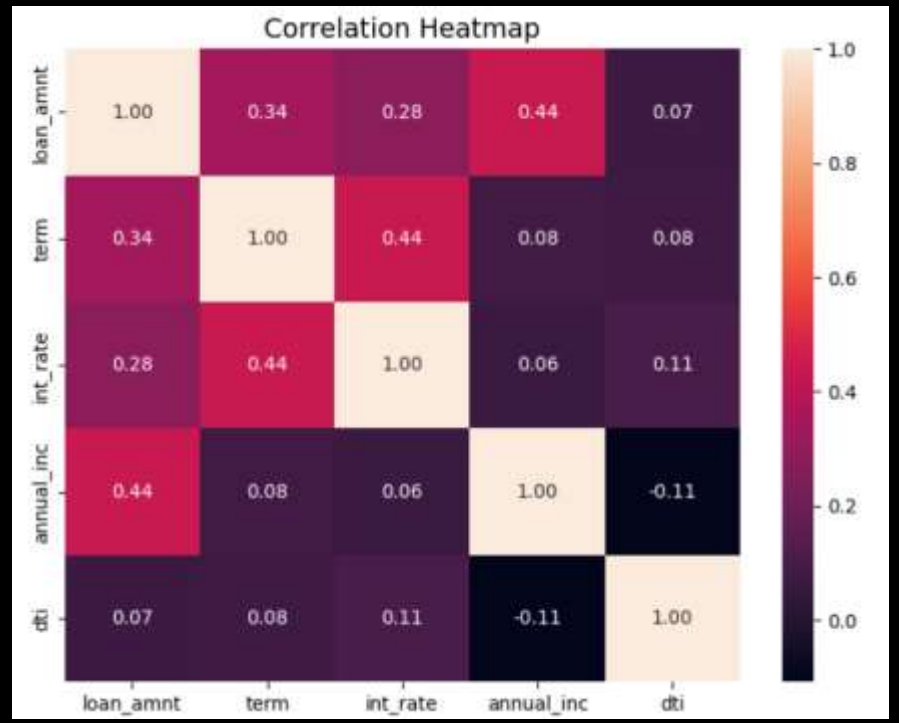


Interest rate vs DTI by loan_status

- If interest rate is less, even though with more DTI - people are paying off loans.
- If interest rate increases, even with less dti, there are more charged off cases.





Correlation between quantitative Columns

This shows that there is no much correlation between variables.

Business Recommendations

Loan Amount

Avoid Business Loss - Lend loans to people but for loans above 150000, lend only if interest rate is less and annual income is more than 80000.
Avoid Financial Loss - Lend loans with smaller amounts as there won't be much charged offs for smaller amounts.

Interest Rate

Avoid Business Loss - Lend loans with higher interest rate only when loan amount is less than 150000 and annual income is more than 80000.
Avoid Financial Loss - Lend loans with smaller interest rates as there won't be many charged offs for small interest rates.

Annual Income

Avoid Business Loss - Lend loans with less annual income only when interest rate is less, and loan amount is less

* with term as 36 months
* purpose for loan is not home_improvement, small_business and renewable_energy

Avoid Financial Loss - Lend loans with annual income more than 80000 as they will payoff loans easily.

Term

Avoid Business Loss - Lend Loans with more term only when

* interest rate is less
* loan amount is less than 15000

Avoid Financial Loss - Lend Loans with lesser term as term is more, charged offs will be more.

Grade

Avoid Business Loss - Lend Loans with Grade E, F, G only when
annual income is more
loan amount is less
Avoid Financial Loss - Lend Loans with Grade A, B, C and D as there are lesser charged offs with these Grades.

Purpose

Avoid Business Loss - Lend Loans with purpose home_improvement, small_business and renewable_energy only when

* interest rate is less
* loan amount is less than 15000
* term should be less, and DTI should be less.

Avoid Financial Loss - Lend Loans without these purposes home_improvement, small_business and renewable_energy as there are more charged offs in these cases.

DTI

Avoid Business Loss - When lending loans with high DTI consider these reasons

* lesser loan amount
* Interest rate is less.
* Grade should be A or B, Term has to be 36 months.

Avoid Financial Loss - Lend loans to people only with lesser DTI as if the DTI is more, there will be more charged offs.

Issued_Months

Avoid Business Loss - When lending loans from January - April consider these factors.

* Loan amount should be minimum and Annual income should be more.
* Term should be 36 months and Interest rate should be less.
* Grade should be A or B.

Avoid Financial Loss - Lend loans in the months from September to December as there will be lesser charged offs in such cases.

Thank you