Lending Club Case Study

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Introduction

- The consumer finance industry faces risks when deciding to approve or reject loan applications based on applicant profiles.
- Two major risks are associated with loan decisions:
 - 1. Loss of business if a reliable borrower is denied a loan.
 - 2. **Credit loss** if a borrower defaults after approval.
- The dataset contains past loan applicant data, focusing on those who defaulted, which is critical for identifying high-risk borrowers.
- The analysis aims to identify factors that indicate whether a borrower is likely to default, helping reduce credit losses.
- By identifying risky applicants, the company can:
 - 1. Reject or minimize high-risk loans.
 - 2. Offer higher interest rates for riskier borrowers

Problem Solving Methodology:

Understanding the features and data: Explored the dataset to comprehend the features and their significance.

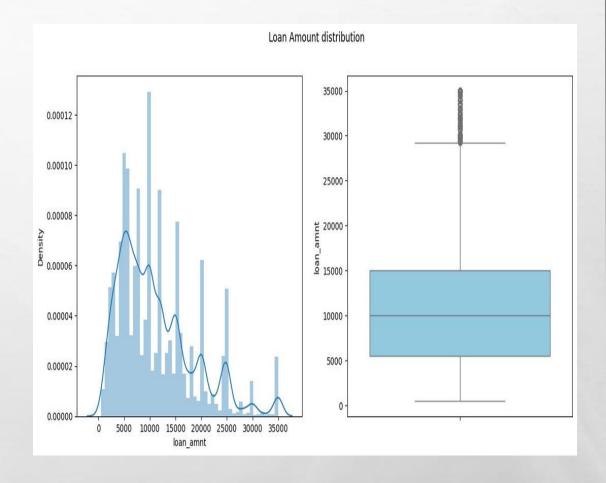
Cleaning the data: Handled missing values, and outliers, and ensured data consistency for accurate analysis.

Univariate analysis: Analyzed the frequency distribution of each feature to understand individual characteristics.

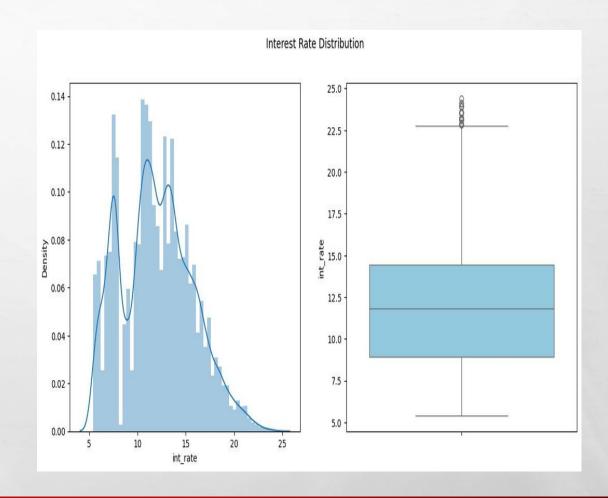
Segmented univariate analysis: Performed targeted univariate analysis to explore feature distributions within specific categories.

Bivariate analysis: Examined the relationships and correlations between two features to identify patterns. **Drawing inferences:** Derived insights based on the analysis to identify key factors influencing loan default.

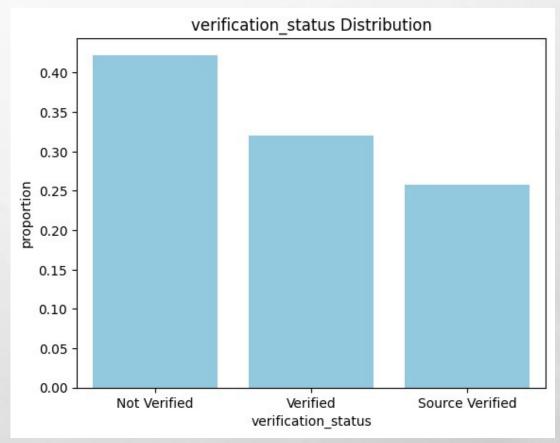
- As we see, the distribution of loan amount follows the Gaussian curve which is right-skewed.
- Majority of the customers are having a loan amount of around 10000 and the rest of the people are also having more than 10000



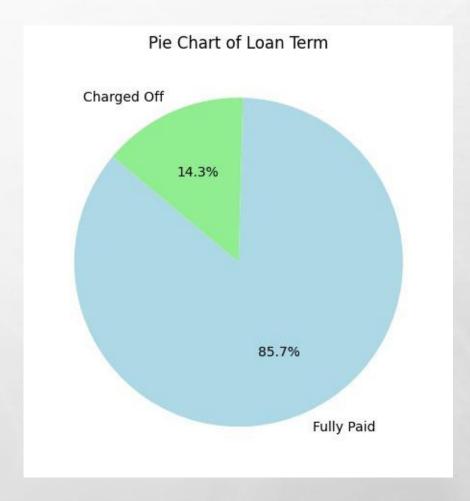
- Based on the analysis of the two plots, we can conclude that the majority of interest rates fall within the range of 9% to 14.5%, with a median rate of approximately 12.5%.
- A small number of borrowers, however, took loans with significantly higher interest rates, reaching up to 22.5%.



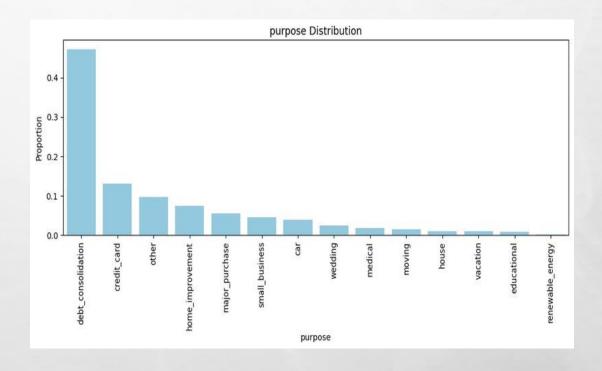
- As we can observe, the majority of the customer got their loan sanctioned from Lending Club with proper background verification.
- More than 40% of the customers were grated the loans without verification, which can cause the more defaulters and credit loss to the company



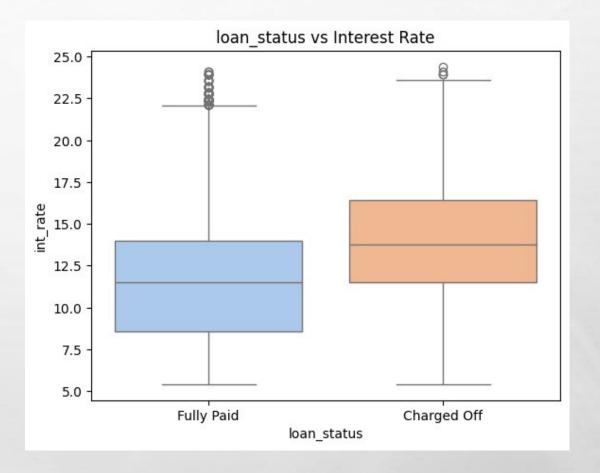
• As we can observe, 85.7% of borrowers paid the loan fully, where 14.3% are defaulted the loan.



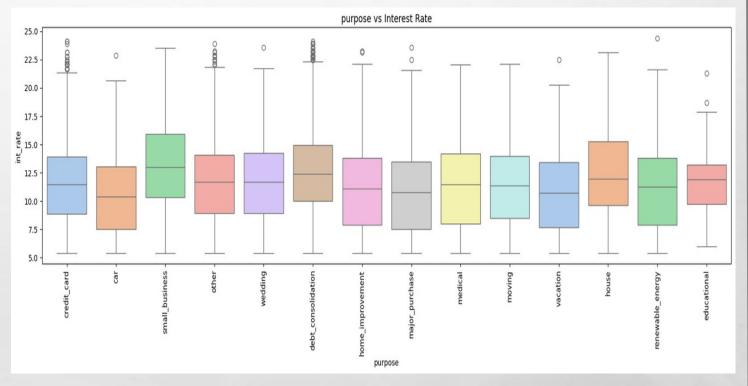
• Customers who are having the loan purpose as debt consolidation have the higher take followed by the credit card holders and home improvements



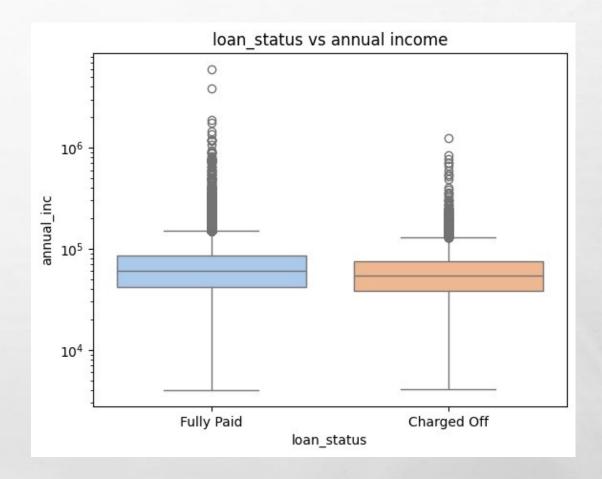
- We can infer that the customers who have high interest rates have been prone to default on the loan with most of the interest rates being around 14%
- While the customers who are having lesser interest rates are able to clear the loans.



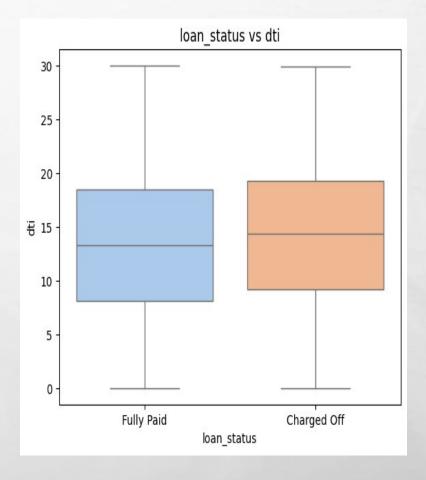
- Customers for the loan purposes like small business, debt consolidation and house loans have higher interest rates than others.
- Also, a good volume of customers has taken the higher interest loans who are having debt consolidation and credit card



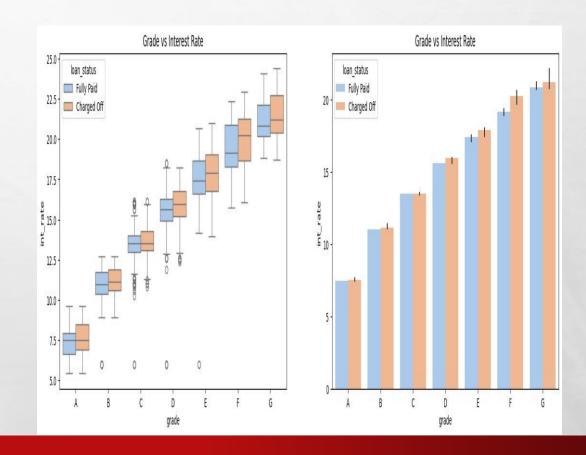
- Customers having a higher annual income can successfully repay the loan.
- While customers who have less annual income are prone to default on the loan.



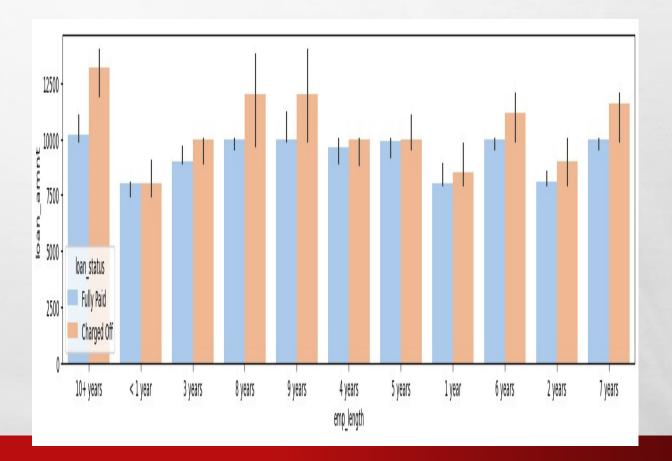
- Although it's not too significant and evident from dti feature, but there is a slight indication that customers having more dti have more chances to default on the loan.
- Customers having relative lesser dti are able to close the loan payment successfully.



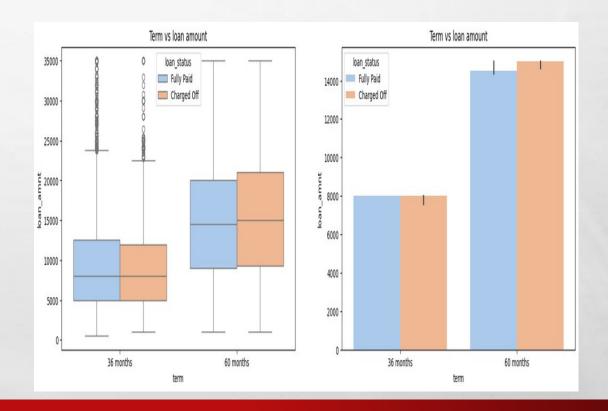
- As the grade of the customer increases, the interest also linearly increases with in turn leads to a higher rise in the defaulter's chances.
- Customer having A, B and C grades can clear the loans with fewer loan default rate



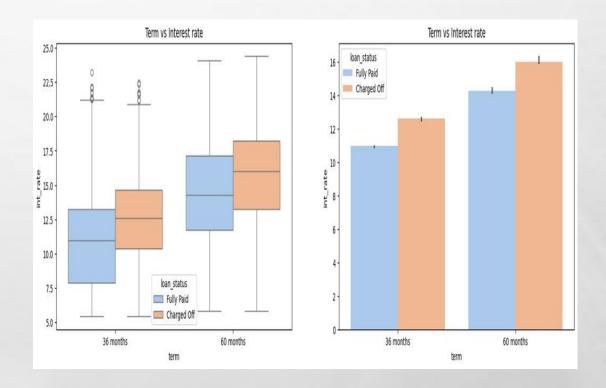
- Customers with high employment length have defaulted the loan more than less employment lengths.
- Shorter loan tenures make is yielding the good loan recovery and good credit maintenance for the company.



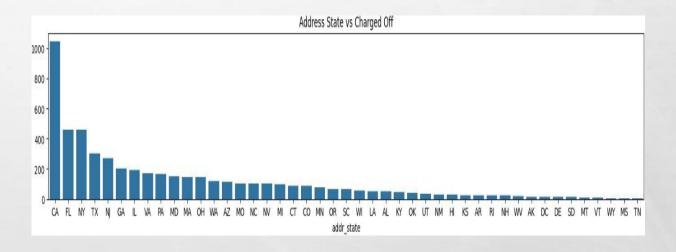
- Customers with short term were able to clear the loan amount effectively.
- The customers who are having higher term loan payments are subjected to default on the loan.



- Customers who opted to clear the loan for higher terms are subjected by the company to pay the higher interest rates.
- This has counter-fired as many of the customers have defaulted on the loan because of the higher interest rates and higher term.



• It's evident that customers from the CA, FL, and NY have a very high charged Off compared to customers from the other states.



										Со	rrelati	on bet	ween	Colum	ns									
loan_amnt -	1	0.98	0.95	0.3	0.93	0.27	0.13	0.06	-0.035	-0.18	0.011	0.17	-0.047	0.32	0.061	0.26	0.88	0.86	0.48	-0.032	-0.12	0.12	-0.0087	-0.18
funded_amnt -	0.98		0.97	0.3	0.96		0.14	0.06	-0.035	-0.17	0.011	0.17	-0.048		0.065	0.25	0.9	0.88		-0.033	-0.035	0.13	0.0011	-0.17
funded_amnt_inv -	0.95	0.97		0.29	0.92	0.26	0.23	0.063	-0.039	-0.16	0.00016	0.16	-0.052		0.068	0.24	0.89	0.91		-0.038	0.14	0.22	0.0035	-0.16
int_rate -	0.3	0.3	0.29	1	0.28	0.048	0.033	0.11	0.16	0.11	0.14	0.0086	0.099	0.096	0.46	-0.046	0.29	0.28	0.17	0.083	0.0032	0.026	0.032	0.11
installment -	0.93	0.96	0.92	0.28	1		0.069	0.05	-0.023	-0.16	0.009	0.17	-0.043		0.091	0.23	0.86	0.83		-0.029	-0.037	0.061-	0.00088	-0.16
annual_inc -			0.26	0.048	0.27	1	0.017	-0.12	0.021	-0.18	0.035	0.16	-0.014		0.016	0.24	0.26	0.25	0.14	-0.012	-0.03	0.015	-0.0033	-0.18
issue_d -	0.13	0.14	0.23	0.033	0.069	0.017	1	0.081	0.00019	0.059	-0.051	0.015	-0.024	-0.0036	0.075	0.042	0.12	0.2	0.14	-0.011	0.45	0.94	-0.024	0.06
dti -	0.06	0.06	0.063	0.11	0.05	-0.12	0.081	1	-0.035	-0.037	0.00067	0.29	-0.0054	0.23		0.23	0.058	0.06	0.0077	0.0064	0.014	0.081	0.0028	-0.037
delinq_2yrs -	-0.035	-0.035	-0.039	0.16	-0.023	0.021	0.00019	-0.035	1	-0.064	0.0084	0.011	0.011	-0.056	-0.044	0.067	-0.025	-0.03	-0.013	0.0058	-0.0085	0.0043	0.011	-0.065
earliest_cr_line -	-0.18	-0.17	-0.16	0.11	-0.16	-0.18	0.059	-0.037	-0.064	1	-0.015	-0.21	-0.04	-0.24	0.036	-0.35	-0.16	-0.15	-0.066	-0.049	0.067	0.054	0.0029	1
inq_last_6mths -	0.011	0.011	0.00016	0.14	0.009	0.035	-0.051	0.00067	0.0084	-0.015	1	0.094	0.023	-0.025	-0.07	0.12	-0.0088	-0.016	0.028	0.014	-0.041	-0.059	-0.0019	-0.014
open_acc -	0.17	0.17	0.16	0.0086	0.17	0.16	0.015	0.29	0.011	-0.21	0.094	1	0.0034	0.29	-0.088	0.69	0.16	0.15	0.08	0.0091	-0.04	0.015	-0.0019	-0.21
pub_rec -	-0.047	-0.048	-0.052	0.099	-0.043	-0.014	-0.024	-0.0054	0.011	-0.04	0.023	0.0034	1	-0.059	0.057	-0.02	-0.05	-0.053	-0.034	0.84	-0.017	-0.016	0.0014	-0.04
revol_bal -	0.32			0.096			-0.0036	0.23	-0.056	-0.24	-0.025	0.29	-0.059	1	0.3	0.31			0.13	-0.047	-0.071	-0.0085	-0.0048	-0.24
revol_util -	0.061	0.065	0.068	0.46	0.091	0.016	0.075		-0.044	0.036	-0.07	-0.088	0.057	0.3	1	-0.069	0.073	0.075	-0.018	0.06	0.026	0.062	0.00061	0.036
total_acc -	0.26	0.25	0.24	-0.046	0.23	0.24	0.042	0.23	0.067	-0.35	0.12	0.69	-0.02		-0.069	1	0.22	0.22	0.17	-0.0067	-0.035	0.043	-0.0043	-0.35
total_pymnt -	0.88	0.9	0.89	0.29	0.86	0.26	0.12	0.058	-0.025	-0.16	-0.0088	0.16	-0.05		0.073	0.22		0.98		-0.039	-0.0021	0.12 -	0.00022	-0.16
total_pymnt_inv -	0.86	0.88	0.91	0.28	0.83	0.25	0.2	0.06	-0.03	-0.15	-0.016	0.15	-0.053		0.075	0.22	0.98	1	0.5	-0.043	0.14	0.19	0.0025	-0.15
last_pymnt_amnt -	0.48	0.48	0.47	0.17	0.41	0.14	0.14	0.0077	-0.013	-0.066	0.028	0.08	-0.034	0.13	-0.018	0.17	0.51	0.5	1	-0.023	-0.0055	0.13	-0.012	-0.066
pub_rec_bankruptcies -	-0.032	-0.033	-0.038	0.083	-0.029	-0.012	-0.011	0.0064	0.0058	-0.049	0.014	0.0091	0.84	-0.047	0.06	-0.0067	-0.039	-0.043	-0.023	1	-0.021	-0.0032	0.0038	-0.048
approved_loan_amnt_ratio -																						0.46	0.033	0.067
issue_d_year -																						1		0.055
issue_d_weekday -																							1	0.003
earliest_cr_line_year -	-0.18	-0.17	-0.16	0.11	-0.16	-0.18	0.06	-0.037	-0.065	1	-0.014	-0.21	-0.04	-0.24	0.036	-0.35	-0.16	-0.15	-0.066	-0.048	0.067	0.055	0.003	1
	loan_amnt -	funded_amnt -	funded_amnt_inv -	int_rate -	installment -	annual inc -	- p anssı	- ig	deling_2yrs -	earliest_cr_line -	ing_last_6mths -	- oben acc	- bnp rec -	revol_bal -	revol_util -	total_acc -	total_pymnt -	total_pymnt_inv -	last_pymnt_amnt -	pub_rec_bankruptcies -	approved_loan_amnt_ratio -	issue_d_year -	issue_d_weekday -	earliest_cr_line_year -

- 0.8

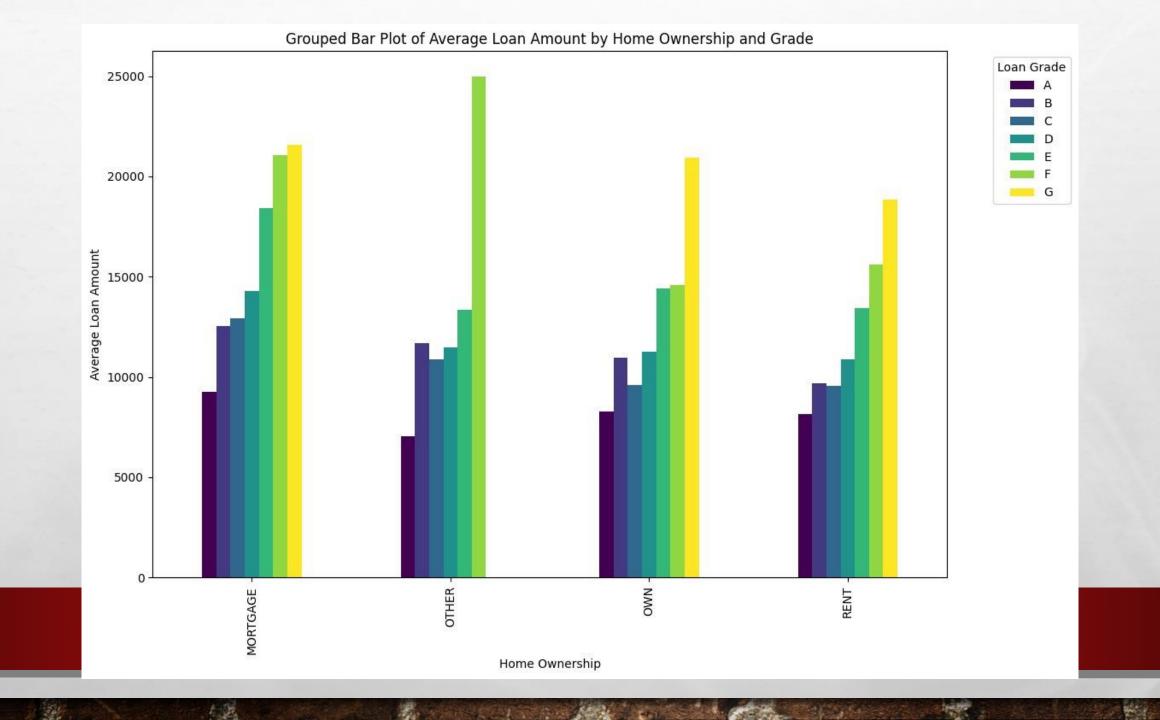
- 0.6

- 0.4

- 0.2

- 0.0

- -0.2



1. Strong Positive Correlations:

Loan Amount, Funded Amount Inv: These variables are highly correlated, as expected since they represent different aspects of the loan amount.

Total Payment, Total Payment Inv: Similarly, these variables are strongly correlated, indicating a direct relationship between the total amount paid and the total amount invested.

2. Moderate Positive Correlations:

Loan Amount, Interest Rate: There's a moderate positive correlation, suggesting that larger loans might have higher interest rates.

Installment, Loan Amount: A larger loan amount typically corresponds to higher installments.

3. Weak or No Correlations:

Public Records Bankruptcies, Interest Rate: There's a weak correlation or no correlation between these variables, indicating that bankruptcy history doesn't significantly influence interest rates.

4. Specific Observations:

Interest Rate: While it has moderate positive correlations with loan amount and installment, it doesn't seem to be strongly correlated with other variables.

Delinquency: Delinquency (delinq 2yrs) doesn't have strong correlations with most other variables, suggesting it might be a relatively independent factor.

Public Records Bankruptcies: As mentioned earlier, it doesn't seem to be strongly correlated with interest rates.

Conclusions:

- The Lending Club should exercise heightened caution when offering loans to small businesses, as they have a higher likelihood of default.
- It is advisable not to issue loans with a repayment tenure exceeding 8 years, as shorter terms are more effective in ensuring loan recovery.
- Special attention should be given to applicants from California (CA), Florida (FL), and New York (NY), as these states exhibit higher default rates.
- The company must maintain tight control over interest rates, as higher rates tend to increase the risk of default, leading to significant credit losses.
- A robust customer verification process is critical. Unverified applicants have shown a significantly higher tendency to default on their loans.
- Borrowers in lower credit grades, particularly F and G, should be closely monitored, as they are more likely to default.