



LENDING CLUB CASE STUDY ASSIGNMENT SUBMISSION

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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). 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'.





Objectives

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.

Identify the factors influencing Charged Off loans.

Identify loan patterns using Exploratory Data Analysis





Assumptions

Analysis done for data between the years 2007 & 2011.

We only consider Charged Off & Fully Paid Loans.

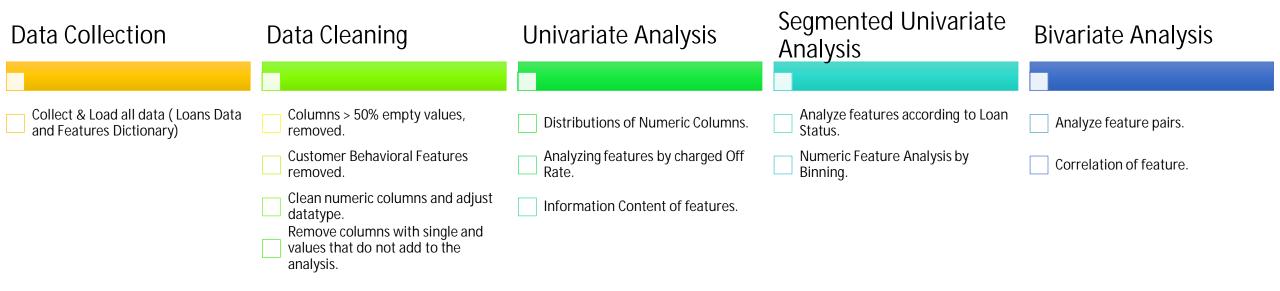
Customers Behavior Variables are ignored for analysis.

The Grades are assumed to be in order A > B > C > D > E > F > G





Analysis Methodology







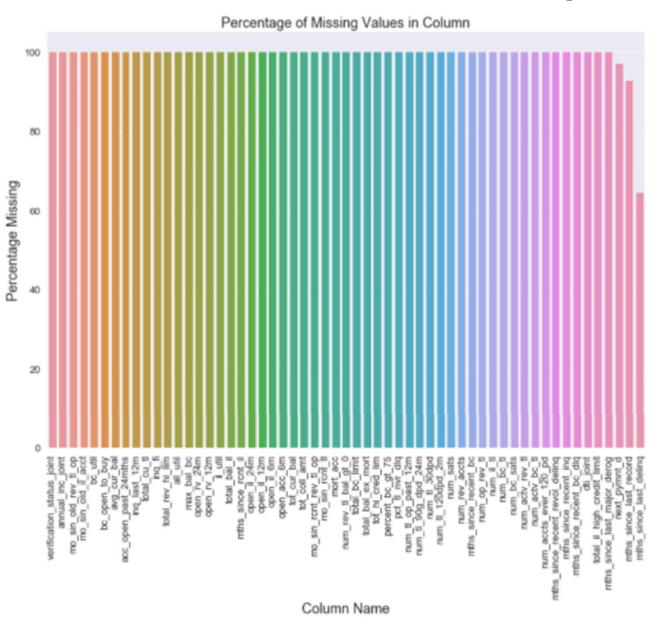
Data Cleaning

There are 111 columns and 39716 rows in the dataset.

There are several columns which have either entirely empty or have majorly Empty values.

Remove columns > 50% missing value for analysis.

Remove Customer Behavior columns .







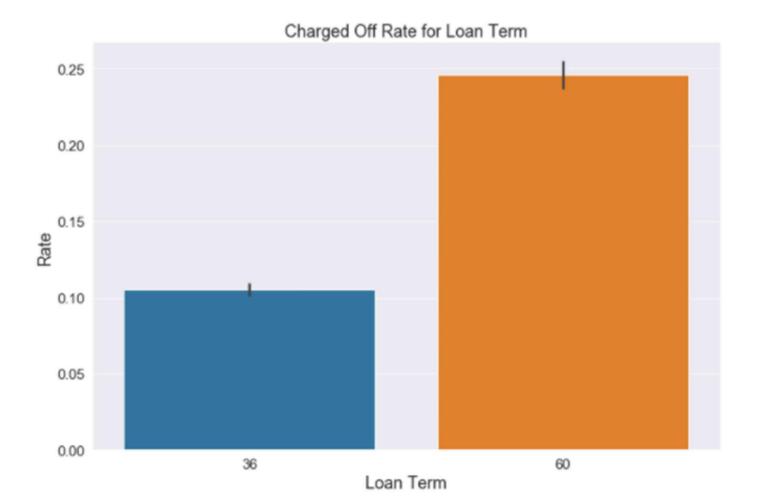
Univariate Analysis





Loan Term

Charged Off rate is more in case of 60 Months duration loan tenure.

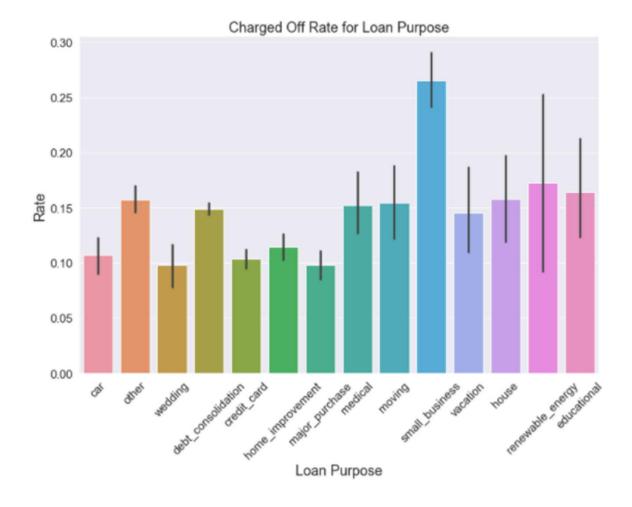






Loan Purpose

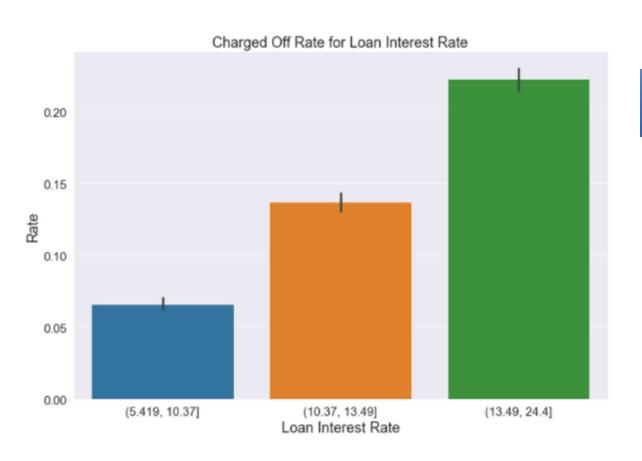
Loans that are being availed for Small Businesses, renewable energy, Debt Consolidation, housing and education have a higher charged off rate.







Loan Interest Rate

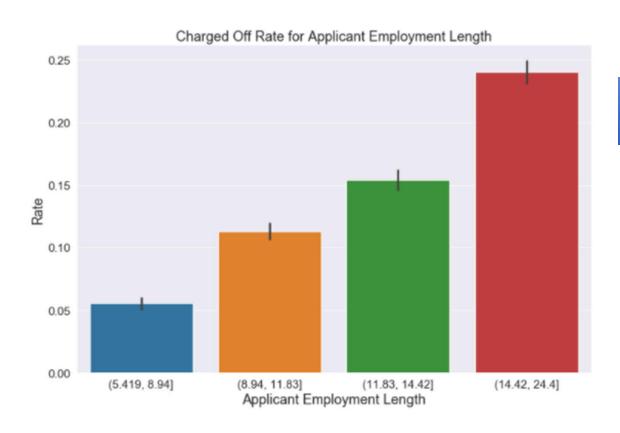


The higher the interest rate the higher the chances of the loan getting charged off.





Applicant Employment Length

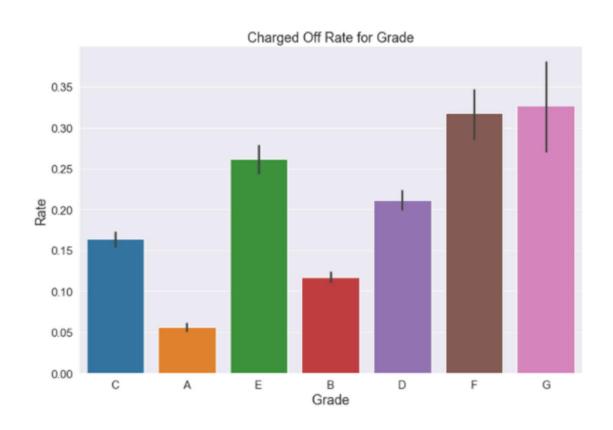


As the employment length among the applications is increasing the charge off rate also seems to increase.





Loan Grade



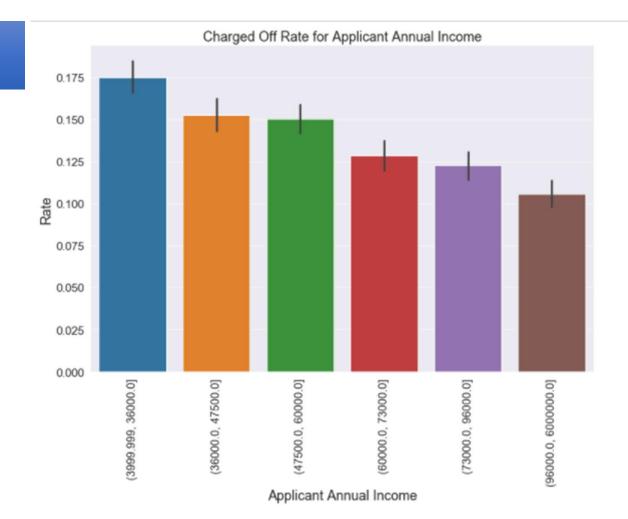
Grades D,E,F,G have higher charged off rates than the other grades.





Applicant Annual Income

There are evidences of higher Charged Off Rate in case of lower income brackets.





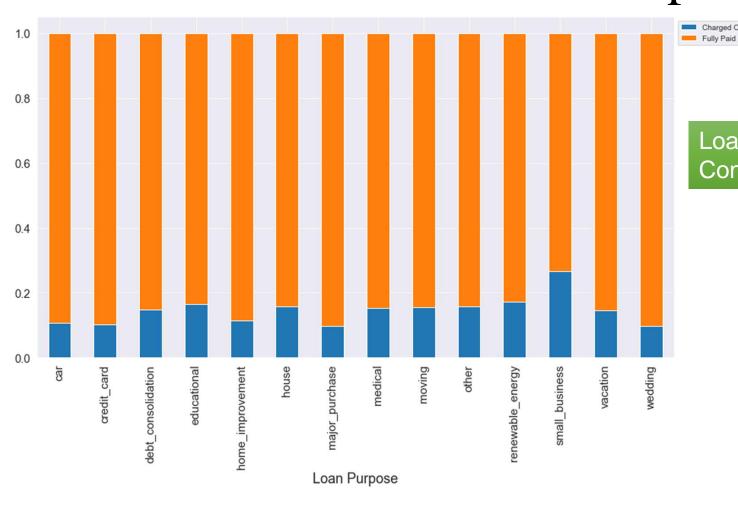


Segmented Univariate Analysis





Loan Status vs Loan Purpose



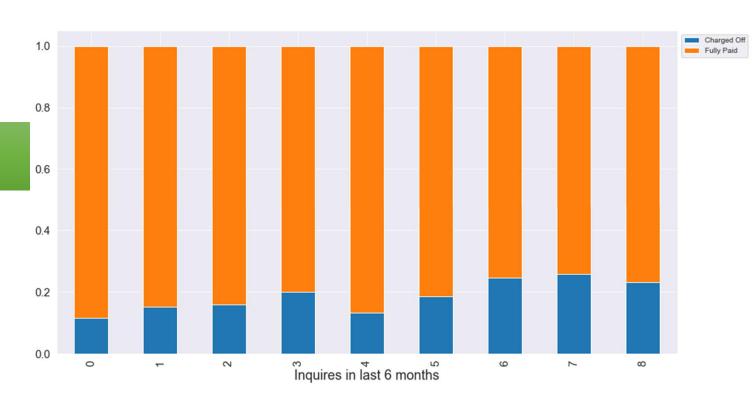
Loans taken for Small Business and Debt Consolidation have higher charged off rate.





Loan Status vs Inquiries in Last 6 Months

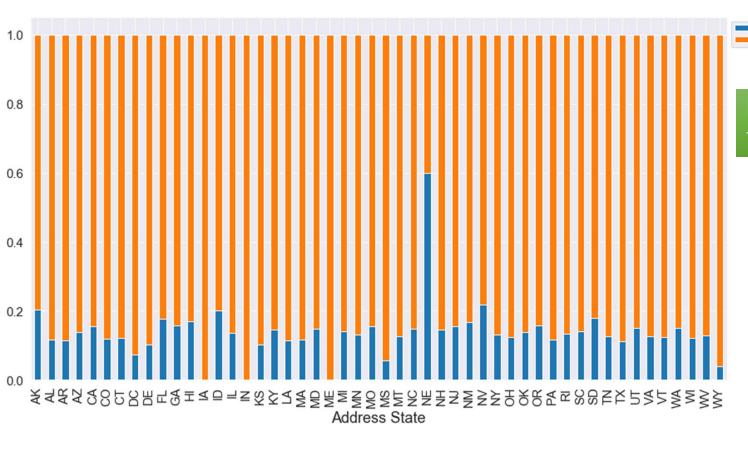
Higher the no of inquiries within the last 6 months, higher is the chance of the loan getting charged off.







Loan Status vs Address State



Fully Paid

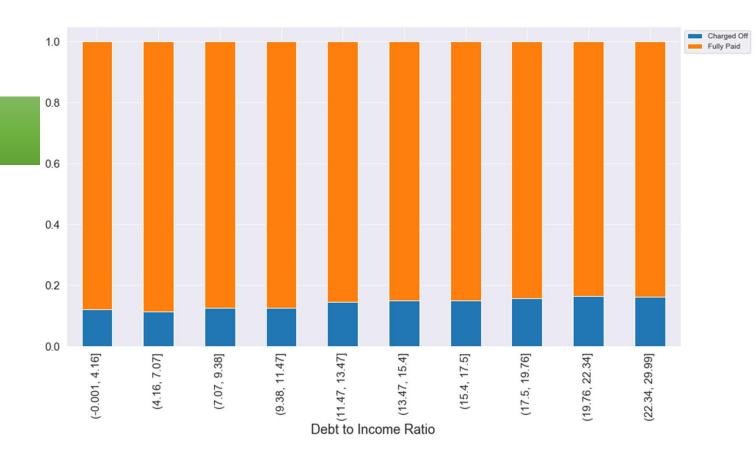
Nebraska(NE) has the highest charged off loans followed by Nevada(NV) and Alaska(AK).





Loan Status vs Debt to Income Ratio

The loan defaulting status slowly increases with the increase in one's debt-to-income ratio.





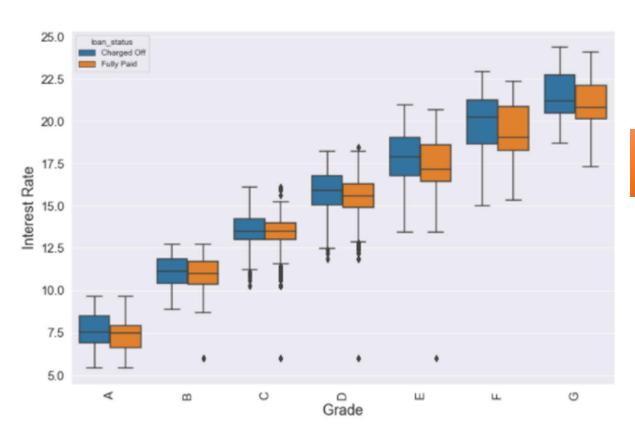


Bivariate Analysis





Percentage of Charged Off Loans



This makes it clear that as the Grades change from good to bad the interest rate also increases



Correlation between Features



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loan_amnt	4,	1.	0.9	0.9	0.3	0.06	0.01	0.2	-0.05	0.3	0.07	0.1	0.05
funded_amnt	4	2.	1	1	0.3	0.06	0.01	0.2	-0.05	0.3	0.06	0.1	0.04
funded_amnt_inv	0.9	4	i	0.9	0.2	0.07	-0.004	0.2	-0.05	0.3	0.04	0.3	0.07
installment	0.9	4	0.9	1	0.3	0.05	0.01	0.2	-0.04	0.3	0.03	0.06	0.03
annual_inc	0.3	0.3	0.2	0.3	1	-0.1	0.04	0.2	-0.01	0.05	-0.04	0.01	0.007
dti	0.06	0.06	0.07	0.05	-0.1	,	0.003	0.3	-0.006	0.1	0.05	0.09	0.01
inq_last_6mths	0.01	0.01	-0.004	0.01	0.04	0.003	1	0.09	0.02	0.1	0.07	-0.06	0.01
open_acc	0.2	0.2	0.2	0.2	0.2	0.3	0.09	(1)	0.003	0.01	-0.002	0.01	0.002
pub_rec	-0.05	-0.05	-0.05	-0.04	-0.01	-0.006	0.02	0.003	1	0.1	0.05	-0.01	-0.02
int_rate_cleaned	0.3	0.3	0.3	0.3	0.05	0.1	0.1	0.01	0.1	14	0.2	0.04	0.03
loan_status_mapped	0.07	0.06	0.04	0.03	-0.04	0.05	0.07	-0.002	0.05	0.2	ï	0.02	0.03
issue_year	0.1	0.1	0.3	0.06	0.01	0.09	-0.06	0.01	-0.01	0.04	0.02	Ť	-0.03
issue_month	0.05	0.04	0.07	0.03	0.007	0.01	0.01	0.002	-0.02	0.03	0.03	-0.03	1
	loan_amnt	Inded_amnt	d_amnt_inv	installment	annual_inc	įŧ	last_6mths	open_acc	pub_rec	ate_cleaned	ns_mapped	issue_year	ssue_month

Few features that are positively correlated with each other are Loan Amount, Funded Amount ,Funded Amount Invoice and Installment.

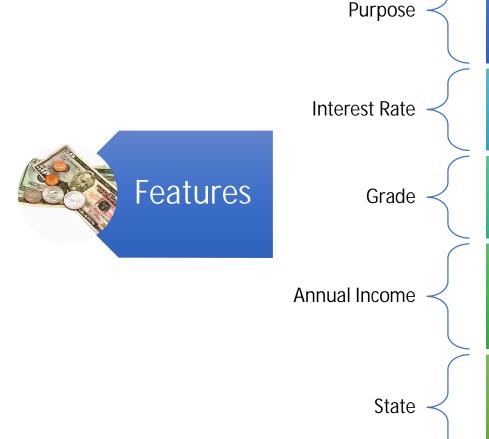




Summary

The key variables or features as per our analysis are as follows as well as our recommendations to keep a

check on bad loans.



- Applicants borrow money for several reasons but money borrowed for Small Business and Debt Consolidation are often charged off.
- Lending Club might charge more interest rate on these loans or perform stricter background verification on these loans applications.
- It was seen that higher interest attracts more charge off cases.
- Lending Club might optimize the process by only providing short term loans for these cases.
- For loans categorized with grades E,F,G have higher charge off rates.
- These loans might need more verification and customized payment plans for minimizing the risk of charge offs.
- Lower Annual Income brackets have higher charge off rates in comparison to Higher income applicants.
- LC should keep a check on the approved loan amount and optimize the interest rate for such loans.
- States such as Nebraska(NE), Nevada(NV) and Alaska(AK) have high charge off rates.
- LC should do thorough verification and decide on the approved loan amount among other things