Landing Club Case Study

How Finance Company analyzed & mitigated lending risks for loans

22nd Sep 2024

Case Study Objective

Business	Context	Problem statement
Consumer Finance company deals in various types of Loan facilities to urban customers pertaining to different purposes.	At loan approval stage, business carries significant risks **False Negative** Applicants likely to repay loan but not approving loan. **False Positive** Applicants not likely to repay loan but approving loan.	Based on historical data trend, company is looking to **improve the decision making** process to **mitigate risks** resulting in either **business loss or financial loss** to the institution.

Data Understanding, Cleaning & Manipulation

Source Loan Dataset (2007 - 2011)

Features : 111
Records: 39717

Inference : Loan Status

Data Wrangling Considerations

Feature Level

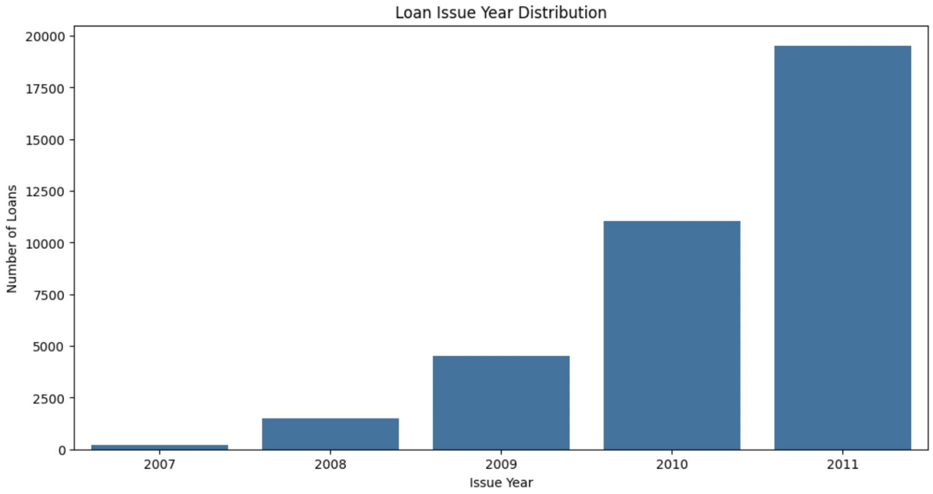
- There are quite a few columns with Null values. Dropped all columns with missing 2/3rd of data.
- Remove single-valued columns.
- Removed dependent variables using correlation metric.
- Columns formatting with data type correction (Interest Rate, Revolving utilization rate)
- Handle Outliers (Annual Income)
- Identified significant columns based of business knowledge
- Derived new columns (Loan_issue_month, Loan_issue_year, installment_to_monthly_income_ratio)

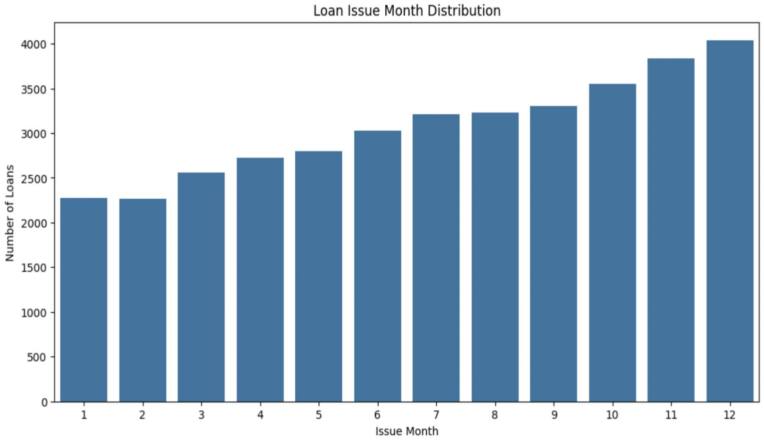
Records Level

- There are none rows with all Null values.
- There are no duplicate rows.
- Segmented dataset for closed loans (load status includes 'Fully Paid' & 'Charged Off')

Data Analysis

Univariate Analysis





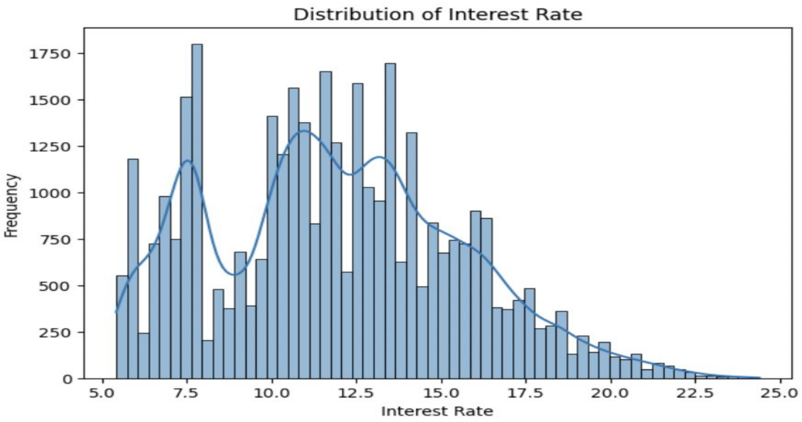
Observations

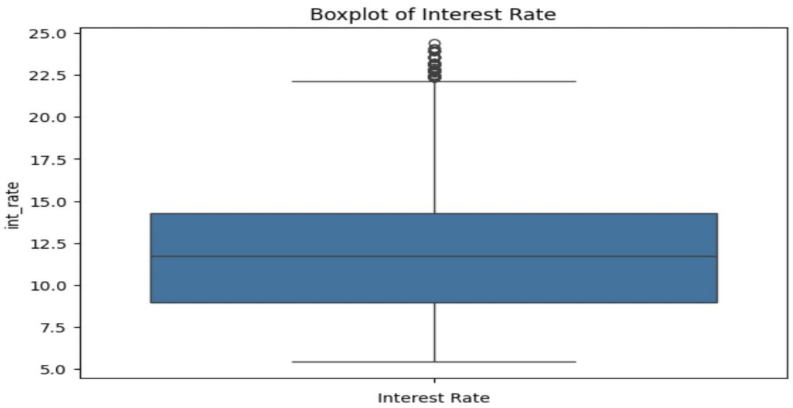
- Based on derived variable **Loan Issue Year vs Loan count**, it is clear that loan lending business have increased multifolds from 2007 till 2011.
- This inorganic growth may been due to **US Great Recession** and hence lending business during this time period Reference link
- Based on derived variable **Loan Issue Month vs Loan count**, there is also **seasonality** in lending business. It is high during Year end for festive period (Christmas, New Year).

Inference

- Lending business grew multifolds during US recession from 2007 till 2011.
- It is seasonal business with spikes during holiday and Festive season.

Univariate Analysis





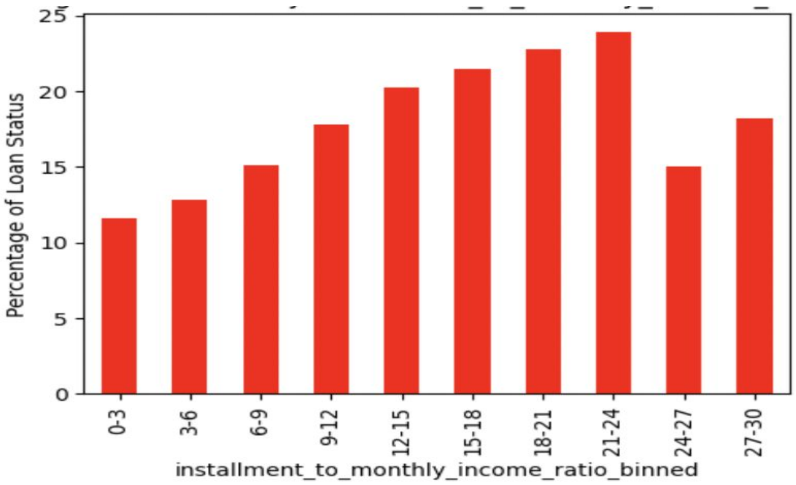
Observations

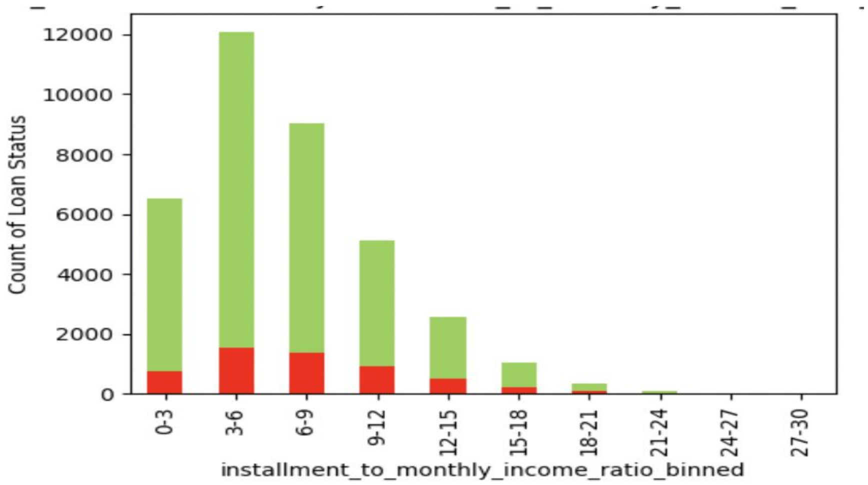
- Based on **Interest Rates vs Frequency**, it is clear that interest rates have **IQR 8.9% - 14.2 %** with **mean 11.8%** & **median 11.7%**
- Countplot shows right skewed distribution and same is visible from outliers in boxplot

Inference

- Though Interest rates are mostly focussed b/w **11% - 12 % range** with some outliers making it **right skewed** distribution.

Bivariate Analysis





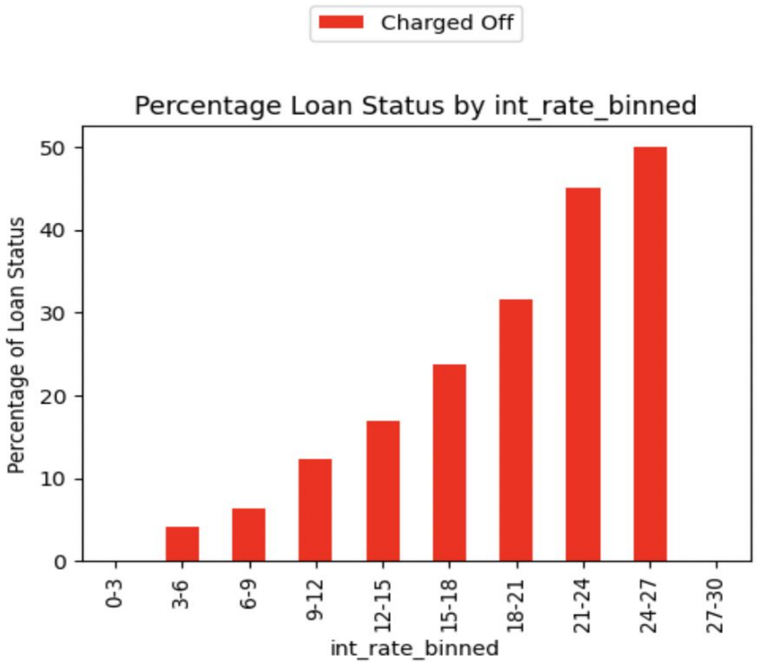
Observations

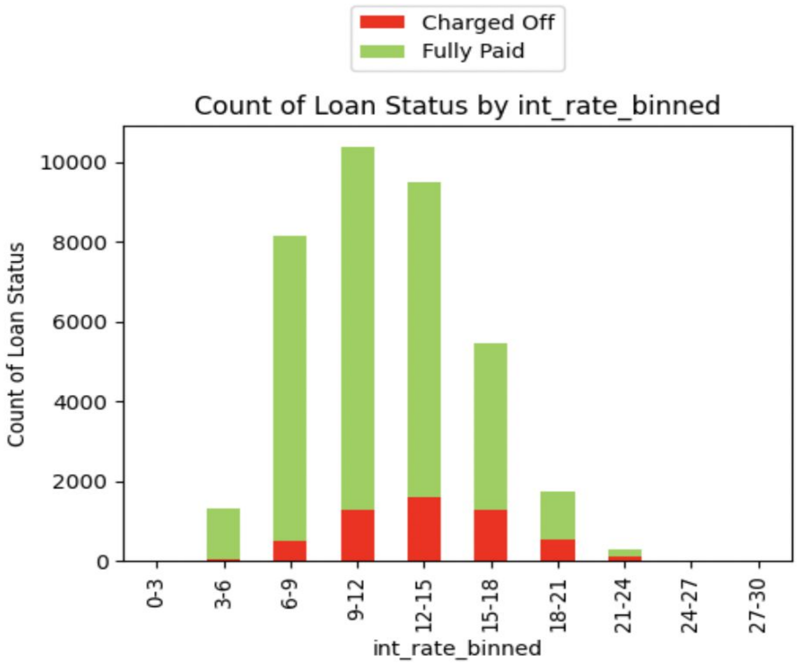
With higher **installment to monthly income** ratio, it is clear that loan defaults have been increasing.
It must be due to the fact applicant is not able to pay back due to constrained monthly income as compared to monthly installment value.
There is some decrease towards the extreme right bins, should be due to fact that they are very less number of loans on that bin category.

Inference

It is better to keep **loans for higher terms** (60 months) to keep installment to monthly income ratio in control.

Bivariate Analysis





Inference

There is clear impact of interest rates on Loan Defaults. With higher interest rates, loan defaults have been increasing.

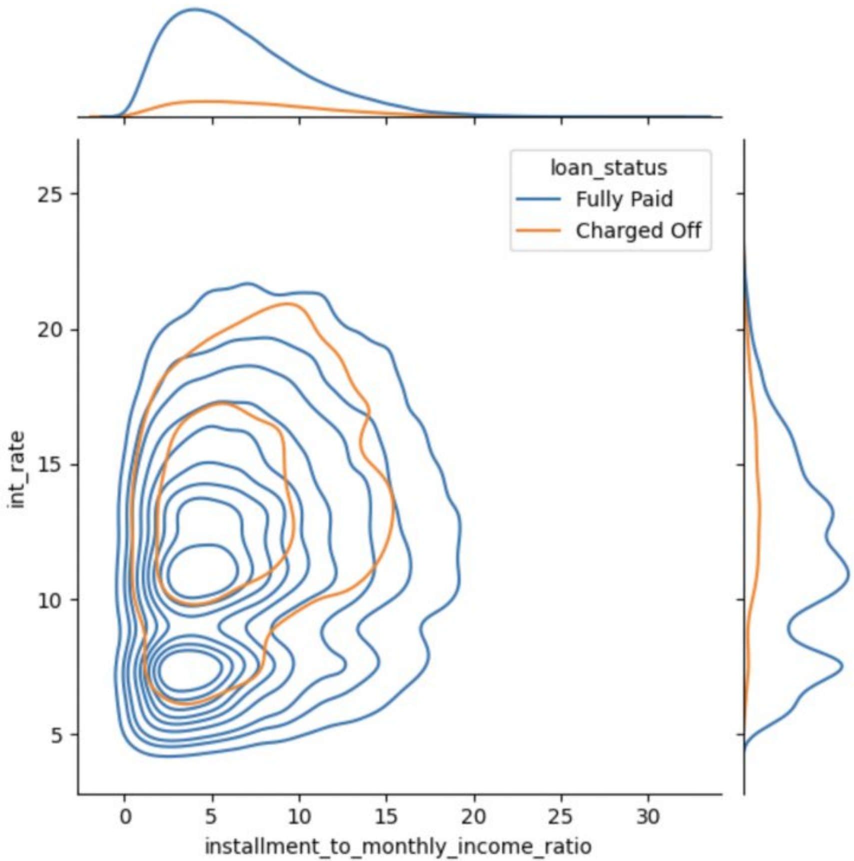
Multivariate Analysis

Observations

- Graph shows Fully Paid loans are highly concentrated at Bottom Left quadrant.
- Charged Off loans are increasing towards top right quadrant.

Inference

- With Higher interest rates and Installment to monthly income ratio, probability to default increases significantly.



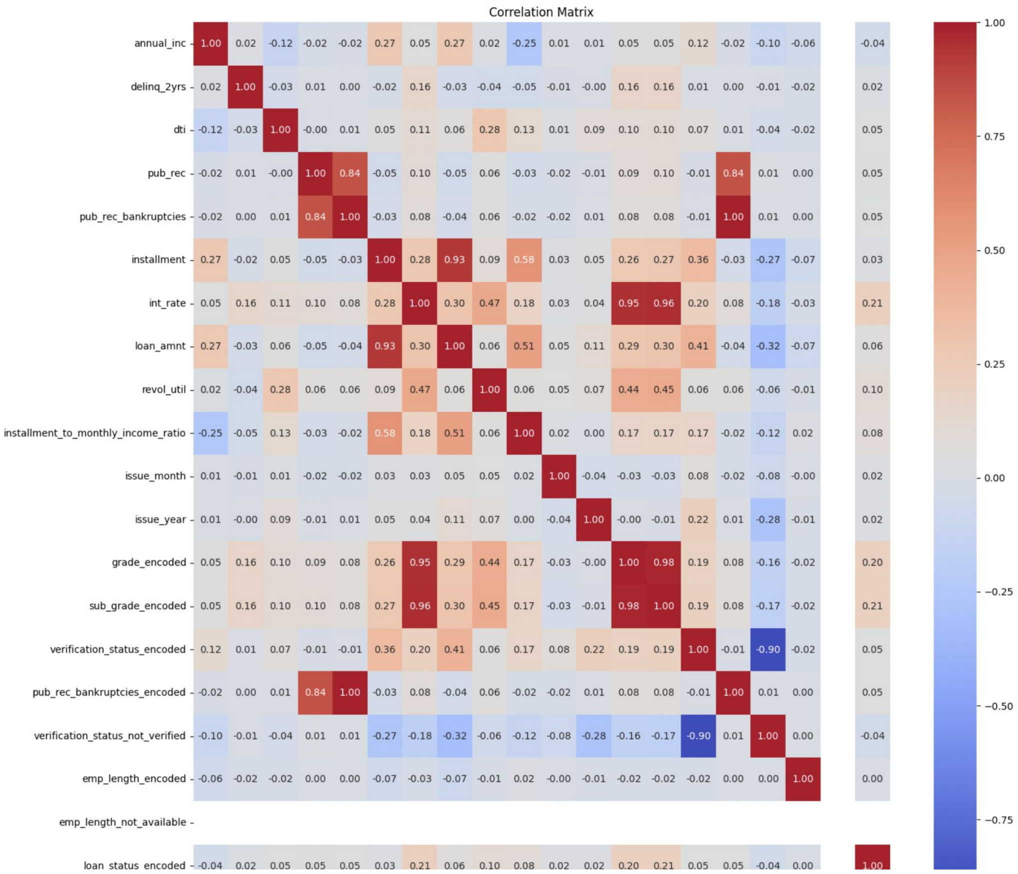
Multivariate Analysis

Observations

- Correlation Metric shows positive correlation between interest rates and loan status.
- It shows positive correlation between grades and loan status.
- Also, it shows positive correlation between sub-grades and loan status.

Inference

- Loan status has higher impact of interest rates and lower grades/subgrades.



Recommendations

Recommendations

- Increase focus on higher term loans (60 months).
- Verification process to be strengthen.
- Applicants who are delinquent in last 2 years carries more risk to default.
- Business should continue doing a good job while determining loan grades/Sub grades.. Lower loan grades clearly trend to higher defaults rates.
- Applicants eligible for lower interest rate with higher installment to monthly income ration are less likely to default

Thank You