

Gramener Case Study

EDA - ONLINE LOAN MARKET PLACE

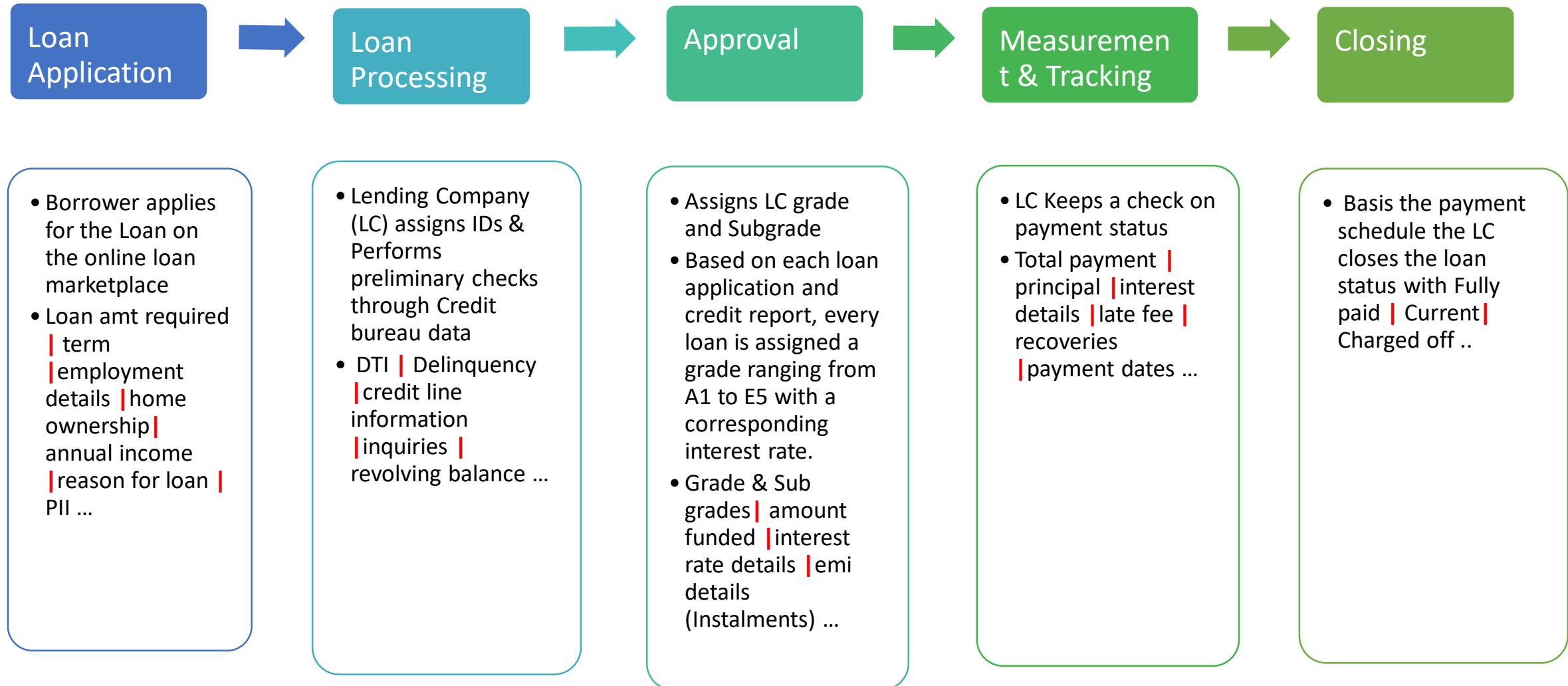
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Pre Read

- This company is the largest online loan marketplace like a peer-to peer lending platform where the people are the bank
- Facilitates personal loans, business loans, and financing of medical procedures.
- Lending period ideally for period of 36 & 60 months
- Ideally one can borrow anywhere from 1000 USD to 40,000 USD
- Benefits for the Borrower
 - An alternate source to borrow money other than the bank
 - Interest rates depends on credit rating.. The better the score the lower the interest and vice versa
- Risks for the Investor
 - Liquidity is never guaranteed
 - Not insured by FDIC and possibility of 100% loss if borrower does not repay the money

Understanding the loan process



Context Setting

Step

01

Background

- I. We have a dataset of all loan loans issued through the time period 2007 – 2011
- II. The data contains status of the loans and have classified them in 3 categories
 - **Fully paid:** Applicant has fully paid the loan
 - **Current:** Applicant is in the process of paying the instalments
 - **Charged-off:** Applicant has not paid the instalments and has defaulted the loan



Problem Statement

- I. The credit loss is the amount of money lost by the lender when the borrower refuses to pay.
- II. In other words, borrowers who default cause the largest amount of loss to the lenders
- III. *This slide is 100% editable. Adapt it to your needs and capture your audience's attention.*

Step

02



Step

03

Business Objective

- I. Understand the driving factors (or driver variables) behind loan default
- II. *Understand* variables which are strong indicators of default
- III. So the company can utilise this knowledge for its portfolio and risk assessment



Approach

- Understanding the variables and values provided in the dataset
- Data preparation
- Current view of the dataset
- Deep dive and exploratory analysis for customers flagged as “Charged Off”
- Findings & Recommendations

Data Understanding

- The table had data starting June 2007 to December 2011 of individual applicants
- A total of 39,717 loans were issued during that period

Year \ Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007						1	30	33	18	47	37	85	251
2008	171	174	236	155	71	66	83	71	32	96	184	223	1,562
2009	239	260	276	290	319	356	374	408	449	545	602	598	4,716
2010	589	627	737	827	920	1,029	1,119	1,078	1,086	1,132	1,121	1,267	11,532
2011	1,380	1,297	1,443	1,562	1,689	1,827	1,870	1,928	2,063	2,114	2,223	2,260	21,656
Total	2,379	2,358	2,692	2,834	2,999	3,279	3,476	3,518	3,648	3,934	4,167	4,433	39,717

- Each record had 111 variable from personal information, reason for loan, interest details, payment details, credit history

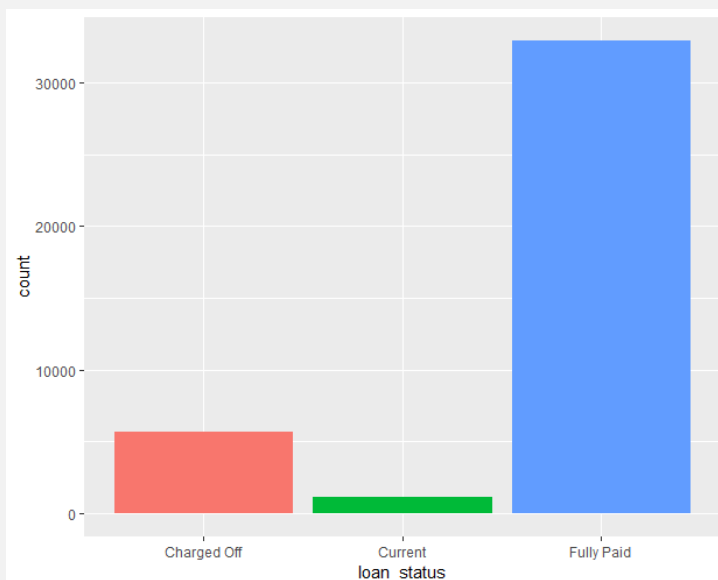
Data Preparation

Check	Status / Results
Checking for columns where data consists N.A values	54 observations have been returned
Checking for columns where data is constant across all rows <u>or</u> have no values <u>or</u> consists of N.A <u>or</u> have 0 as their value	13 observations have been returned
Checking outliers	
Checking for duplicates in IDs assigned for the loan listing & borrower member ID	No Duplicates

Data Transformation

- Converting data to factors
- Converting relevant columns such as “Int_rate”, “revol_util” to number, “annual_inc” to intergers for aide calculation
- Formatting data to suit analysis
- Creating bins for annual income

A view of the loan dated

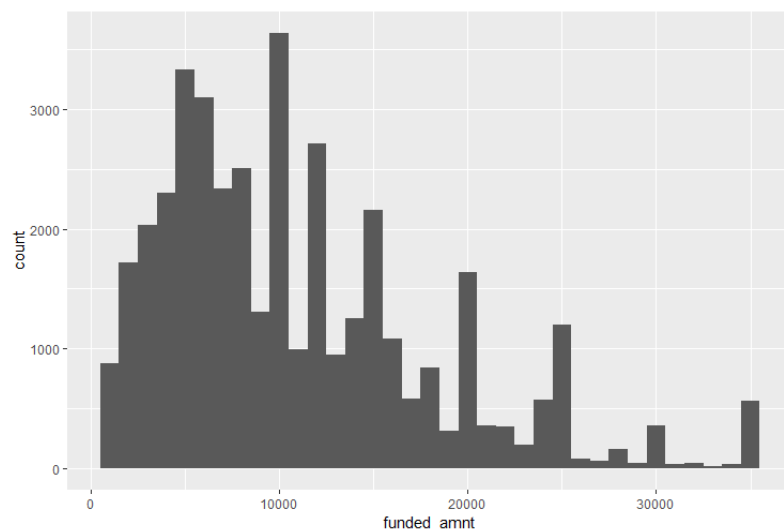
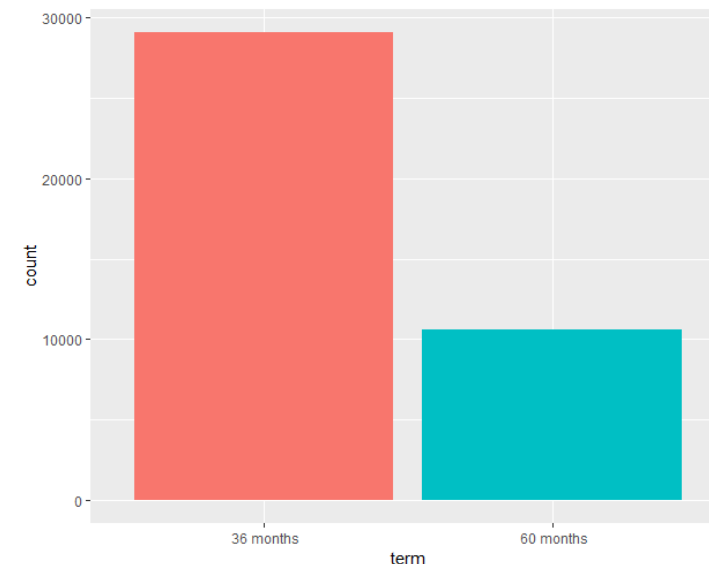


- 83% of the data have fully paid their loans
- 14% of borrowers are defaulters

loan_status	count
Fully paid	32,950
Current	1,140
Charged off	5,627
Total	39,717

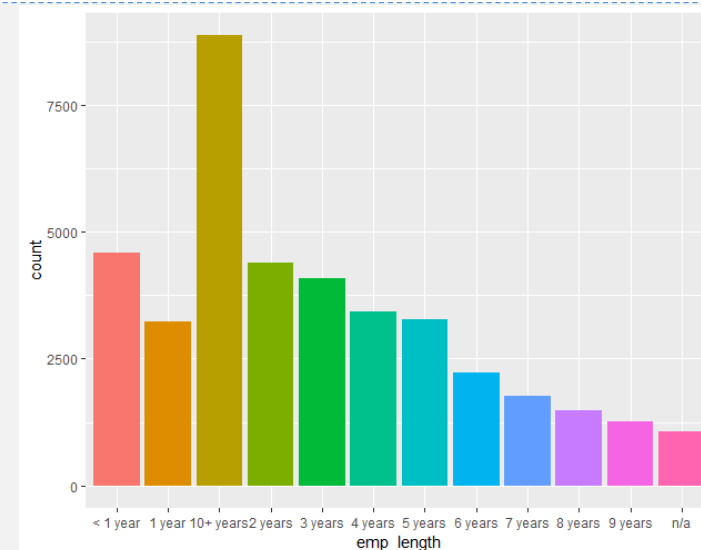
Loan terms	count
36 Months	29,096
60 Months	10,621
Total	39,717

- 73% of the borrowers have opted for a 36 month loan period (short term to address immediate requirements)

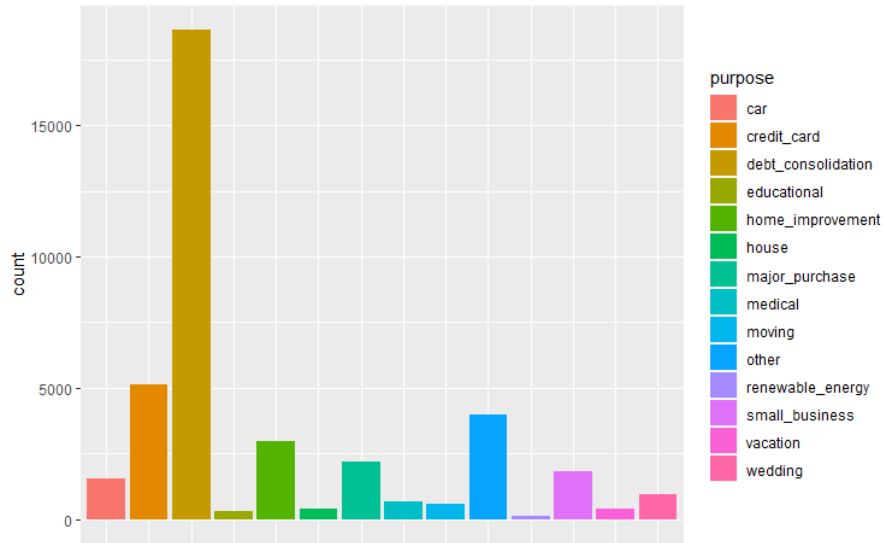


- 51% of the loan amount are in between 5,500 and 15,000 USD

- Maximum borrowers are people who are employed for more than 10 years
- But the larger group of borrowers who are early starters in their career i.e **less than 1 year to 3 years**



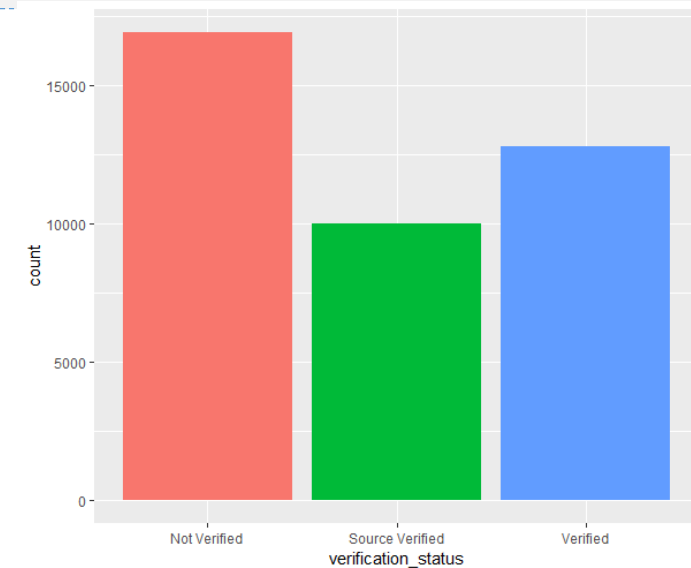
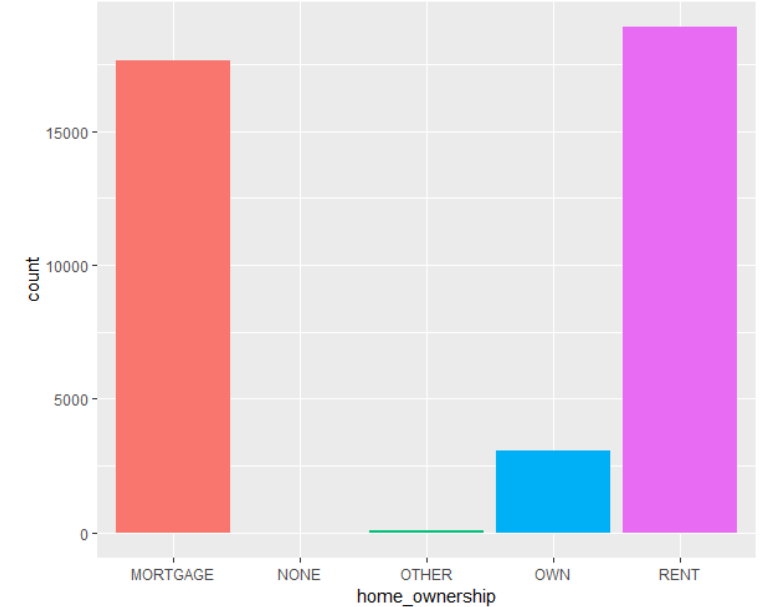
A view of the data provided



- 60% of the borrowers have taken loans to clear previous debts (credit card & debt consolidation)

home ownership	count
MORTGAGE	17,659
NONE	3
OTHER	98
OWN	3,058
RENT	18,899

- 92% of the borrowers don't have a home of their own

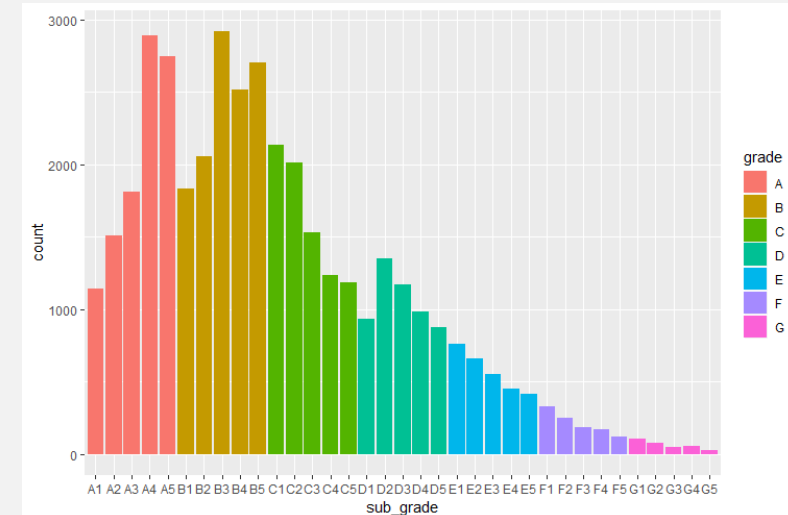


loan_status	count
Not Verified	16,921
Source Verified	9,987
Verified	1,280
Total	39,717

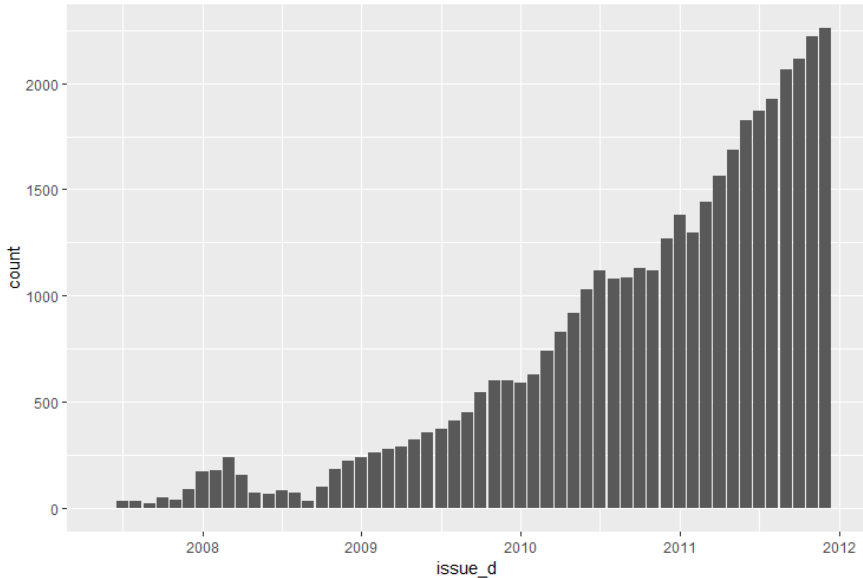
- 42% of the borrowers details are not verifies. Which might be very risky for the investors

- Majority of the loan disbursed are for Higher loan grade(A, B & C)

LC Grade	Count
A	10,085
B	12,020
C	8,098
D	5,307
E	2,842
F	1,049
G	316
Total	39,717



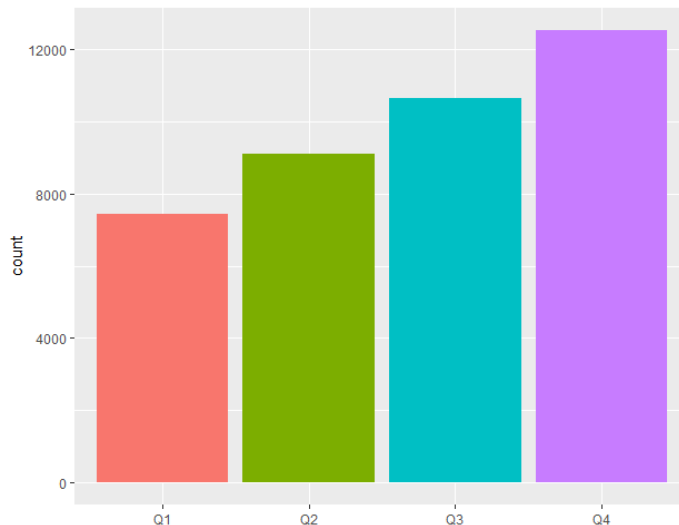
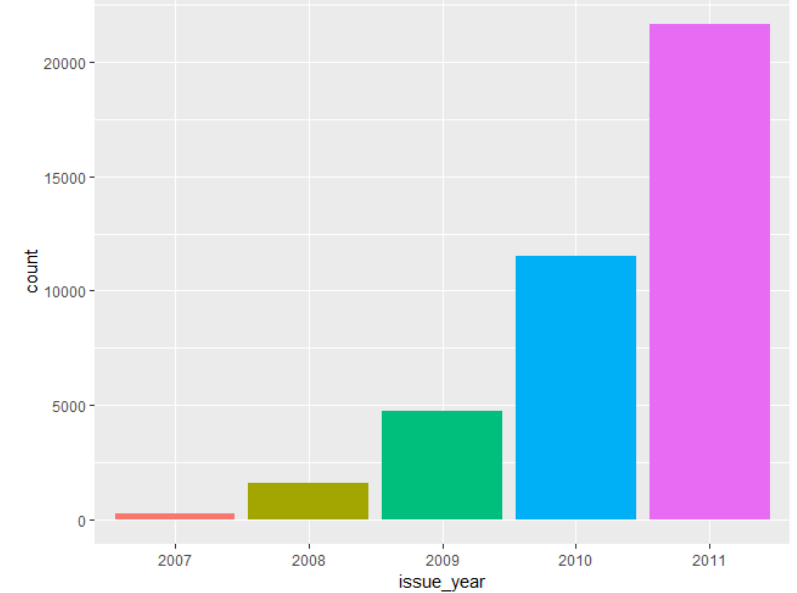
Loan Industry – A booming Growth



- Loan industry is booming with a very strong growth month by month

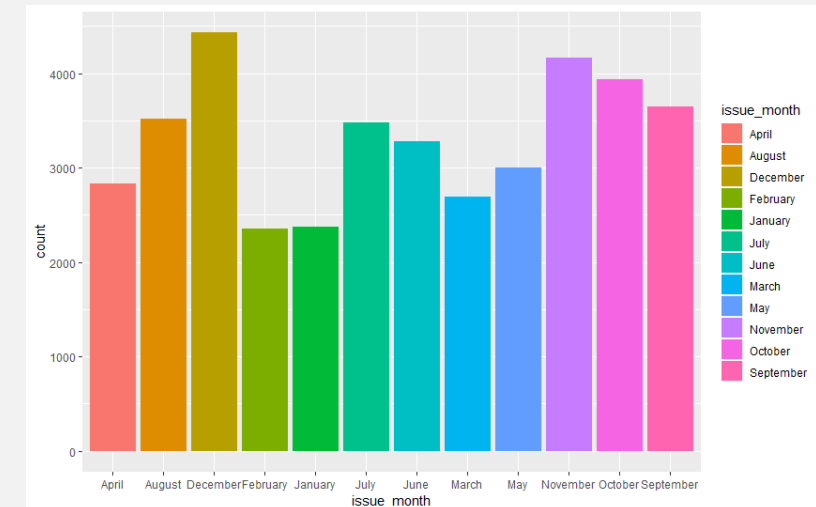
year	count
2007	251
2008	1,562
2009	4,716
2010	11,532
2011	21,656

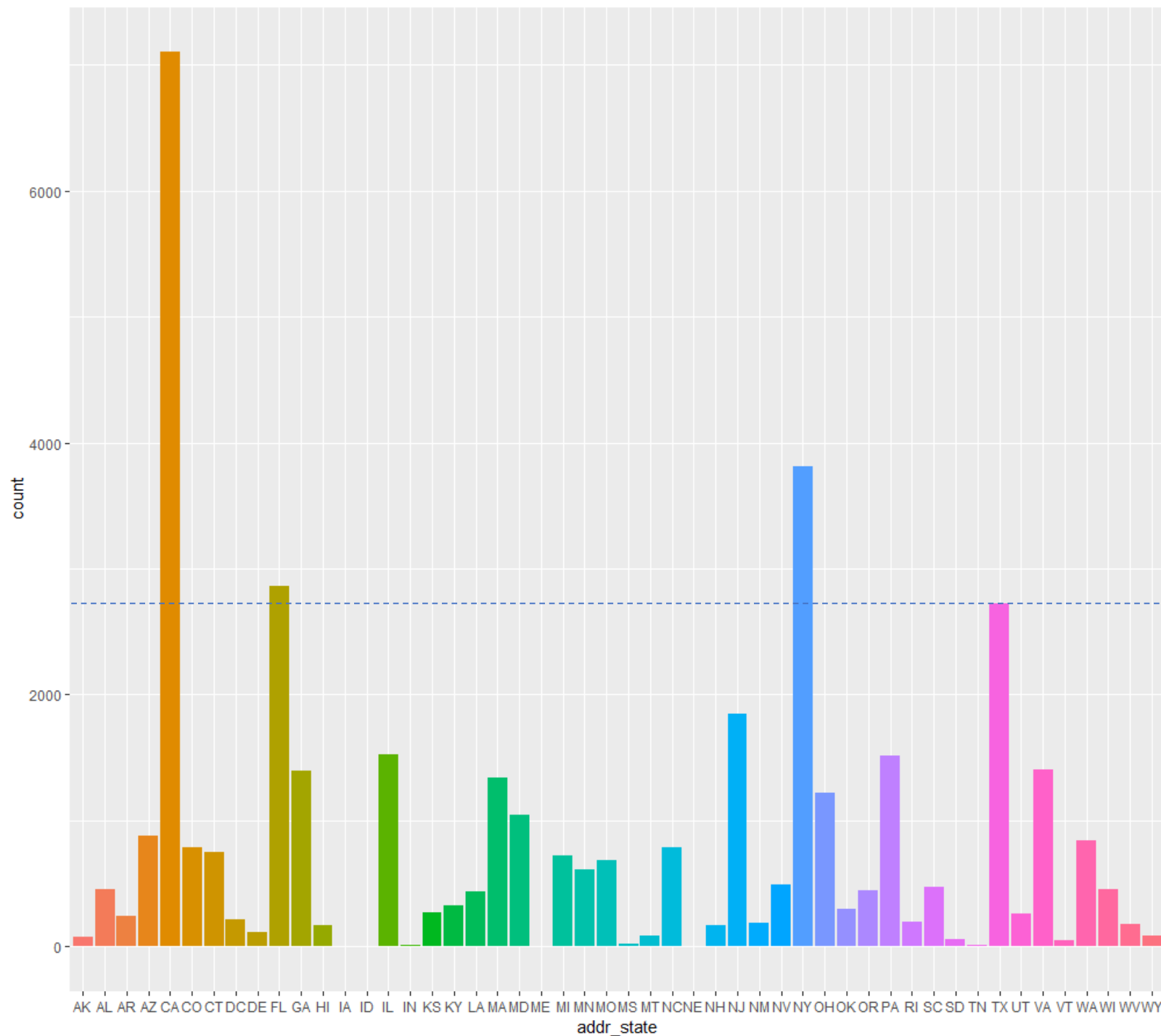
- 3 digit growth for the business in the first year
- 88% growth in 2011



- Q3 an Q4 should highest growth year on year

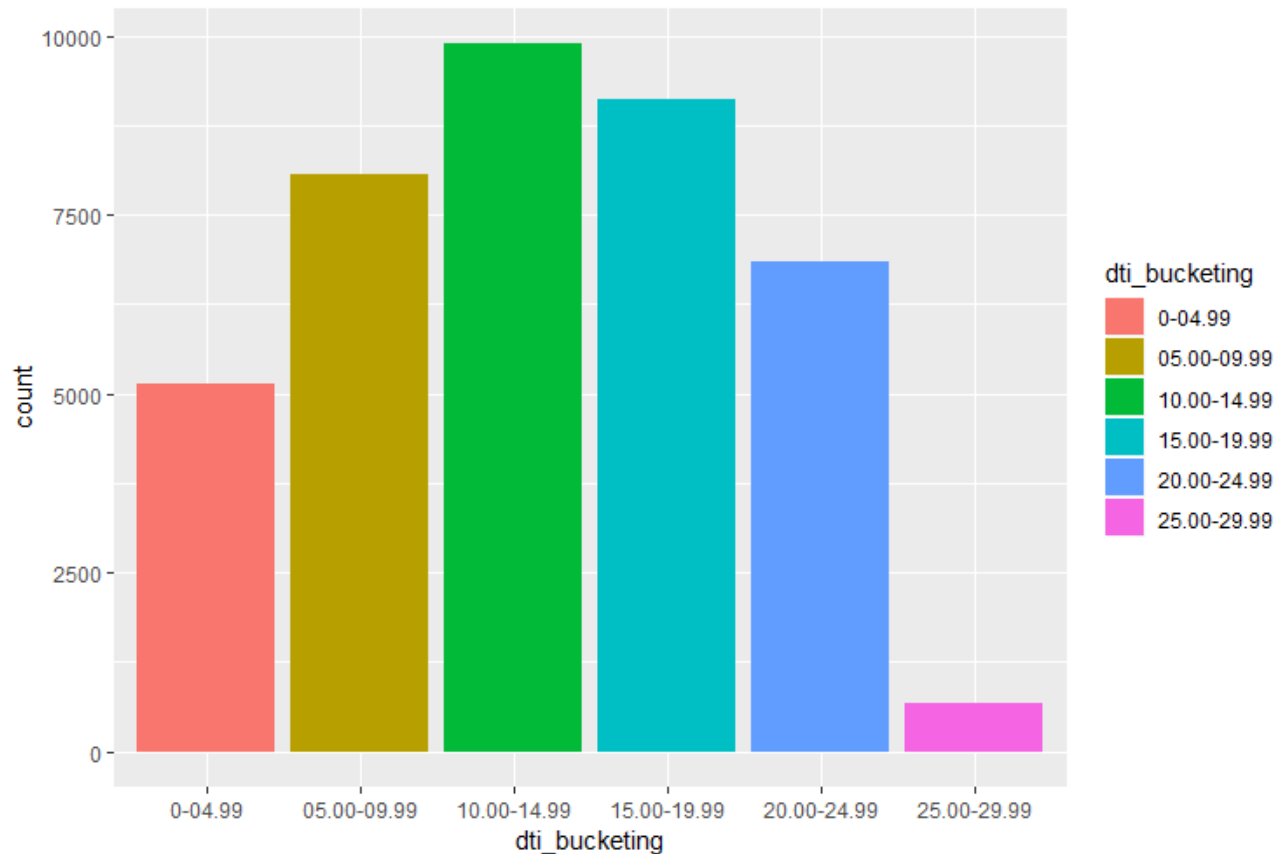
- October November & December are month where maximum number of loans are disbursed





- California, Florida, New York & Texas has states highest number of loans.
- These states are more well to do states than others.
- California because of their tech industry
- Florida because of tourism,
- New york being the financial hub
- Texas being the manufacturing hub.

DTI Analysis – Debt To Income Ratios

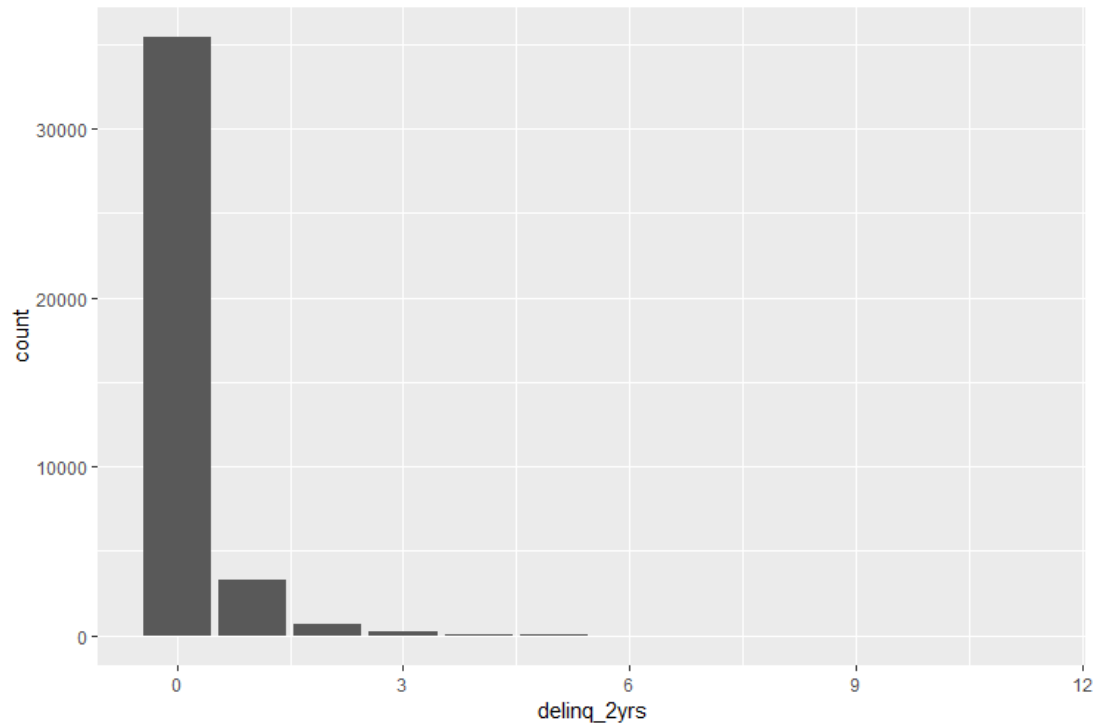


DTI Buckets	Count	%age
0-04.99	5,140	0
05.00-09.99	8,062	0
10.00-14.99	9,893	0
15.00-19.99	9,108	0
20.00-24.99	6,836	0
25.00-29.99	678	0

- 42% of your borrowers are in the higher DTI ratio bracket which could be a slightly risky assessment on their repayment capability

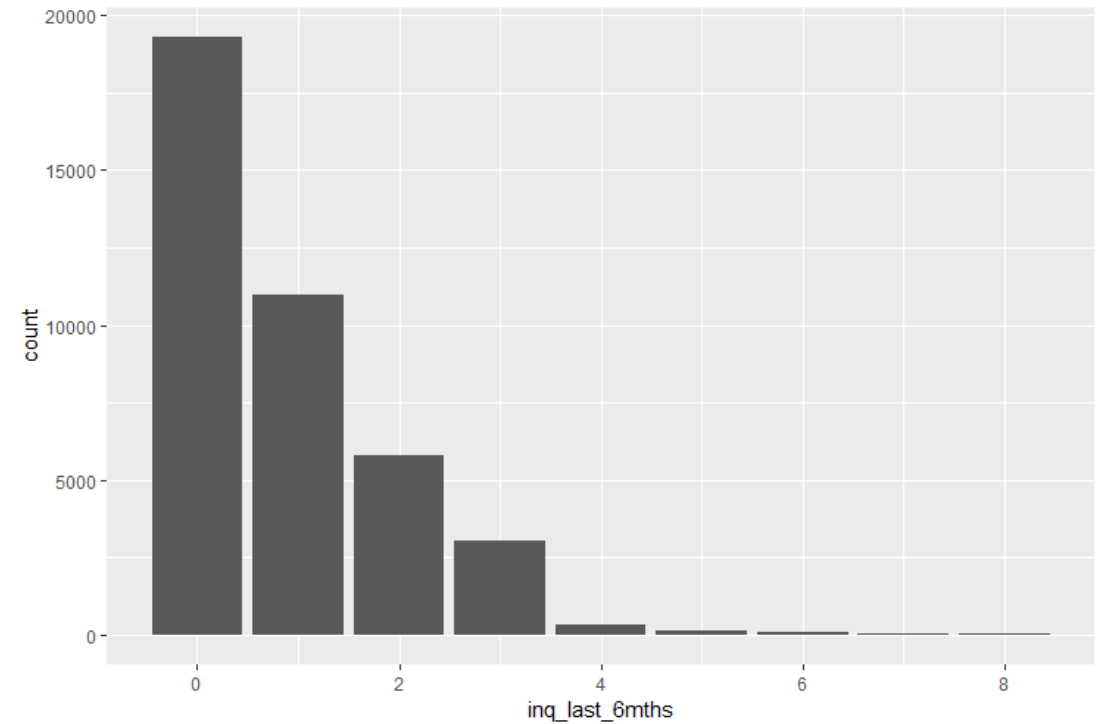
- DTI is reviewed by the investor to access if the borrower can afford the loan and also helps the LC to determine the rate of Interest
- Lesser DTI for an individual is always better from an investor POV**

Customer Delinquency brackets



delinq_2yrs	Count
0	35,405
1	3,303
2	687
3	220
4	62
5	22
6	10
7	4
8	2
9	1
10	1
11	1

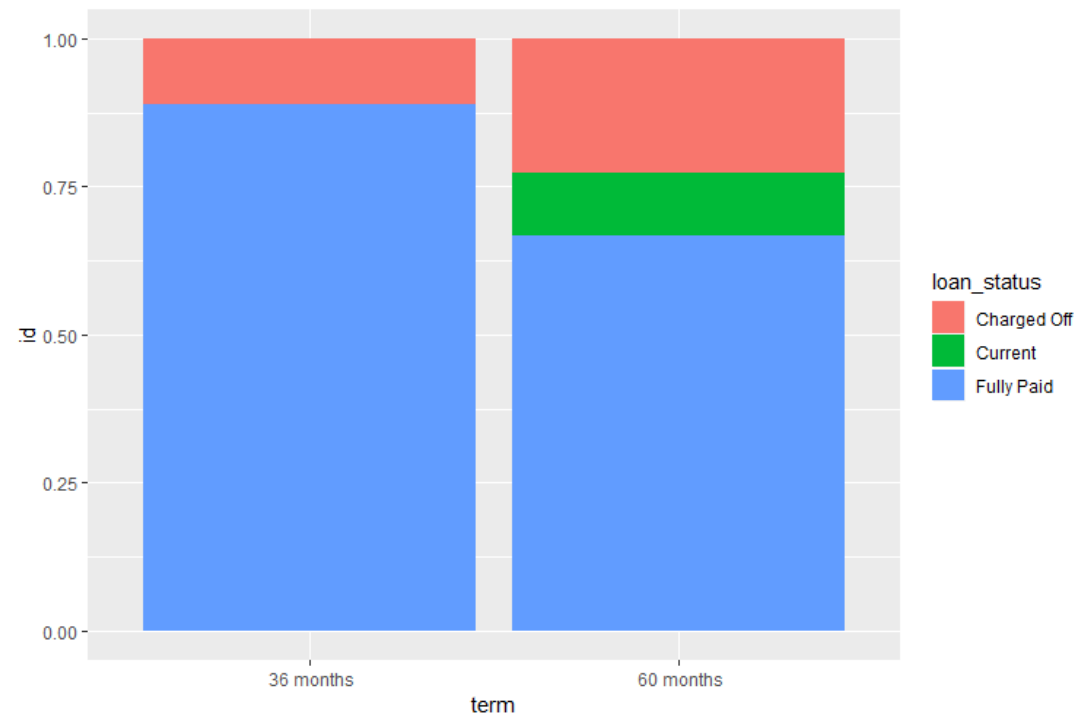
- 11% of your customer fall in the Delinquent bracket



No of Inquiries	Count
0	19,300
1	10,971
2	5,812
3	3,048
4	326
5	146
6	64
7	35
8	15

- 51% of the borrowers have made more than on query in the last 6 months

Tenure v/s Loan Status



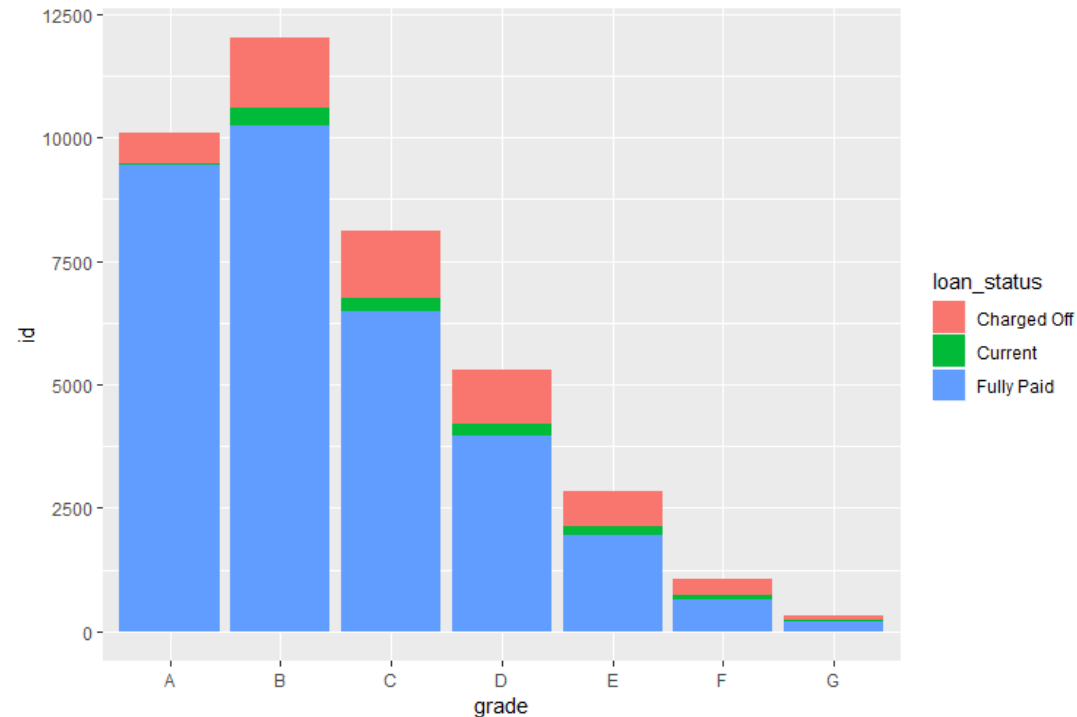
- The number of default loans are somewhat equal in both the terms
- But due to less number of 60 months tenure we can say there is greater share of loan defaulter share in 60 months bracket. giving us the clue

term	loan_status	count	percentage
36 months	Charged Off	3,227	11%
36 months	Fully Paid	25,869	88%

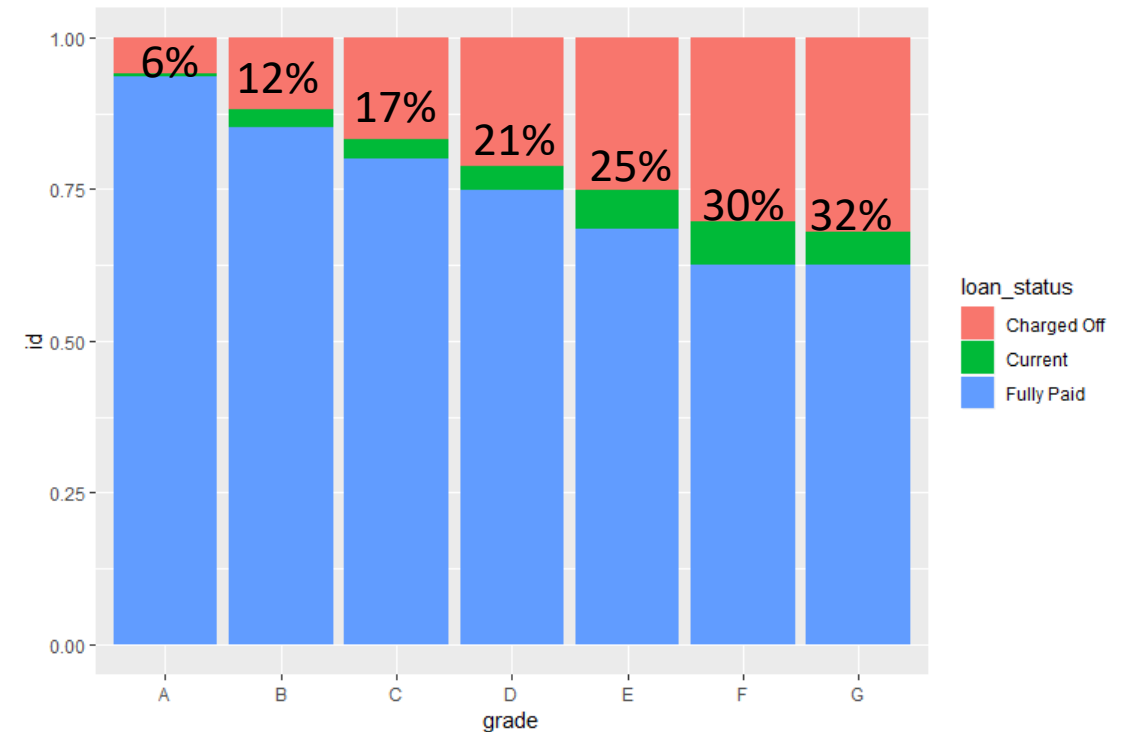
term	loan_status	count	percentage
60 months	Charged Off	2,400	23%
60 months	Current	1,140	11%
60 months	Fully Paid	7,081	67%

- Borrowers taking longer duration loan could have a higher propensity to default on loan

Grade v/s Loan Status



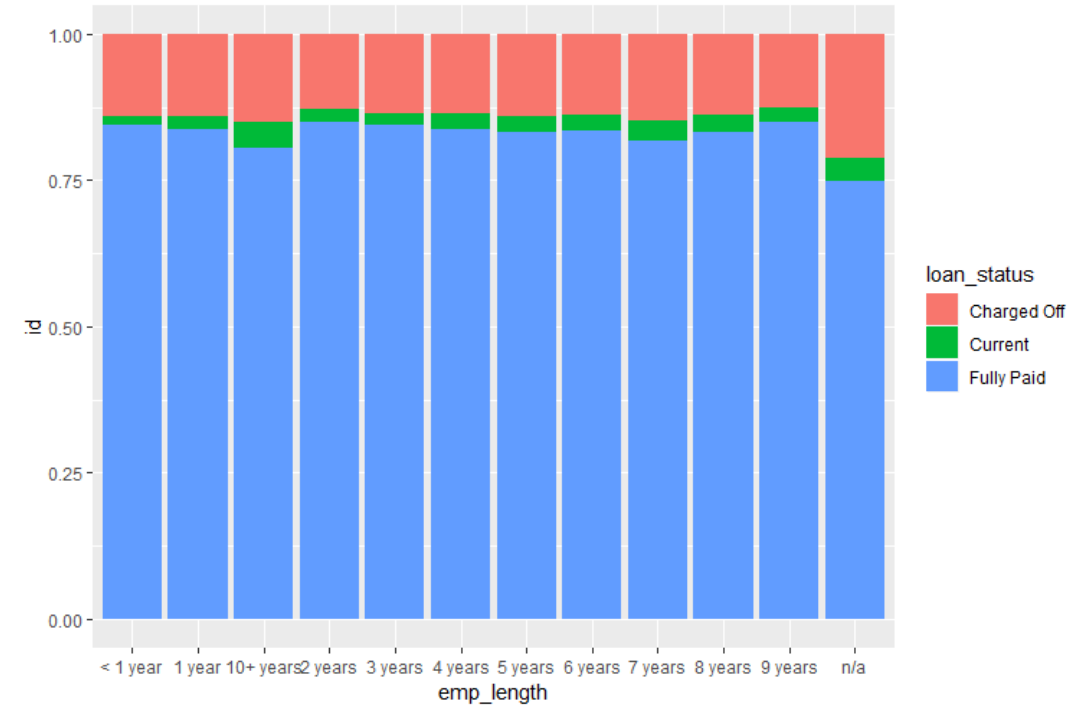
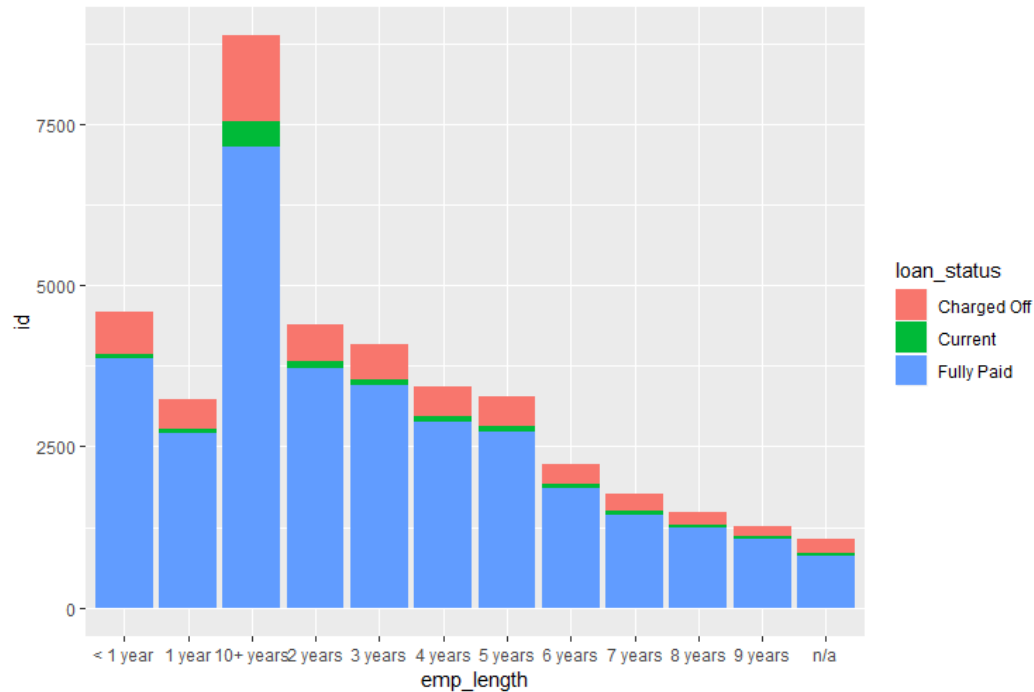
Grades	Charged Off (CO)	Current	Fully Paid	Grand Total	% CO to Total
A	602	40	9,443	10,085	6%
B	1,425	345	10,250	12,020	12%
C	1,347	264	6,487	8,098	17%
D	1,118	222	3,967	5,307	21%
E	715	179	1,948	2,842	25%
F	319	73	657	1,049	30%
G	101	17	198	316	32%
Grand Total	5,627	1,140	32,950	39,717	143%



- As the grades get lower (from A - G) the % of charged off borrowers increases
- The investors should be careful when the lend out monies to borrowers who fall in the higher grade

- As we go to Lower grades (A- G) translates to higher rate of interest
- Propensity to default is higher when the grade is low

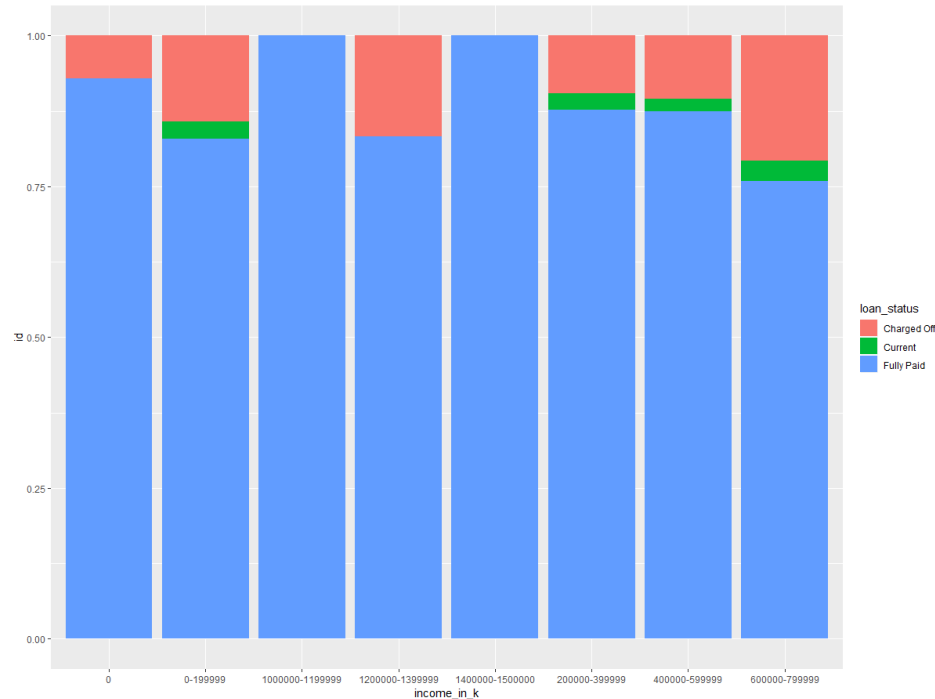
Employment v/s Loan Status



- The range of charged off to the total is almost similar in all tenures
- Ranging from 13 to 15%
- The borrowers who have not given their employment tenure are likely to default on their home loan by 21%

- If a borrower is taking short term loans after 7+ years of Employment assumption is that his finance are not well managed. He is a suspect to default
- Borrowers who do not give their employment details are hiding status of regular source of income and hence have a higher propensity to default.
- One should be cautious when they see employment details as null

Income v/s Loan Status

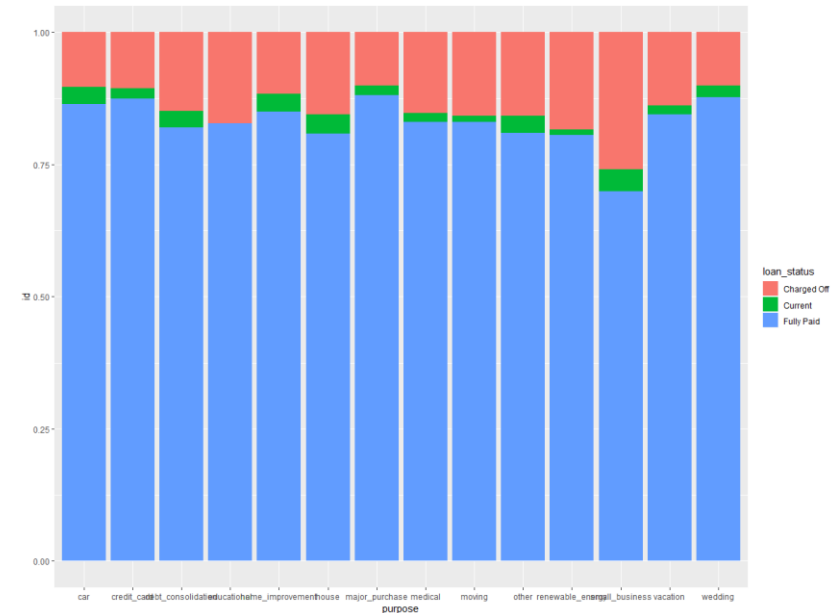
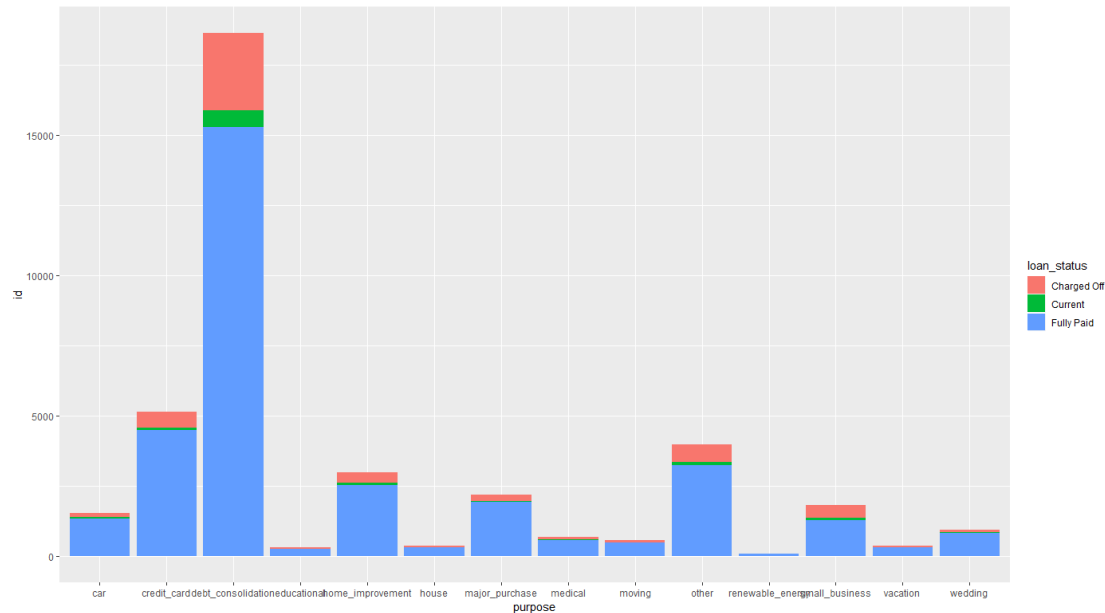


income	Charged Off	Current	Fully Paid
0	1		13
0-199999	5,556	1,121	32,332
1000000-1199999	0		2
1200000-1399999	1	17	5
1400000-1500000	0	1	1
200000-399999	58	1	533
400000-599999	5		42
600000-799999	6		22

- While the % of are similar across segments
- There seems to be no relation between that income affect people propensity to pay off loans or not. It might be because even though a person is earning enough, he or she might be spending a lot on other things.

- A large set of borrowers who fall in the low income group have a higher propensity to default

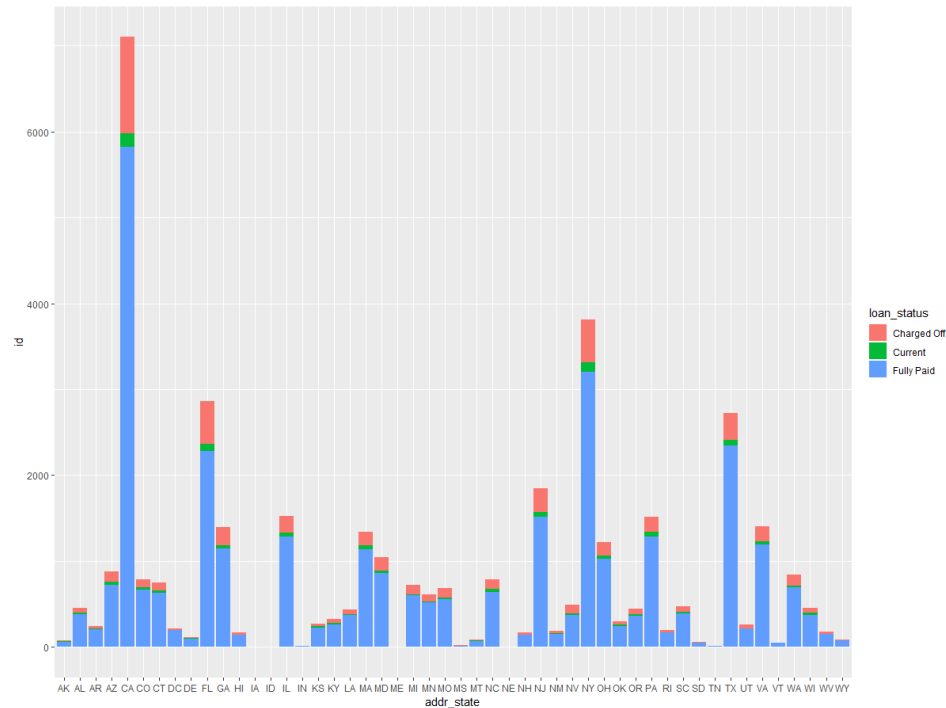
Purpose v/s Loan Status



- Although maximum people are taking loan for debt consolidation and credit card bill pay-out.
- However small business have highest number of percentage of loan defaulters. Small business comes with a inherent risk of loss that increases the propensity of loan defaulters.
- Credit Card, Debt Consolidation Small Business & Other, constitute 78% of the defaulter base & 12% of the overall base

- Credit Card, Debt Consolidation Small Business & Other are the 3 key categories to what out for.
- If borrowers are giving others as a reason they are ambiguous. Be careful make a change to your data capture page to be explicit

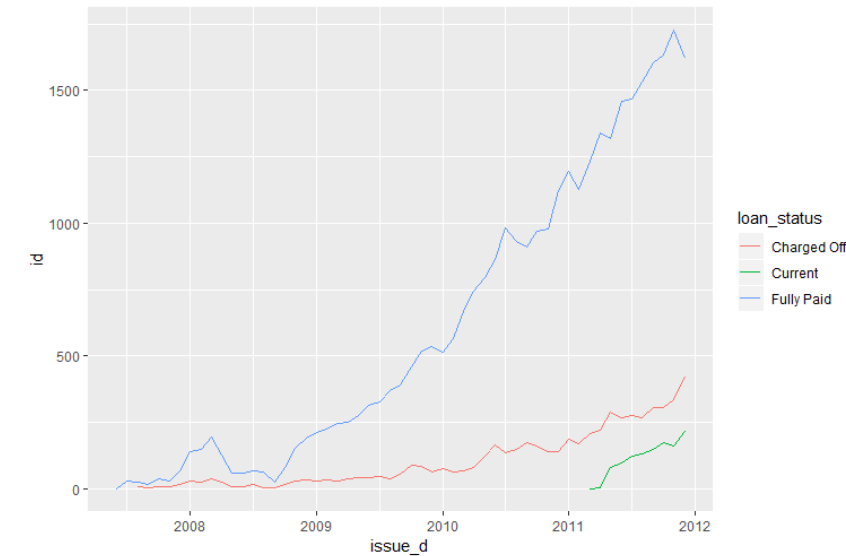
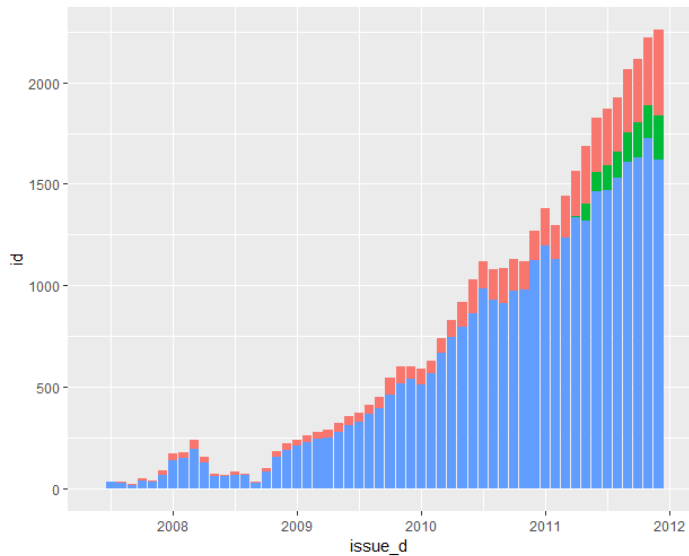
State v/s Loan Status



- For this analysis we have picked state where the total customers to whom the loan has been disbursed is more than 500
- The range of defaults of state base is 12% to 22%
- Nevada tops the defaulters list followed by FL, MO, CA

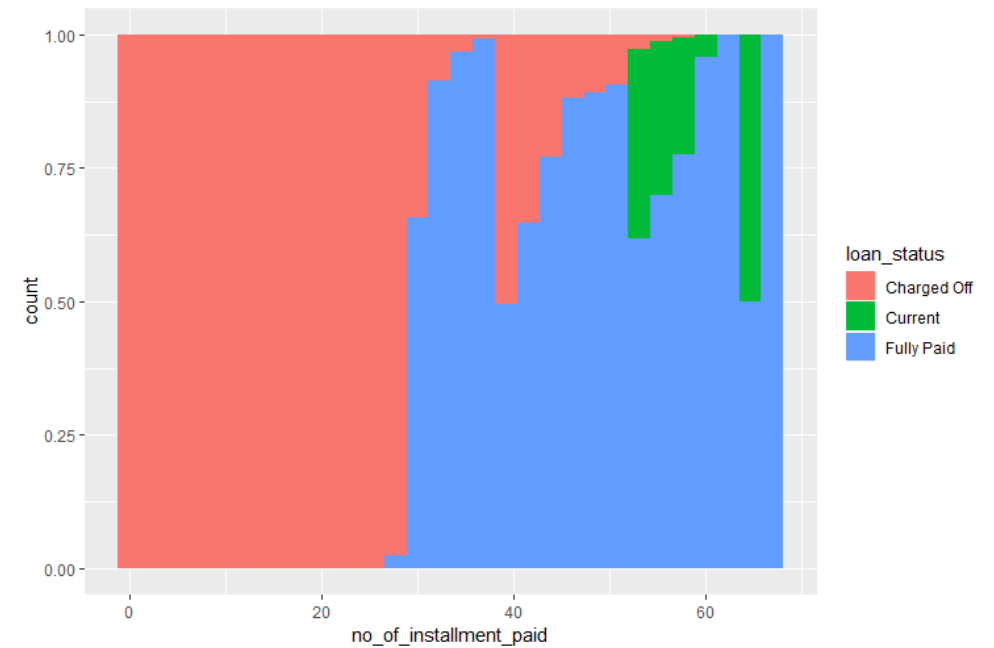
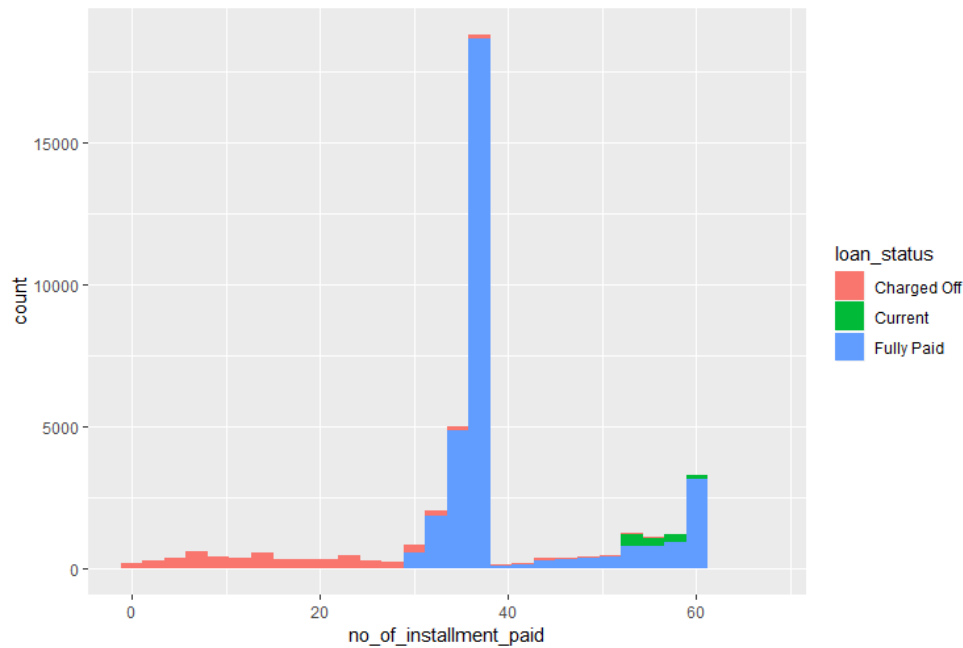
- There are no major insights from state level, need to keep a check on the defaulter to base percentage for all

Time Series v/s Loan Status



- Line graph shows us that there is a more steep rise in fully paid loans.
- However from 2010 loan default rate is increasing more than its previous years
- After 2011 there are some current loans are also there which means some of these loans will also contribute to Default loans.

Instalments Paid v/s Loan Status



- People who are defaulters make less than 30 instalment.
- It means the risk of default stays high till a person has made 30 instalment and then risk of default greatly reduce after 30 payments.

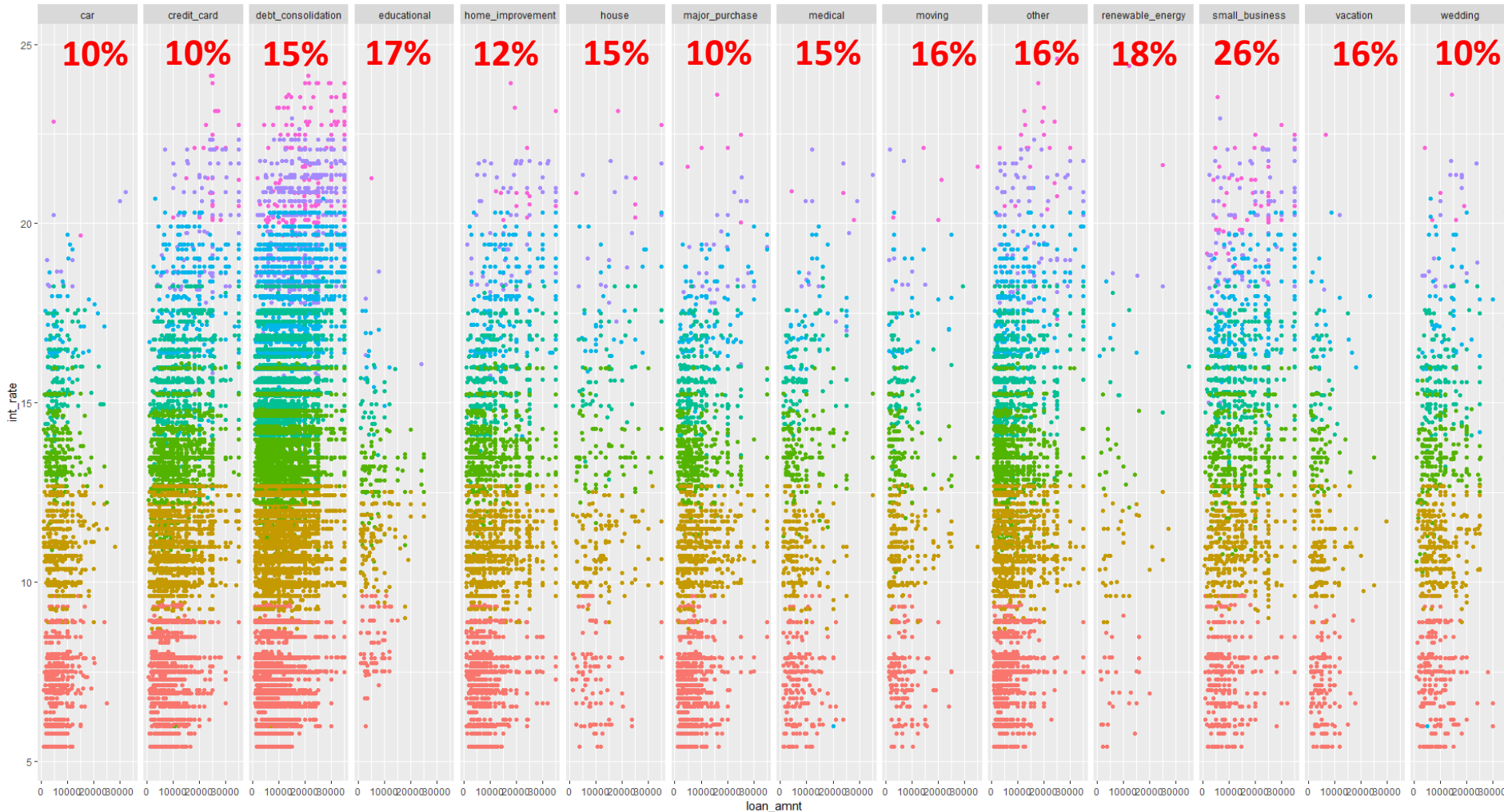
- High probability of default that borrowers will default who take short term loans

YOY borrowers v/s DTI



- Till 2010 there are no loan accepted beyond 25000.
- However in year 2011, it seems that the **organization have been quite lenient in their loan acceptance procedure.**
- organization is earning high profits by charging high interest rate to lower grade customer.
- This is a dangerous line bank might be crossing because we are also seeing that with **most of the high loan amount accepted have been accepted**
- **for loan grade C, D, E, & F**
- **People who are much more capable to paying off the loan does not take high loan amount.** This is evident from the fact that Grade A & B are much denser towards lower loan amount. Whereas Lower grade than A & B are much more diverse in their loan amount.

Purpose v/s Grade v/s Interest Rate v/s Default



← Default %age

- Most popular purpose for lower grade loans are **Debt_consolidation, Credit card, small business & Home_improvement**
- Whereas lower grade loans are much more diversified in their loan amount.
- This suggest that **Debt_consolidation, Credit card, small business & Home_improvement** might have a higher future inherent risk of default.

Recommendations for the Investors

Checks	Compulsory offline verification	Increasing tenure	Reducing loan amount	Increased Interest Rate	Reject	Remarks
Carefully view all applicants with a 60 month loan tenure window	✓					
Loan application amount beyond 25000 USD	✓					Purpose compulsory. Modify the data collection page if necessary
Applicant who employee length is 10+ years and taking loan for repayment			✓	✓		
Applicant who is taking a loan for his small business setup				✓		
Applicant who has just started his career and has a low annual income		✓	✓	✓		
Applicant with a mortgage or live in a rented place	✓		✓		✓	Reject if they are starting a small business or have been employed for more than 10 years
People living in CA, NY, TX & FL	✓	✓				Look at pin codes as a medium of approval
High DTI Ratio			✓	✓	✓	Reject if the DTI Ratio is above 30
Delinquency	✓	✓	✓	✓	✓	Increase ROI or Reject if higher than 6 months
Inquiries (Made more than 4 inquiries in the last 12 months)			✓	✓		

Thank You