

# LENDING CLUB CASE STUDY

**SUBMITTED BY :**

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# PROBLEM STATEMENT

## AIM

To identify the patterns which indicates if a person is likely to default a loan.

## OBJECTIVE

Based on historic data, identify strong indicators of loan default. Using these driving variables at the time of loan application will help in understanding the risks involved.

## APPROACH

Utilise EDA to undertake risk analytics in consumer finance by understanding different consumer attributes as well as loan attributes that influence the tendency of loan default.

# ANALYSIS APPROACH

## CLEAN DATA

Drop columns with null values, random values or single valued columns.



## UNIVARIATE ANALYSIS

Check distributions and frequencies of various numerical and categorical variables. Create derived variables.



## SEGMENTED UNIVARIATE ANALYSIS

Analyse variables against segments of the final variable.



## BIVARIATE ANALYSIS

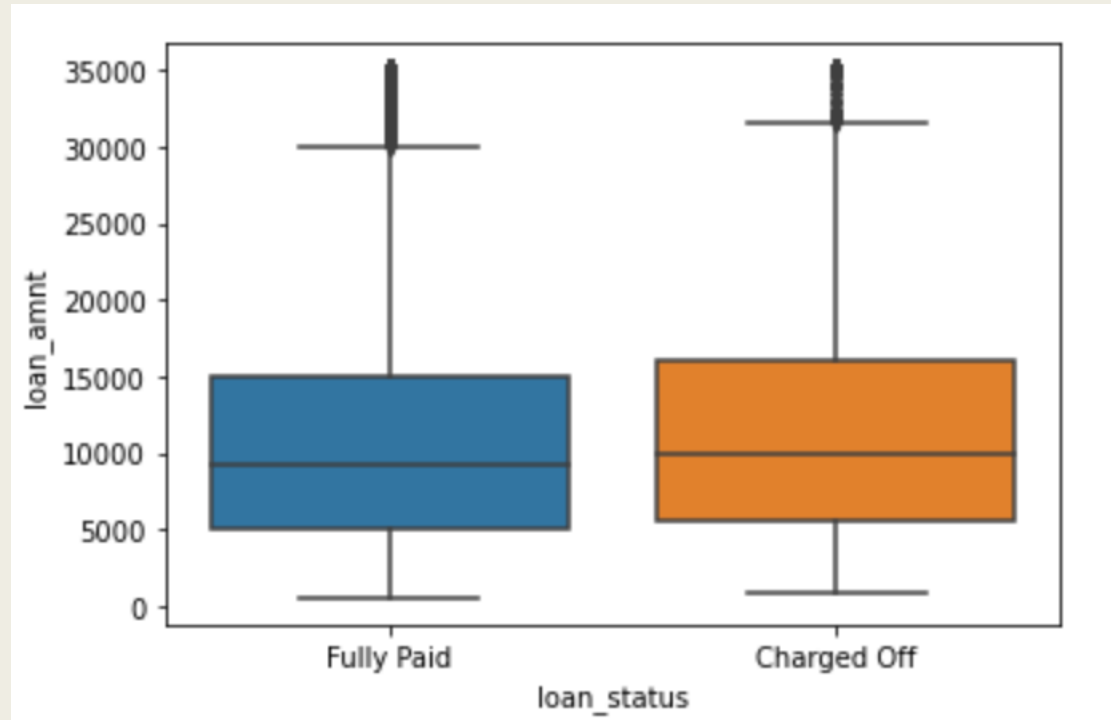
Do correlation analysis. Check how two variables affect each other or a third variable. Analyse joint distributions.



## SUMMARISE RESULTS

Publish insights and observations.

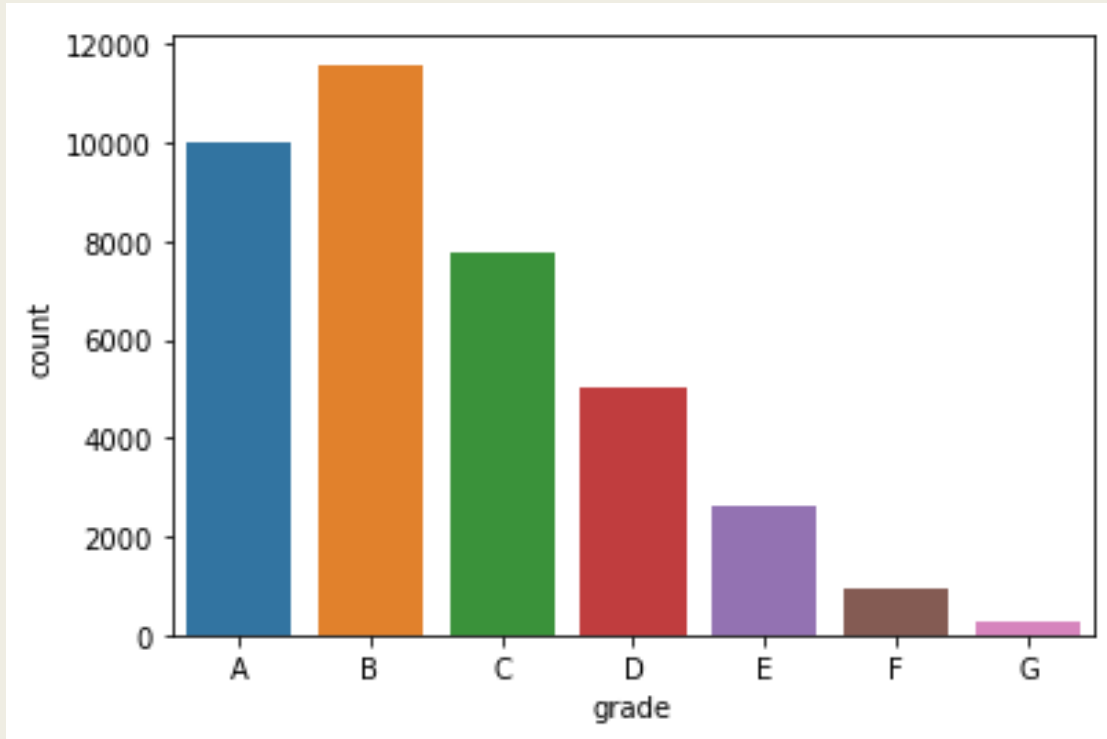
# ANALYSIS – LOAN AMOUNT DISTRIBUTION



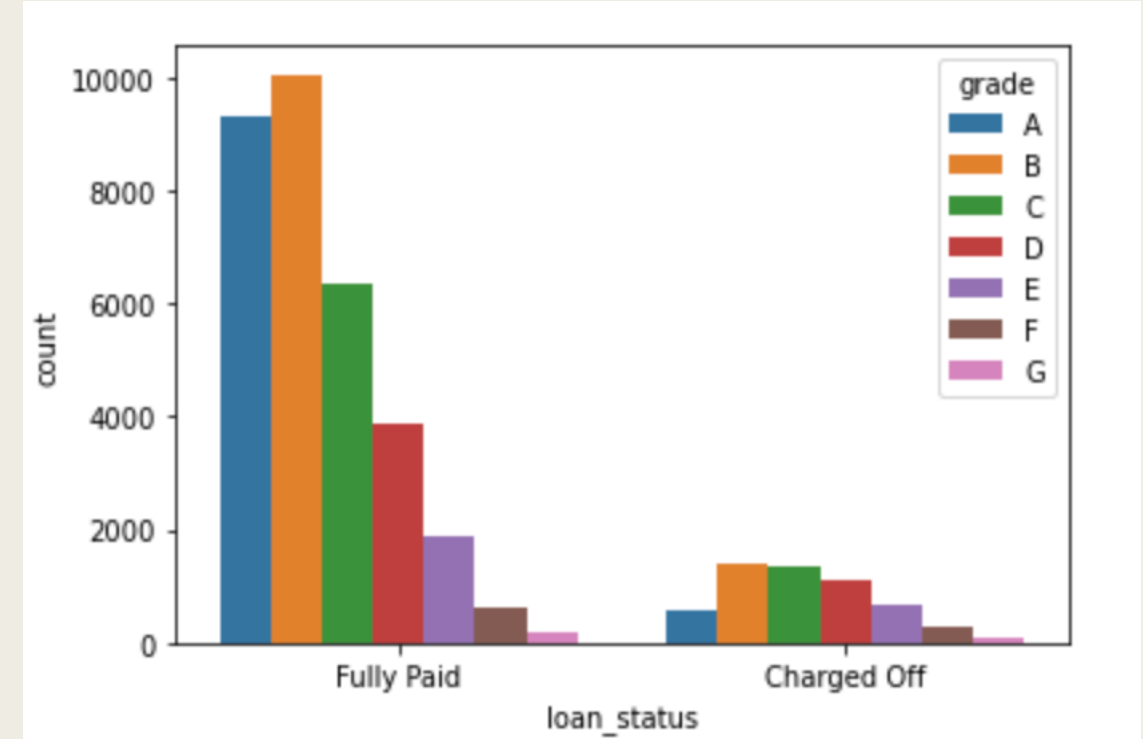
There is no variation between loan amounts in Fully Paid/ Charged Off loans.

The loan amount varies up to ~35,000 & have a mean of 10,000 in both loan status.

## ANALYSIS – GRADES

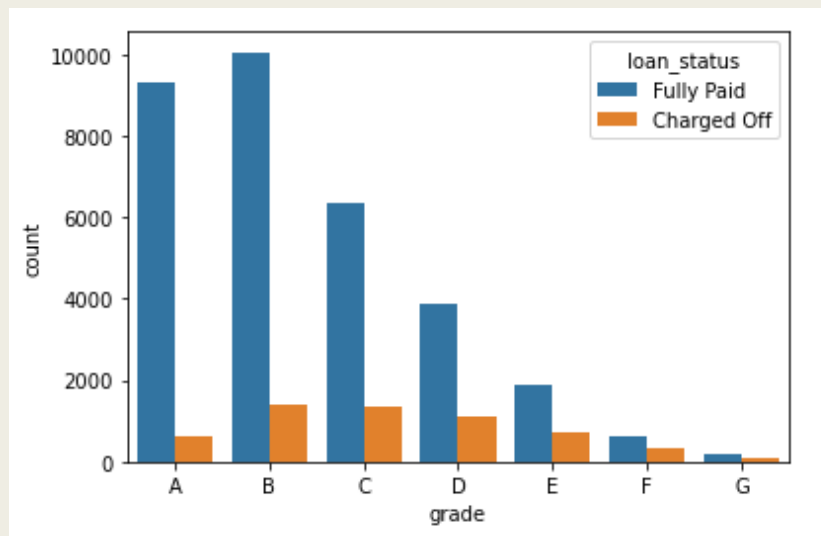


Most of the loans are high graded (grade of A and B) loans, about > 50%.

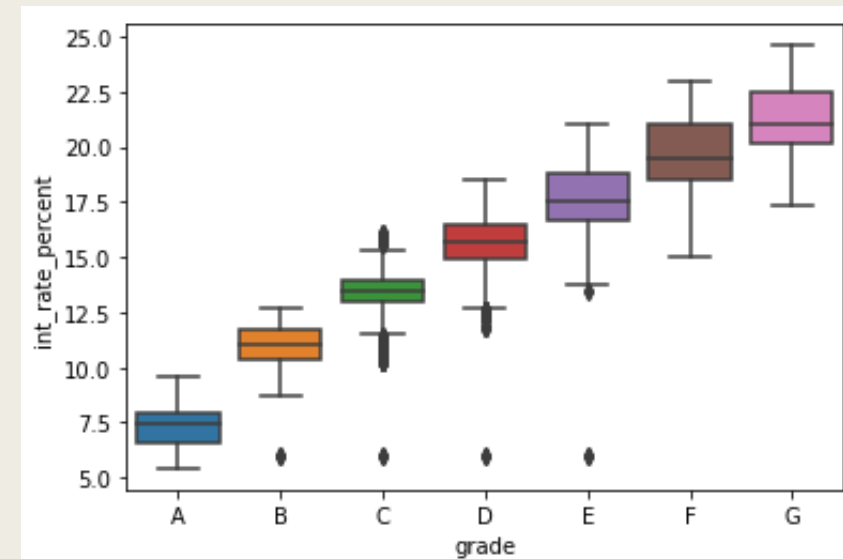


Majority of the Charged Off loans are from B, C, D Grades

## ANALYSIS – GRADES (continued)

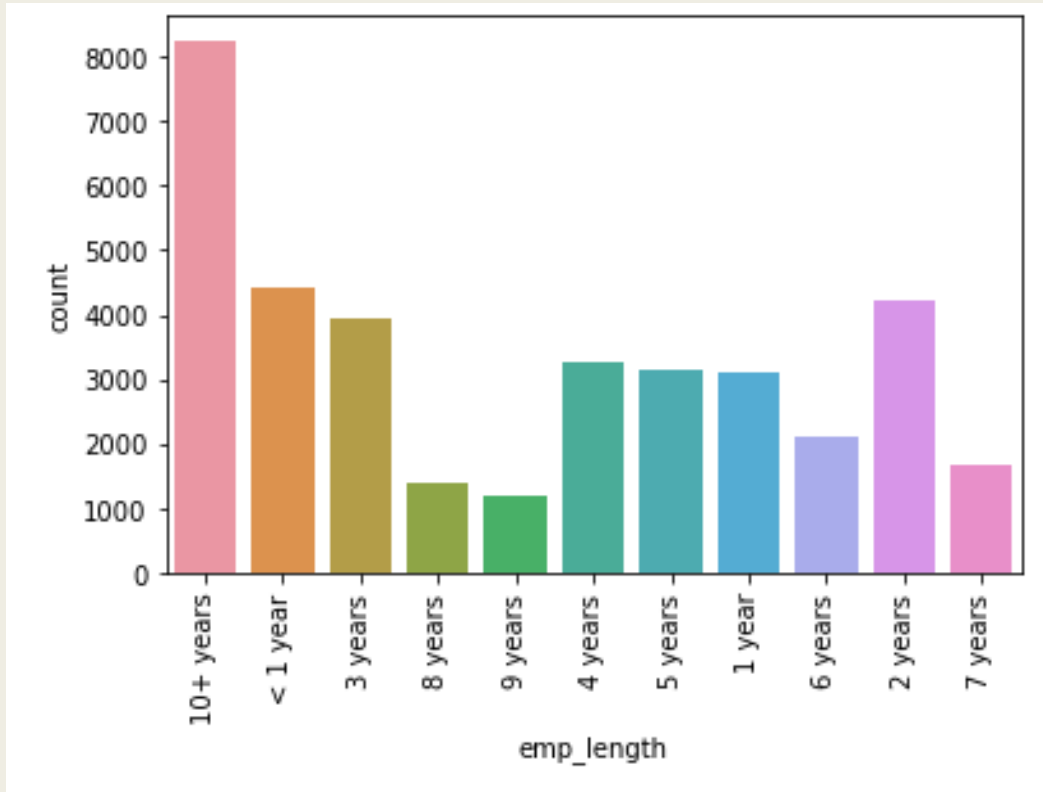


loan_status	Charged Off	Fully Paid
grade		
A	6.055713	93.944287
B	12.259867	87.740133
C	17.430954	82.569046
D	22.202130	77.797870
E	27.015504	72.984496
F	32.941176	67.058824
G	34.154930	65.845070



Change of rate is increasing with the increase in Grade (from A to G).  
Interest Rate is also increasing from Grade A to G, which is in parity with the increase in Charged off rate.

# Analysis – Employee Experience

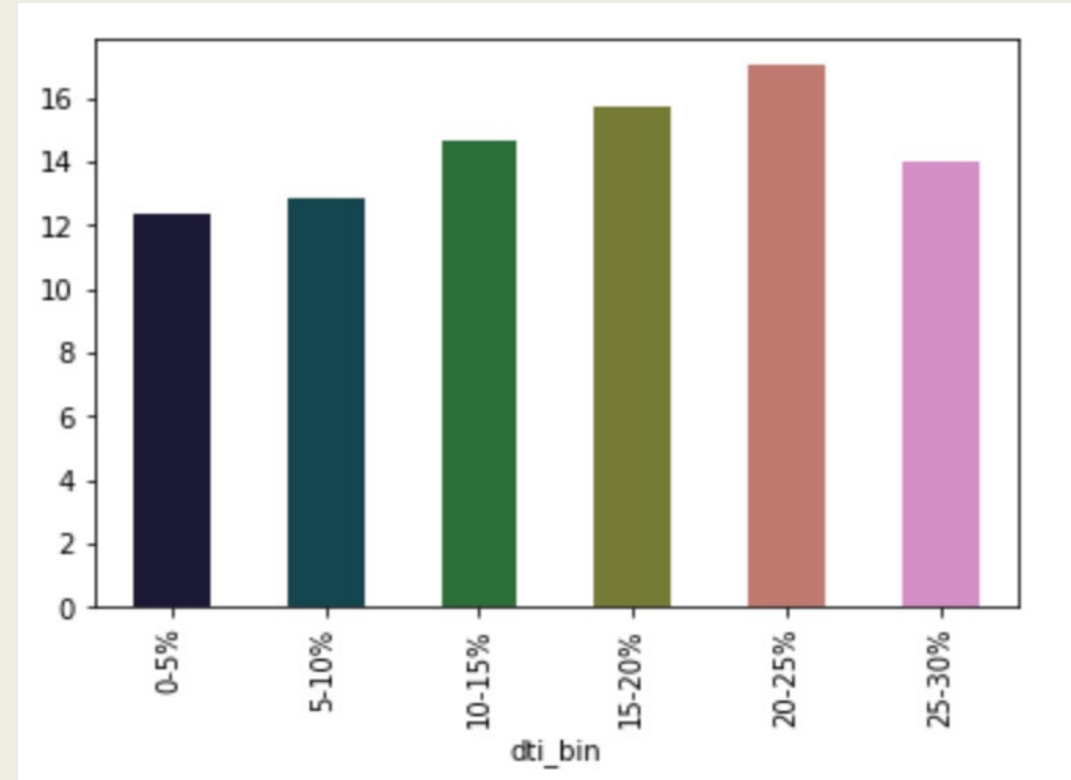


loan_status	Charged Off	Fully Paid
emp_length		
1 year	14.546620	85.453380
10+ years	15.827163	84.172837
2 years	13.298504	86.701496
3 years	13.905775	86.094225
4 years	13.858364	86.141636
5 years	14.372212	85.627788
6 years	14.225352	85.774648
7 years	15.489614	84.510386
8 years	14.306152	85.693848
9 years	12.956811	87.043189
< 1 year	14.211712	85.788288

Most of the loans are taken by employees with more than 10 years exp (~25%).  
But Charge-off rate across all the categories is same.

## ANALYSIS – DTI (Debt to Income Ratio)

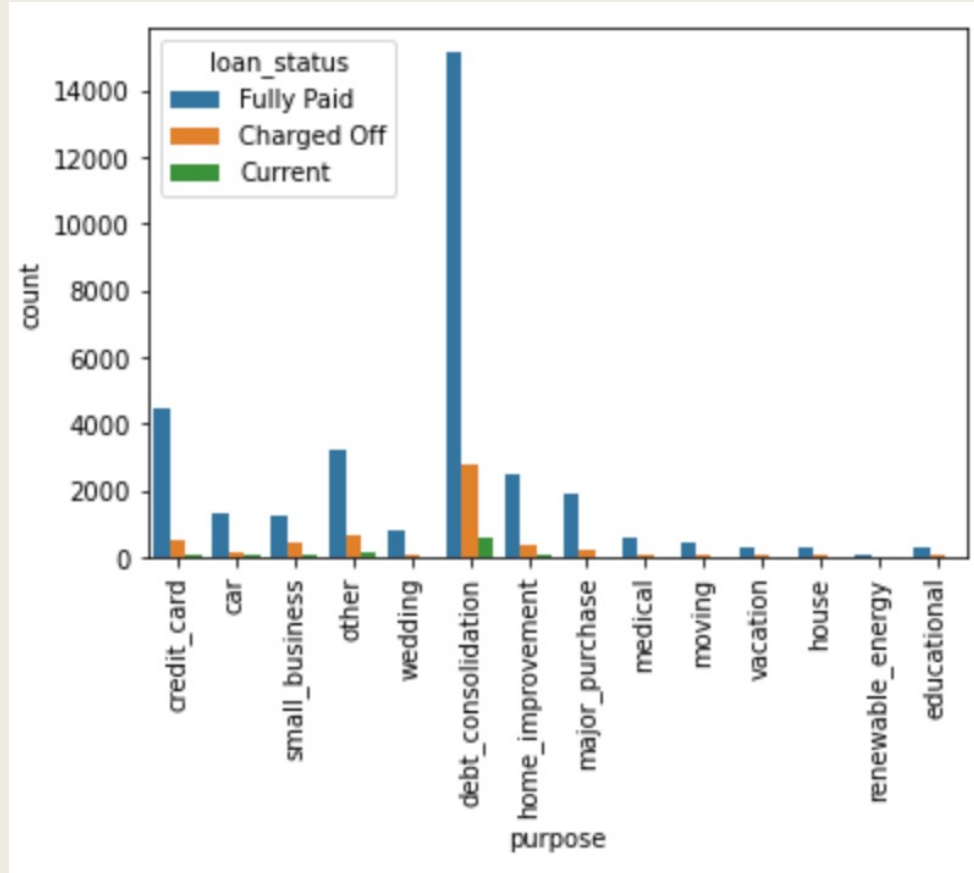
dti_bin	0-5%	5-10%	10-15%	15-20%	20-25%	25-30%
loan_status						
Charged Off	12.384632	12.879086	14.643423	15.753896	17.0255	14.009662
Fully Paid	87.615368	87.120914	85.356577	84.246104	82.9745	85.990338



Charge-off Percentage is increasing with the increase in DTI



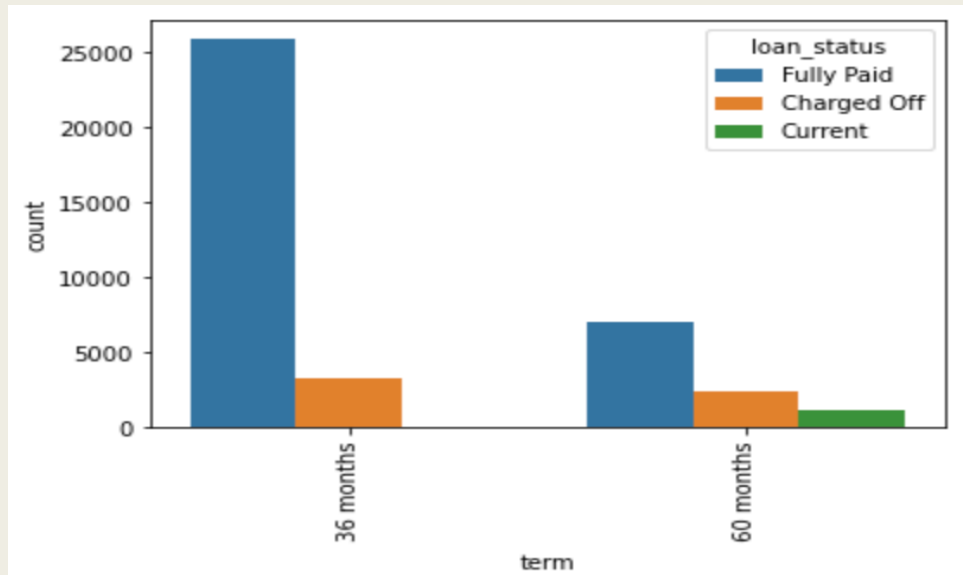
# ANALYSIS – Loan Purpose



loan_status	Charged Off	Fully Paid
purpose		
small_business	27.620730	72.379270
renewable_energy	18.556701	81.443299
educational	16.927900	83.072100
other	16.279683	83.720317
house	16.147309	83.852691
medical	16.036309	83.963691
moving	15.901060	84.098940
debt_consolidation	15.426579	84.573421
vacation	14.247312	85.752688
home_improvement	12.226277	87.773723
car	10.818120	89.181880
credit_card	10.809717	89.190283
major_purchase	10.393925	89.606075
wedding	10.341034	89.658966

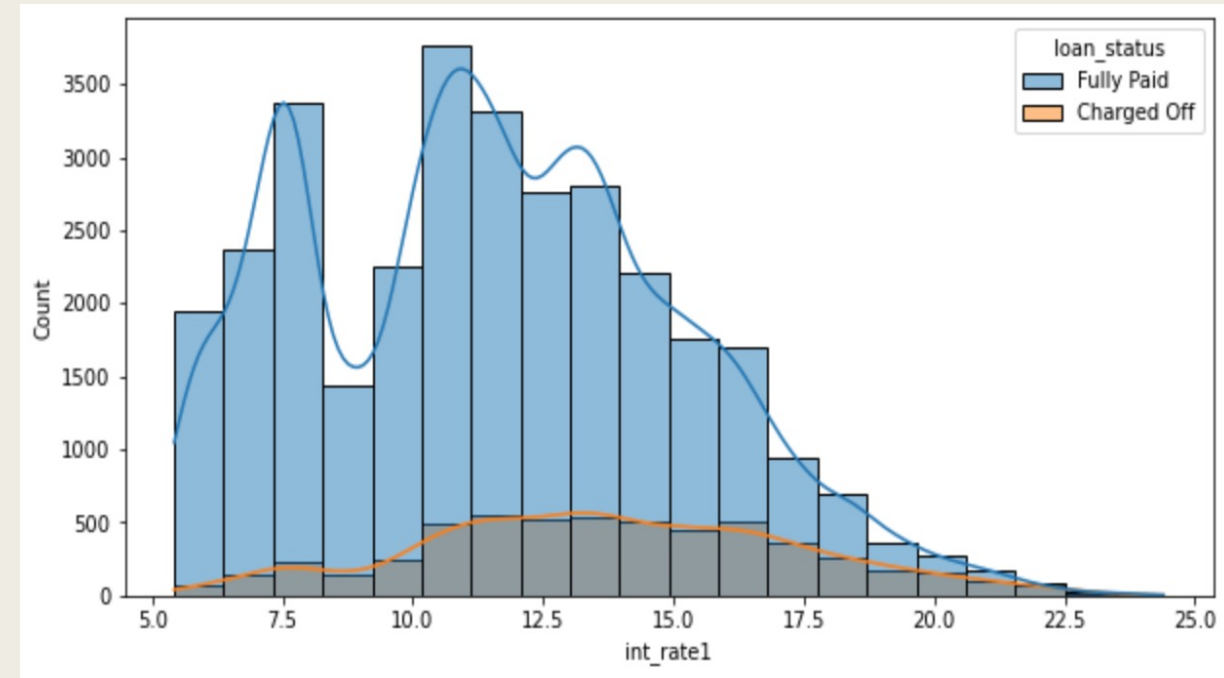
Majority of the loans (40-50%) are for Debt Consolidation but Charged-Off loan percentage is not comparative high. Loans for Small business/ Renewable Energy have high charge-off rate.

# Analysis – Term & Interest



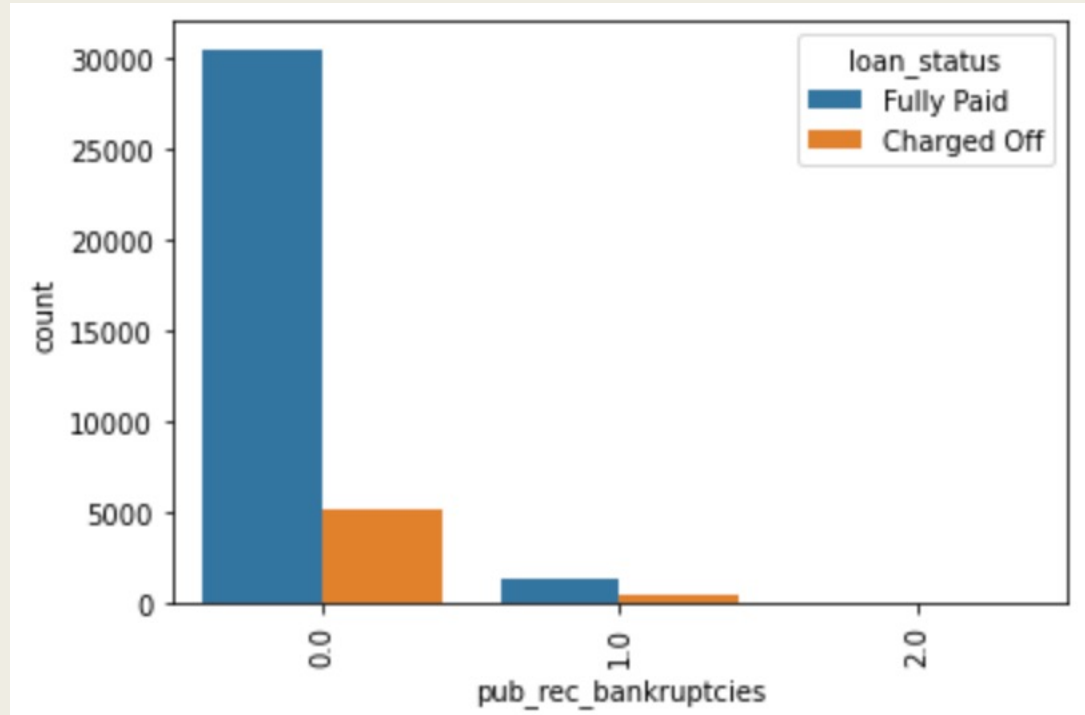
loan_status	Charged Off	Current	Fully Paid
term			
36 months	11.10687	NaN	88.893130
60 months	22.69740	10.724831	66.577769

Majority of the loans are short-term (36 months) but the charged-off rate is very high in long-term loans (60 months).



There is a spike in Charged off cases when interest rates between 11%-17%.

# Analysis – Public Bankruptcies

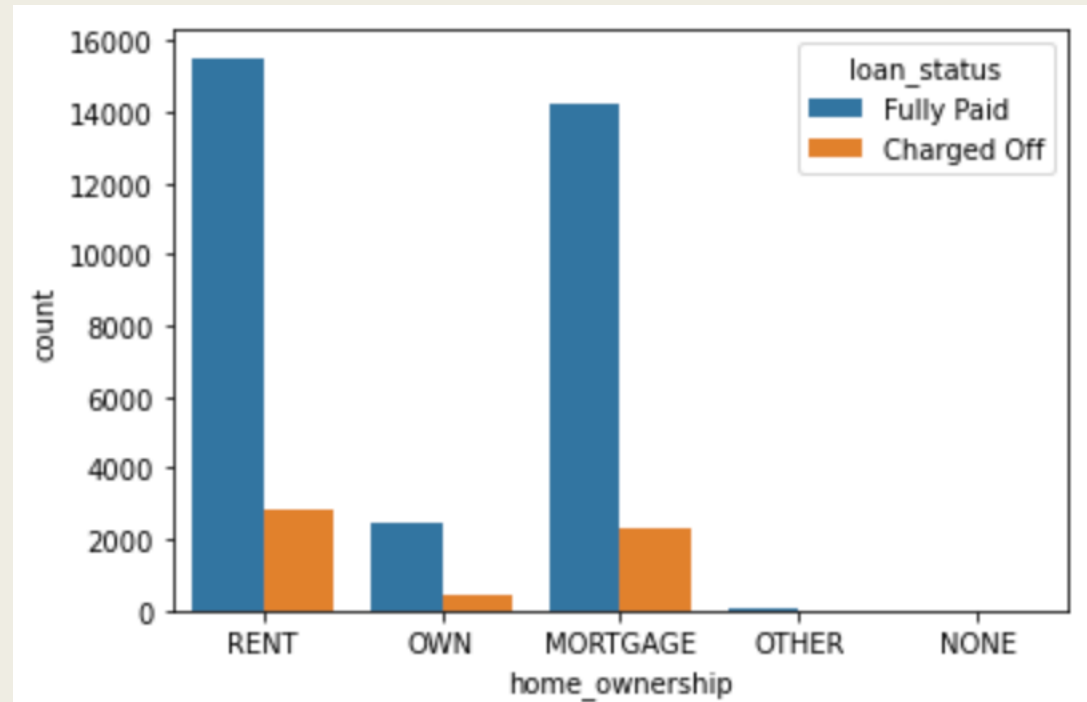


	id	
pub_rec_bankruptcies		
0.0	35507	
1.0	1624	
2.0	5	

loan_status	Charged Off	Fully Paid
pub_rec_bankruptcies		
0.0	14.273242	85.726758
1.0	22.413793	77.586207
2.0	40.000000	60.000000

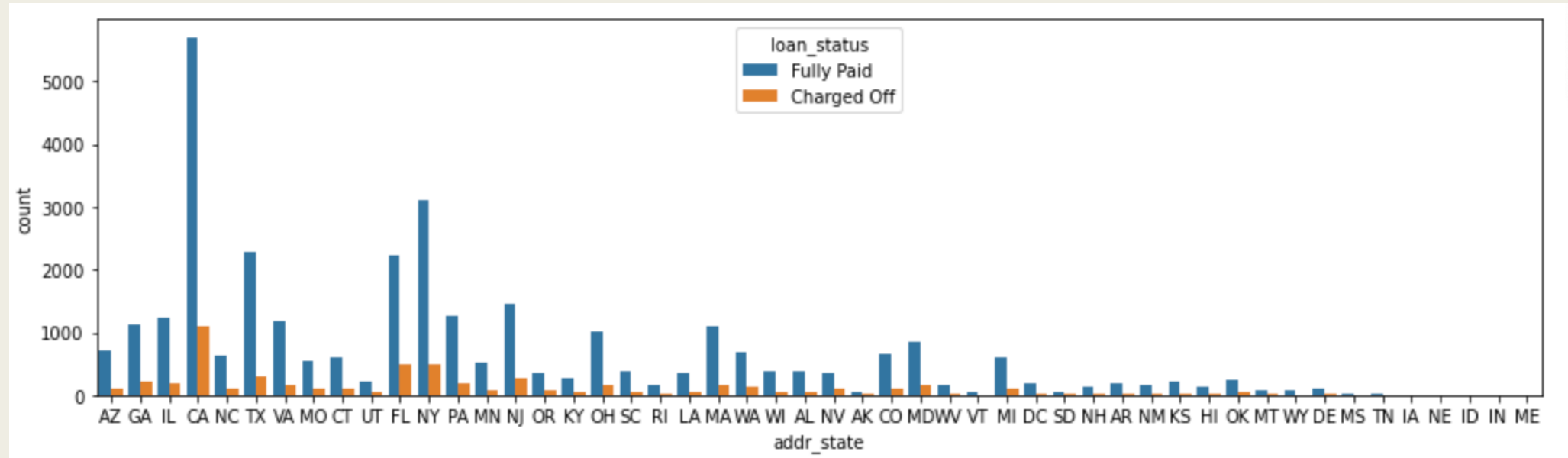
Majority of the clients have 0 Bankruptcies (~96%) but clients with Bankruptcies have a high chance of default/ Charged-off loan.

# Analysis – Home Ownership



Majority of the clients are lacking own properties and are on Rent, Mortgage. These type of clients have high Charge-off rate.

# Analysis - Location



Most of the loans are from CA. Charge-Off Rate from CA is also one of the highest compared to other states.

## Observation & Conclusion

1. Lending club Should consider/ focus more on DTI during the loan process. As Charge-off loan% is increasing with the increase in DTI ratio.
2. Majority of the loans which are defaulted are from grades B, C ,D. So loans under these categories need more focus.
3. Loans for Small business/ Renewable Energy have high charge-off rate. So loans for these purposes need more focus.
4. Loans having higher interest rates have more defaulters. Hence, check the background of applicant thoroughly , if the interest rate is high.
5. Cities like CA, NY which high number of loans as well as high charged-off/ defaulted loans.
6. The charged-off rate is very high in long-term loans (60 months), almost double to short-term loans. So Long term loans have high risk.
7. Clients with Bankruptcies have a high chance of default/ Charged-off loan.