



Lending Club Case Study

Background – Lending Club Case Study

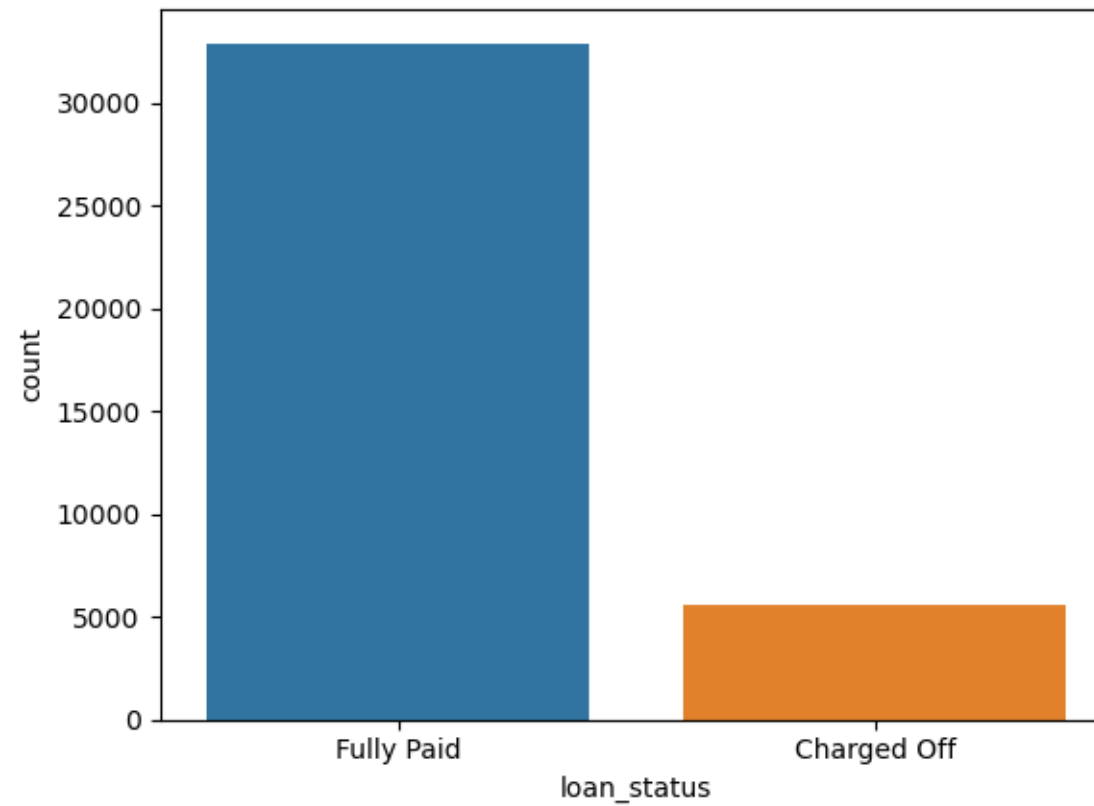
As a consumer finance company, lending club specializes in lending various types of loans to urban customers. When the company receives a loan application, the company has to make a decision for loan approval based on the applicant's profile. Lenders decide 1) whether to lend and 2) the terms of loan such as interest rate, monthly instalment, tenure etc.

Business Objective

To identify variables which are strong indicators of default and potentially use the insights in approval / rejection decision making.

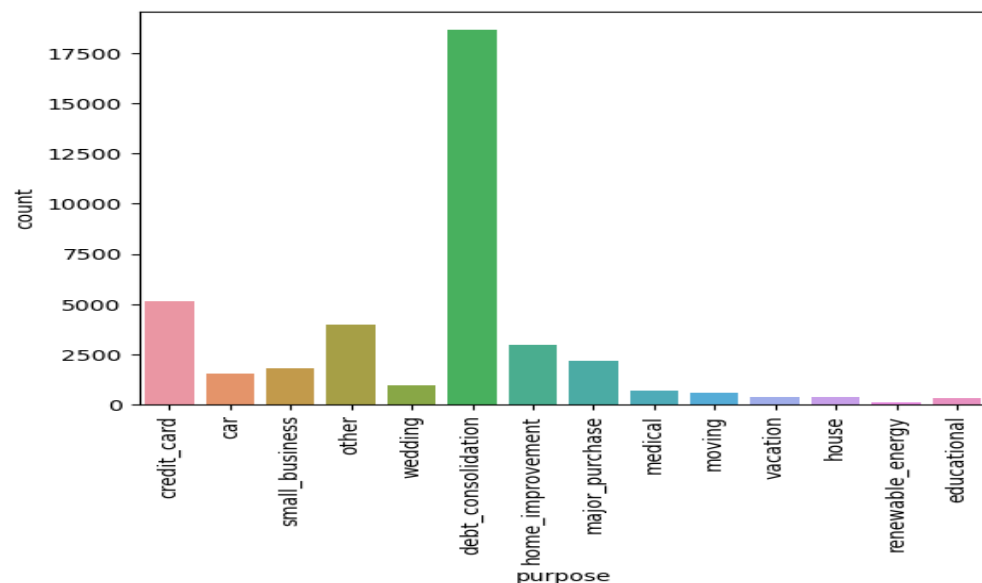
Data Understanding

15.6% of loans are charged off

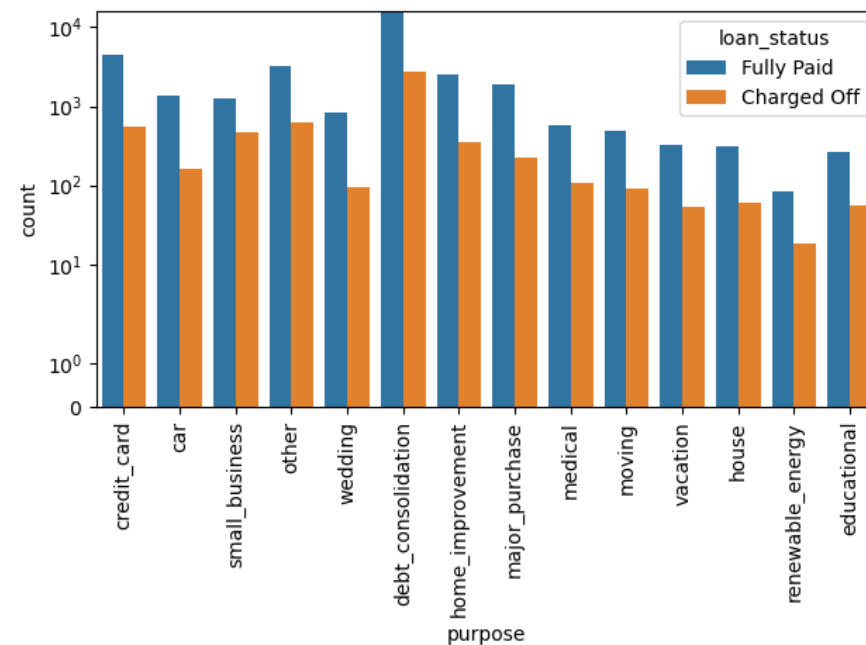


ANALYSIS ON CATEGORICAL DATA

Loan Purpose vs. Loan Status



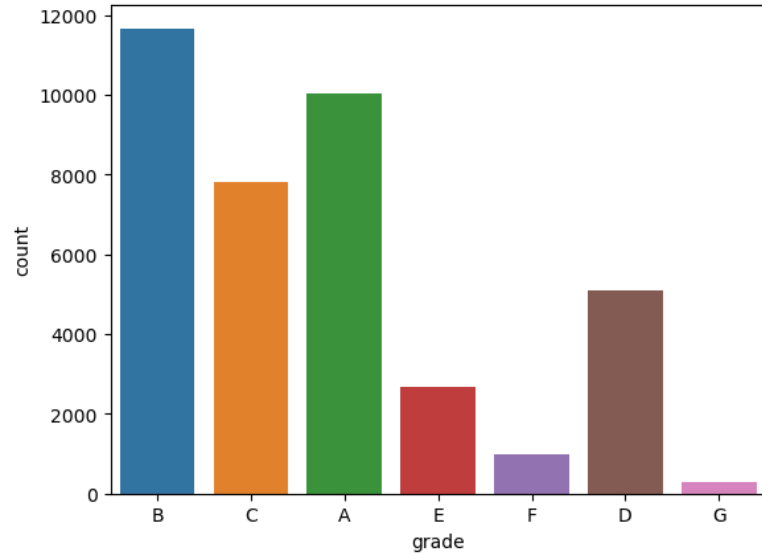
- 47 percent of the loans have purpose as Debt consolidation
- Debt consolidation is the most common purpose why people take loans followed by credit card payment (which is also a sort of debt).



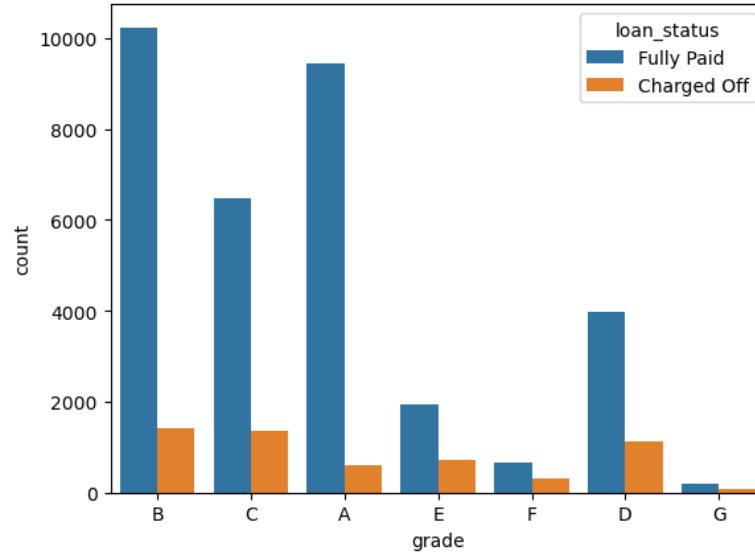
Percentage of Charged Off loans against Purpose

- Small business: 27%
- House: 17%
- Educational: 16%
- Debt consolidation: 15%
- Credit card: 10%
- Major purchase: 10%

Loan Grade vs. Loan Status.



B grade loans are most common, over 30%



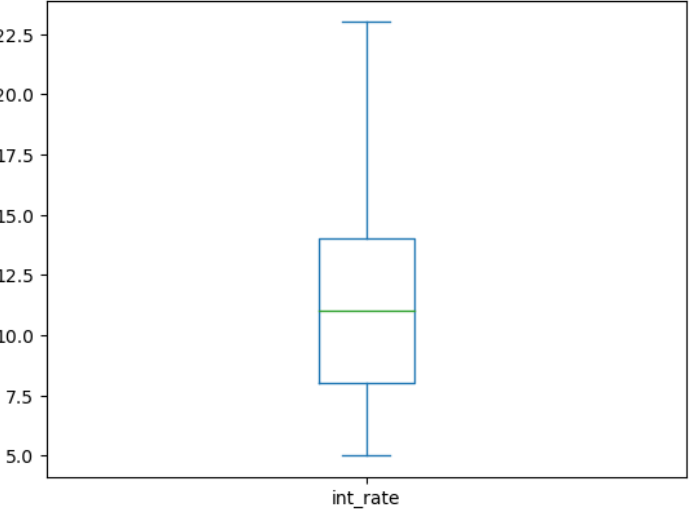
Percentage of Charged Off loans against Grades.

- Grade A: 6 %
- Grade B: 12 %
- Grade C: 17 %
- Grade D: 21 %
- Grade E: 26 %
- Grade F: 32 %
- Grade G: 33 %

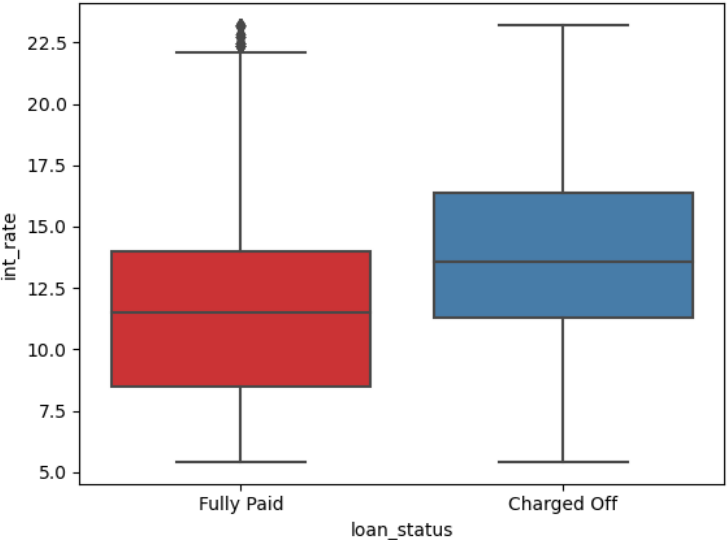
It is evident that as the Grade of the loan increases the percentage of charged off loan increases.

Interest Rate vs. Loan Status

Most loans have interest rate between 7.5 to 15.0.



As interest rate increases Fully paid loans has decreased and Charged off loans increased.

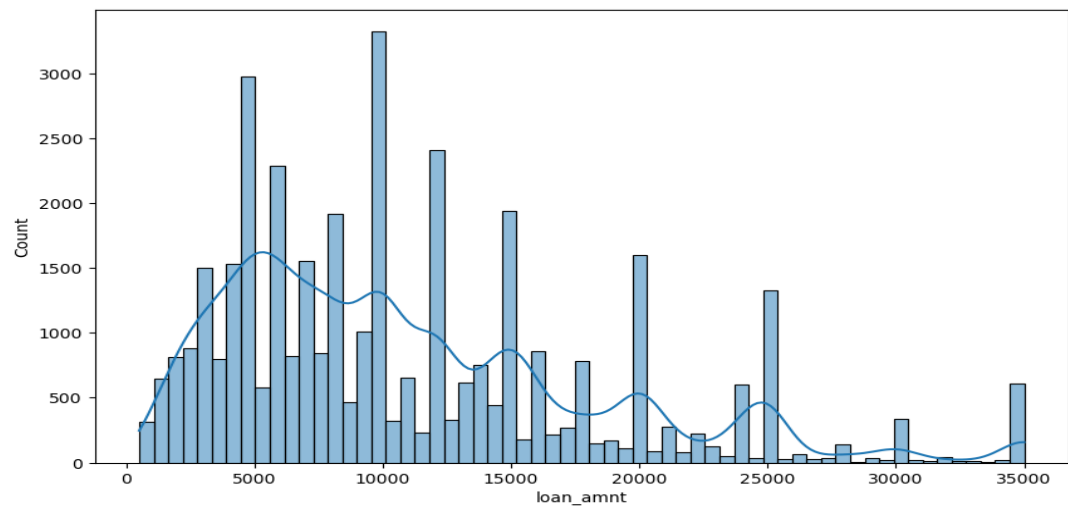


Bivariate analysis between Loan Status and Interest Rate

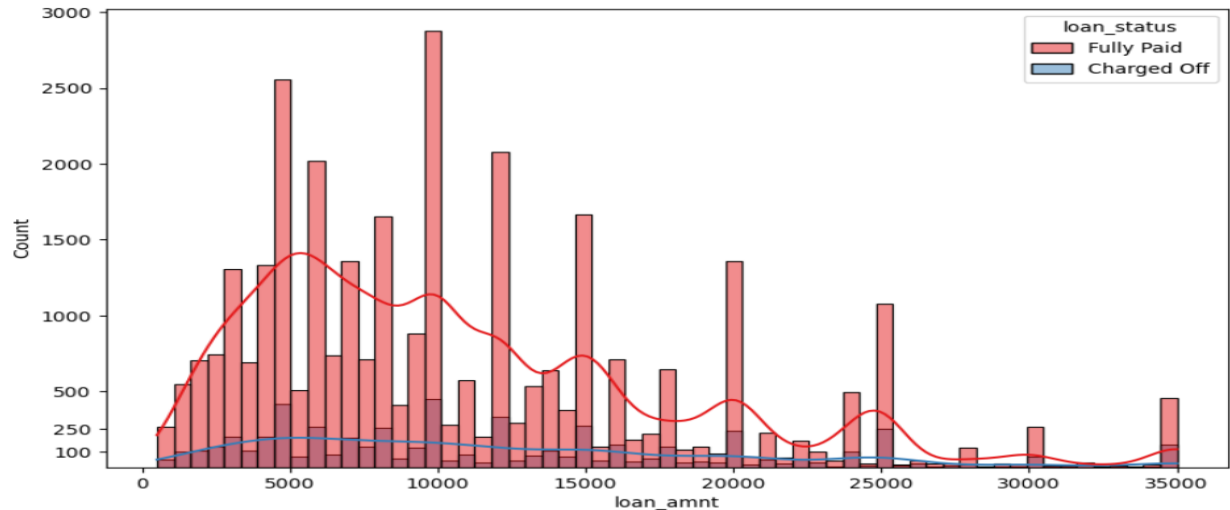
Count of loan_status	Column Labels				
Interest Rate	Charged Off	Fully Paid	Grand Total	Relative percentage of Charged Off Loans	Relative percentage of Fully Paid Loans
3-6	55	1275	1330	4.14	95.86
6-9	530	7936	8466	6.26	93.74
9-12	1310	9533	10843	12.08	87.92
12-15	1639	8268	9907	16.54	83.46
15-18	1352	4398	5750	23.51	76.49
18-21	587	1314	1901	30.88	69.12
21-24	140	177	317	44.16	55.84
Grand Total	5613	32901	38514	14.57	85.43
• From the above analysis it is evident that as Interest rate increases Charged off loans percentage decreases					

Loan Amount vs. Loan Status

Most loan amounts were between 5000 and 15000. Many outliers in the data.



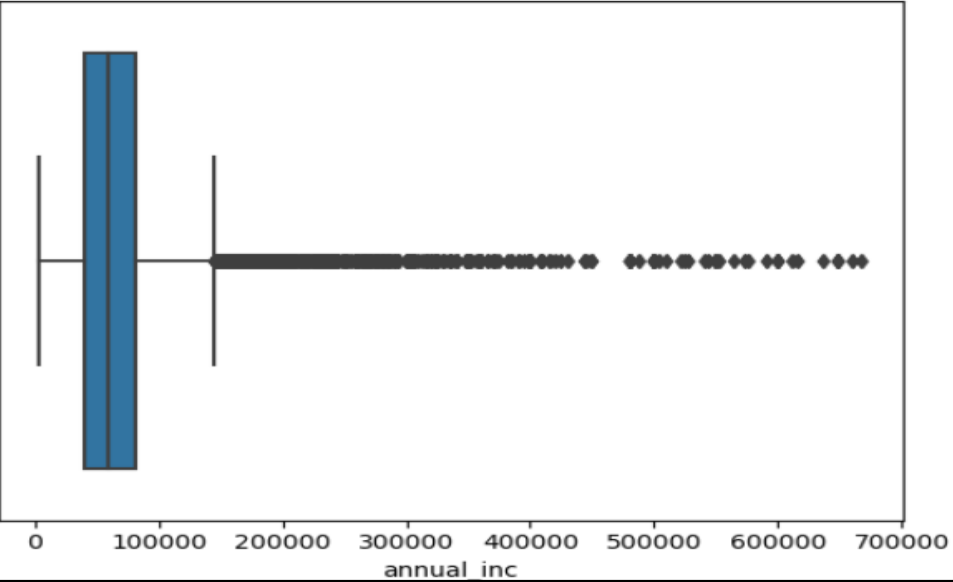
From the plot it is evident that as Loan amount increases Fully paid loans has decreased and Charged off loans increased.



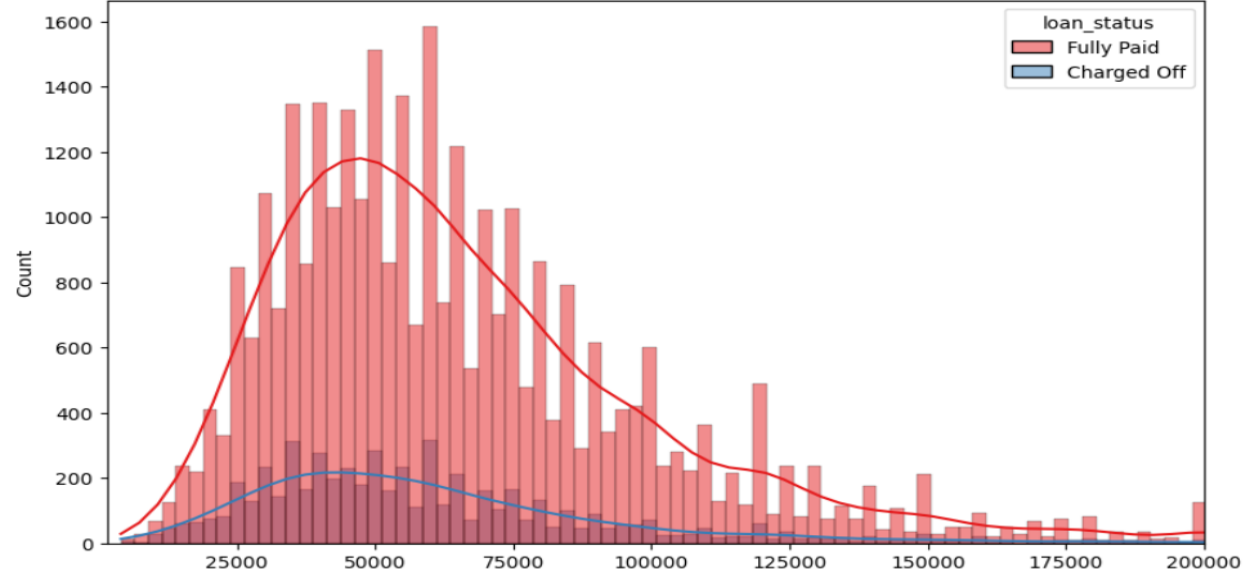
Bivariate analysis between Loan Status and Loan Amount					
Count of loan_status	Column Labels				
Loan Amount	Charged Off	Fully Paid	Grand Total	Relative percentage of Charged Off Loans	Relative percentage of Fully Paid Loans
0-4999	1027	6411	7438	13.81	86.19
5000-9999	1566	10444	12010	13.04	86.96
10000-14999	1154	7487	8641	13.35	86.65
15000-19999	783	3863	4646	16.85	83.15
20000-24999	512	2524	3036	16.86	83.14
25000-29999	325	1354	1679	19.36	80.64
30000-35000	246	818	1064	23.12	76.88
Grand Total	5613	32901	38514	14.57	85.43
• From the above analysis it is evident that as the Loan amount increases Charged Off loans percentage increases					

Annual Income vs. Loan Status

Most loans applicants are having Annual Income from 30000 to 75000



It is evident that income level from 1500 to 25000 annual income has more defaulters

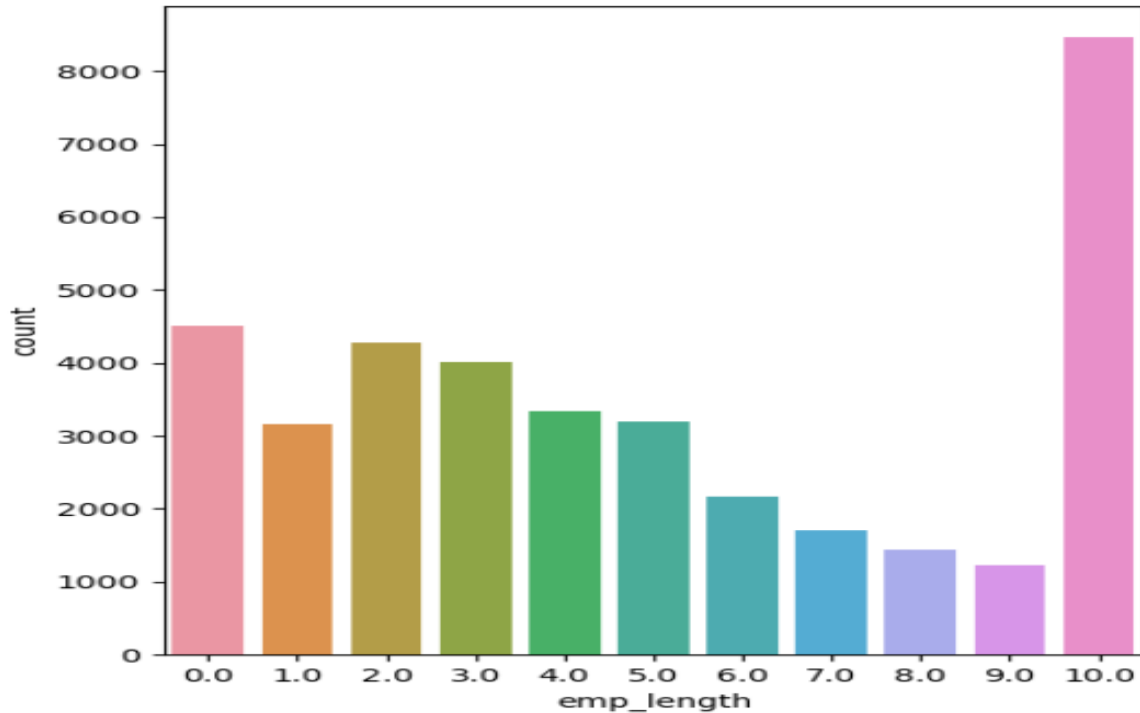


Bivariate analysis between Loan Status and Annual Income

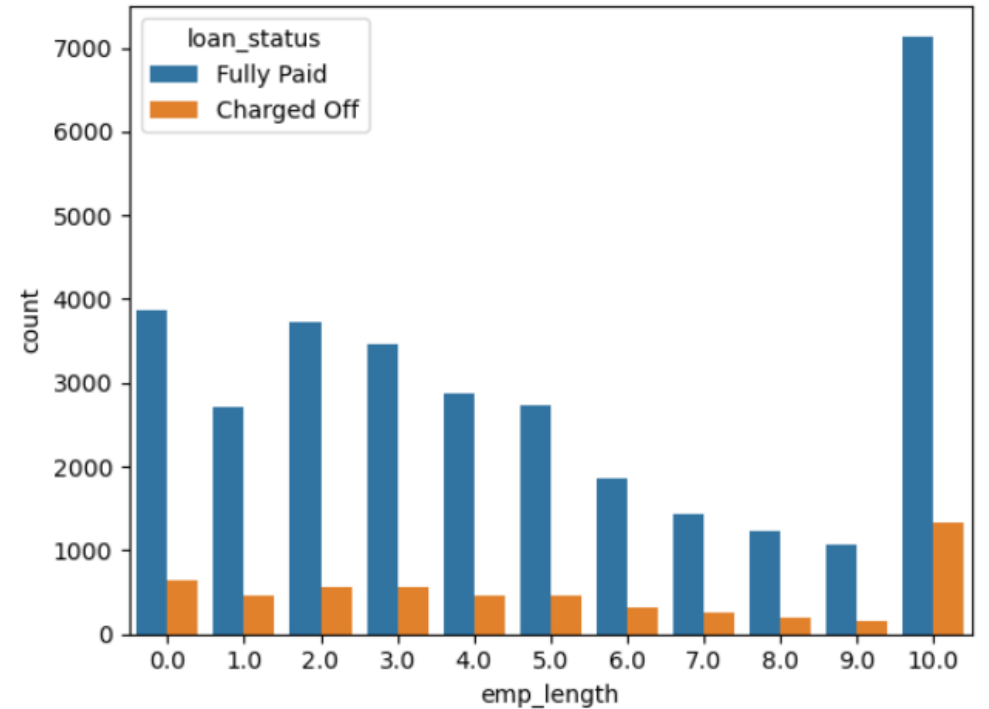
Count of loan_status	Column Labels				
Annual Income	Charged Off	Fully Paid	Grand Total	Relative percentage of Charged Off Loans	Relative percentage of Fully Paid Loans
0-15000	104	326	430	24.19	75.81
15000-30000	596	2717	3313	17.99	82.01
30000-45000	1339	6530	7869	17.02	82.98
45000-60000	1182	6695	7877	15.01	84.99
60000-75000	966	5809	6775	14.26	85.74
75000-90000	550	3720	4270	12.88	87.12
90000-105000	332	2597	2929	11.33	88.67
105000-120000	146	1317	1463	9.98	90.02
120000-135000	152	1172	1324	11.48	88.52
135000-150000	89	732	821	10.84	89.16
>150000	157	1286	1443	10.88	89.12
Grand Total	5613	32901	38514	14.57	85.43

• From the above analysis it is evident that as Annual Income increases Charged off loans percentage decreases

Employment Length vs. Loan Status



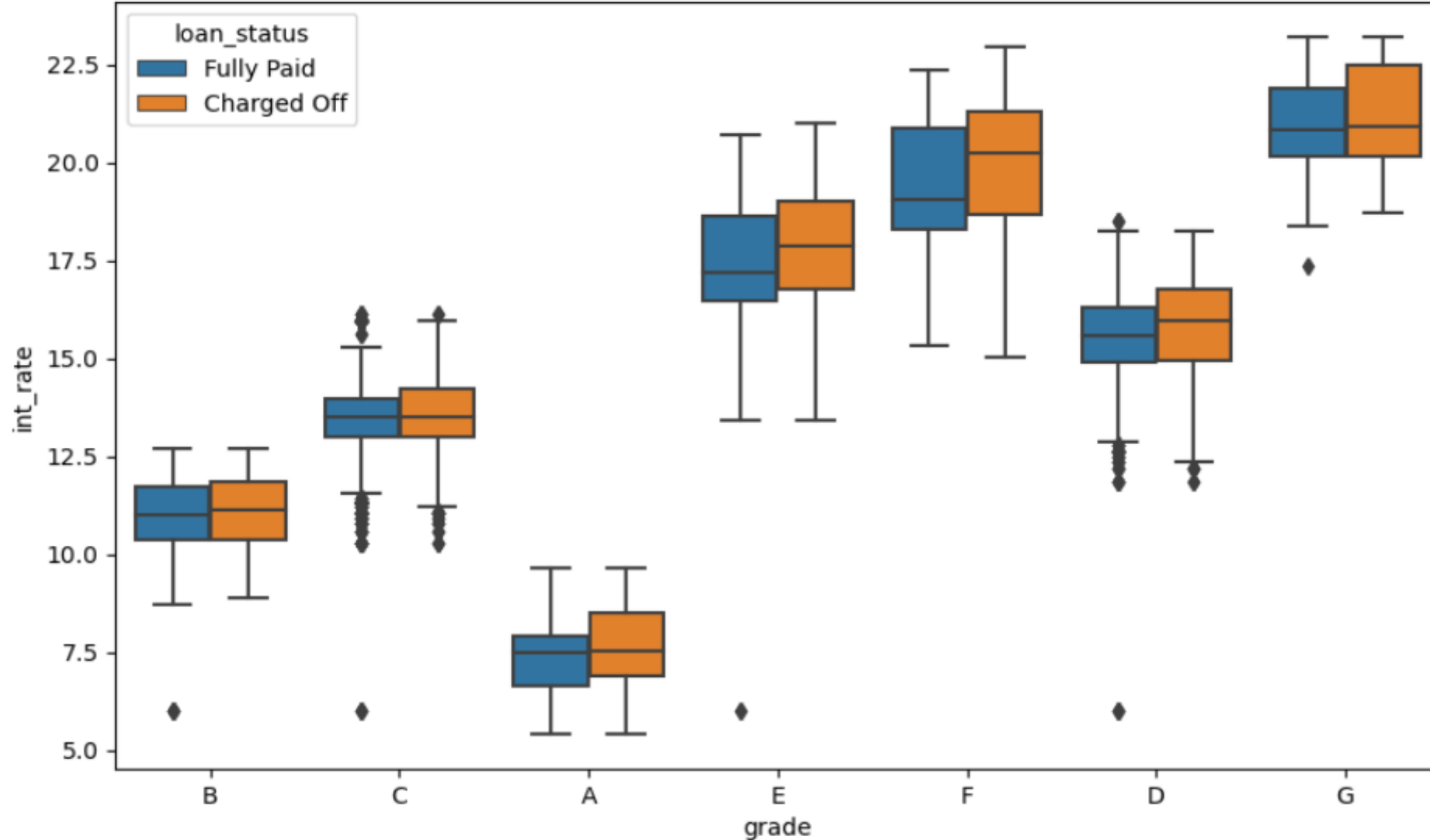
- 20 percent of the loans are taken by the employees with more than 10+ years employment length.
- 10+ years of employment is common but the surprising part is that the second most common loan takers are ones that are newly employed. (<1 year).



Percentage of charged off loans are little more for the employment length equal to 7 and 10 years.

Multivariate Analysis

Using the variables Loan Grade, Interest Rate and Loan Status



Findings

- Charged Off loans percentage is more for F- Grade loans with Interest Rate ranging from 18 – 22.5

Multivariate Analysis

Using the variables Loan Grade, Interest Rate and Loan Status

Count of loan_status	Column Labels				
Grade and Interest rate	Charged Off	Fully Paid	Grand Total	Relative percentage of Charged Off Loans	Relative percentage of Fully Paid Loans
A	602	9431	10033	6.00	94.00
3-6	55	1275	1330	4.14	95.86
6-9	511	7768	8279	6.17	93.83
9-12	36	388	424	8.49	91.51
B	1424	10238	11662	12.21	87.79
6-9	19	158	177	10.73	89.27
9-12	1203	8861	10064	11.95	88.05
12-15	202	1219	1421	14.22	85.78
C	1345	6479	7824	17.19	82.81
6-9	0	4	4	0.00	100.00
9-12	69	277	346	19.94	80.06
12-15	1146	5768	6914	16.58	83.42
15-18	130	430	560	23.21	76.79
D	1117	3966	5083	21.98	78.02
6-9	0	4	4	0.00	100.00
9-12	2	7	9	22.22	77.78
12-15	278	1240	1518	18.31	81.69
15-18	791	2619	3410	23.20	76.80
18-21	46	96	142	32.39	67.61
E	714	1947	2661	26.83	73.17
6-9	0	2	2	0.00	100.00
12-15	13	41	54	24.07	75.93
15-18	409	1303	1712	23.89	76.11
18-21	292	601	893	32.70	67.30
F	319	657	976	32.68	67.32
15-18	22	45	67	32.84	67.16
18-21	202	510	712	28.37	71.63
21-24	95	102	197	48.22	51.78
G	92	183	275	33.45	66.55
15-18	0	1	1	0.00	100.00
18-21	47	107	154	30.52	69.48
21-24	45	75	120	37.50	62.50
Grand Total	5613	32901	38514	14.57	85.43
Charged Off loans percentage is more for F- Grade loans with Interest Rate ranging from 21-24					

Findings

- F grade loans with an interest rate of 21-22.5%, have a very high charge off rate (48.22%)

Observations

Univariate Analysis

1. 84.5% loans are Fully Paid
2. 30% loans are B grade loans
3. 20 percent of the loans are taken by the employees with more than 10+ years employment length
4. 47 percent of the loans have purpose as Debt consolidation
5. 10+ years of employment is common but the surprising part is that the second most common loan takers are ones that are newly employed. (<1 year). It would be interesting to get some insight there.
6. Debt consolidation is the most common purpose why people take loans followed by credit card payment (which is also a sort of debt). We can combine these two and make a single variable (derived metrics). Also, it would be interesting to see whether such loans are easily paid off or they are mostly defaulted.
7. Most loan amounts were between 5000 and 15000. Many outliers in the data.
8. Most loans have interest rate between 7.5 to 15.

Bi Variate Analysis

1. As the Grade of the loan increases the percentage of charged off loan increases
2. The percentage of Charged off loans are more with purpose stated as small business
3. Members who are living on Rent has little more charged off loans compared to Mortgage and Own
4. As interest rate increases Fully paid loans has decreased and Charged off loans increased
5. As Loan amount increases Fully paid loans has decreased and Charged off loans increased
6. The income level from 1500 to 25000 annual income has more defaulters
7. Percentage of charged off loans are little more for the employment length equal to 7 and 10 years

Multi Variate Analysis

1. F Grade loans with an interest rate of 21-22.5%, have a very high charge off rate (48.22%)

Driving factors for Loan default

1. Interest Rate – 18% to 25%
 2. Annual Income – 1,500 to 25,000
 3. Loan Amount – 25,000 to 35,000
 4. Loan Grade – D, E, F, G
 5. Purpose – Small Business
- Above factors drives the probability of Loan Default