EDA : Lending club case study

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Problem Statement

Consumer finance company wants to understand the **driving factors (or driver variables)** behind loan default

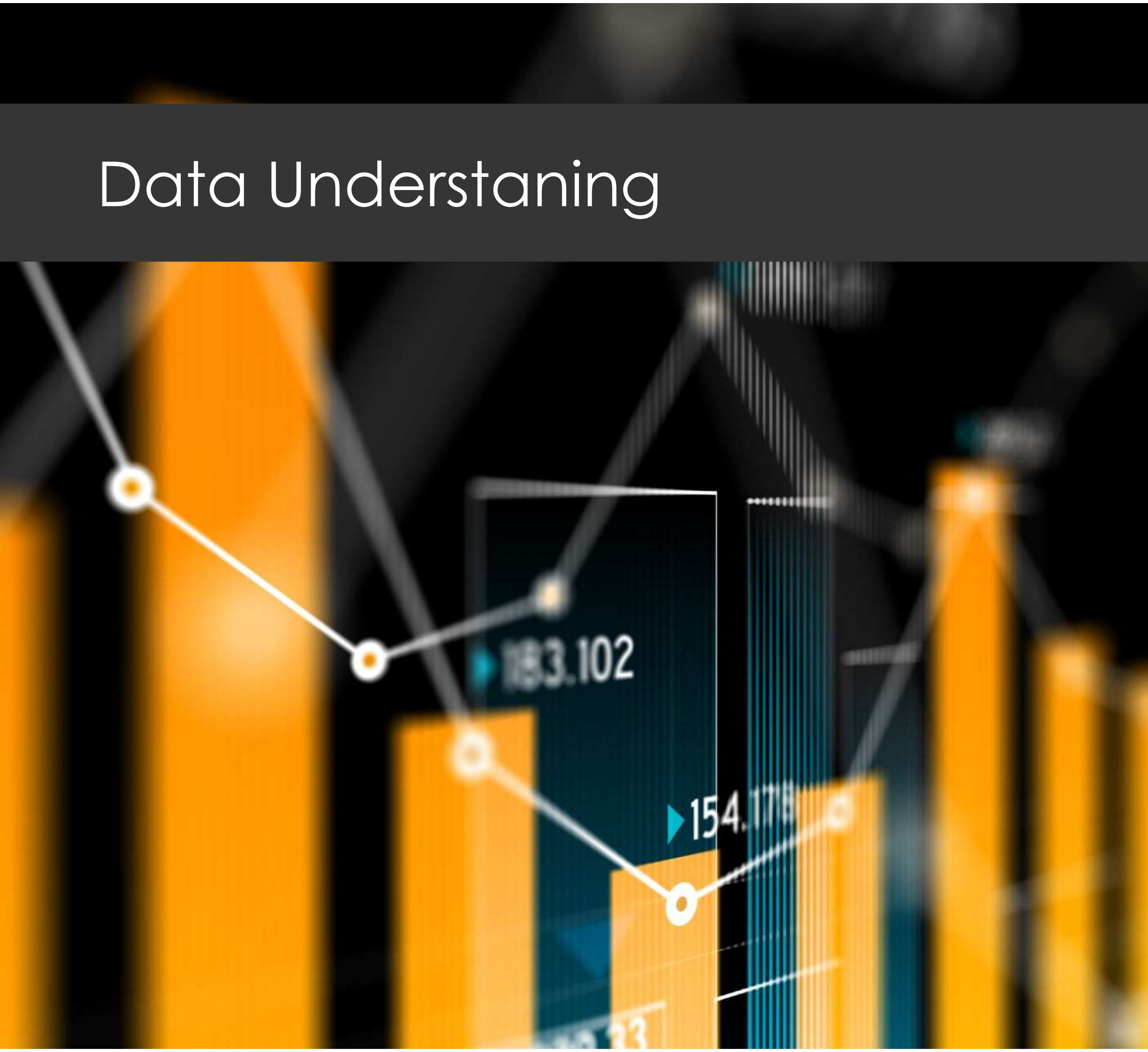
The company can utilize this knowledge for its portfolio and risk assessment

Analysis will help company to make a decision for loan approval based on the applicant's profile

Analysis approach

- Data understanding and sourcing
- Check data quality issues and fix missing values
- Perform univariate data analysis – categorical and numerical variables
- Perform bivariate data analysis - categorical and numerical variables
- Identify correlation between continues variables

Data Understaning



- ➨There are 111 columns having various data types like object, int, float and 305711 rows.
- ➨There are many columns with 0 values or NULL values.
- ➨There are columns with special characters like interest rate, employment length, standardizing is required

Data quality check

- There are 58 columns having missing value more than 30%. Hence we exclude these columns from analysis

```python
## list of columns where missing values are above 30%
nullcol_gt30 = (round((data.isnull().sum()*100/len(data)).sort_values(ascending = False),2))[round((data.isnull().sum()*100/len(data)).sort_values(ascending = False),2)>30]
```

✓ 0.9s Python

```python
print("Num of columns having missing values more than 30% :",len(nullcol_gt30))
```

✓ 0.3s Python

```
Num of columns having missing values more than 30% : 58
```

Data standardizing

- Convert emp_length column to int by removing special characters and alphabets

```
# Remove alhabets and extra characters and convert to numeric
data1['emp_length'].head(2)
```

[55] 0.5s

```
0     10+ years
1      < 1 year
Name: emp_length, dtype: object
```

```
# create new column 'emp_length_int' to get integer part from 'emp_legth' column,
#possible values are between 0 and 10 where 0 means less than one year and 10 means ten or more years.
data1['emp_length_int'] = data1['emp_length'].str.replace(" years",'')
data1['emp_length_int'] = data1['emp_length_int'].str.replace(".*1 year",'0')
data1['emp_length_int'] = data1['emp_length_int'].str.replace("10\+",'10')
```

[21] 0.8s

```
data1[['emp_length_int']]
```

[23] 0.5s

	emp_length_int
0	10
1	0
2	10

Data standardizing

- Clean up int_rate column to int by removing '%'character and convert to numeric

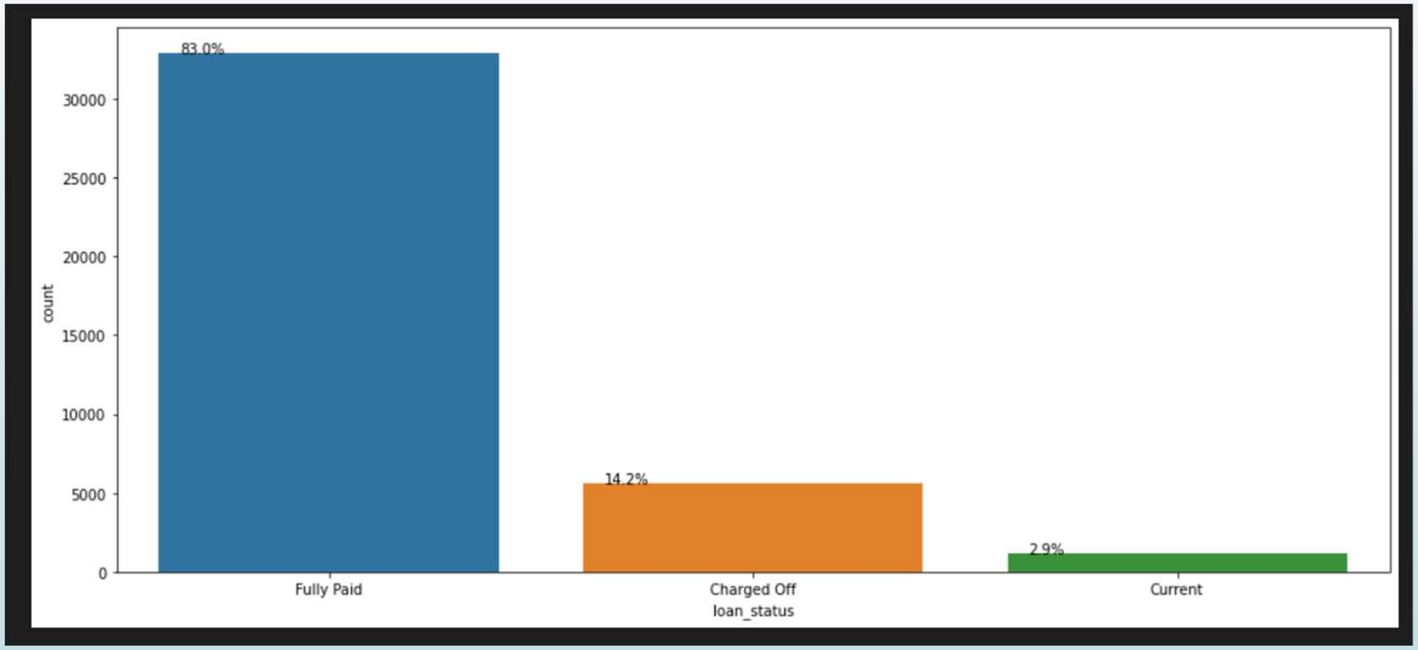
```
# Cleantup -remove % sign and convert to int
data1['int_rate'] = data1['int_rate'].str.replace("%",'')
[29] ✓ 0.4s

data1['int_rate'] = pd.to_numeric(data1['int_rate'] )
[30] ✓ 0.6s

data1['int_rate'] .head()
[31] ✓ 0.4s
...  0    10.65
     1    15.27
     2    15.96
     3    13.49
     4    12.69
     Name: int_rate, dtype: float64
```

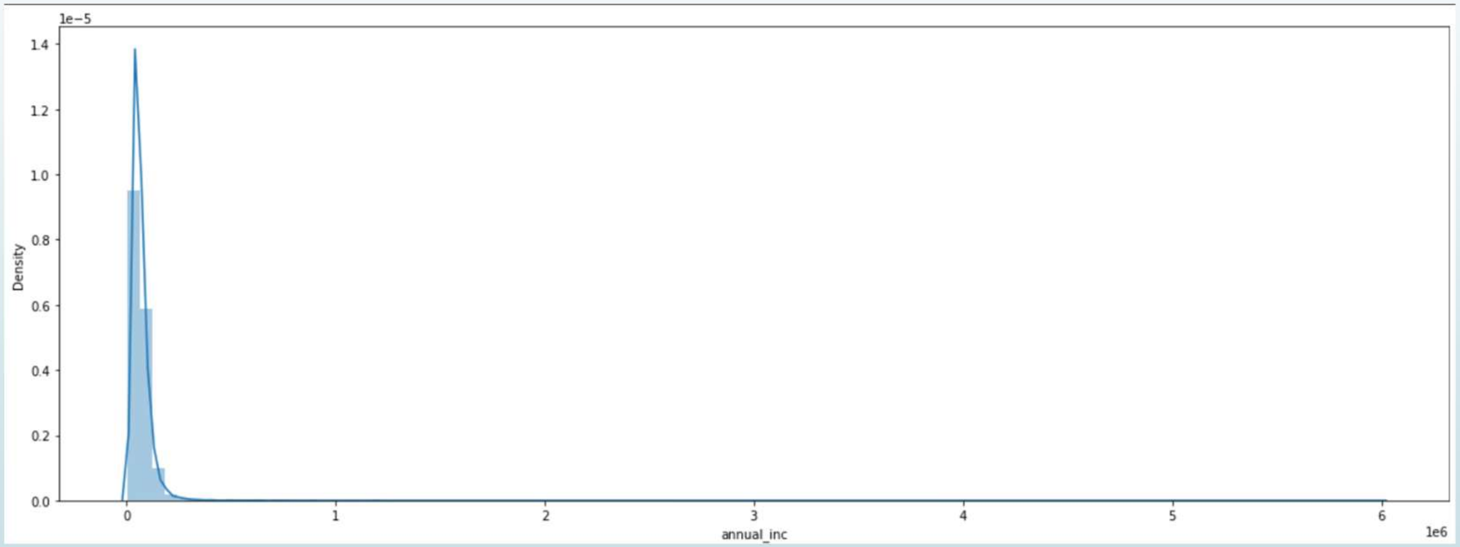
Univariate analysis

Categorical column 'loan_status':
Out of 39717 applicants, 14.2% that is 5609 applicants defaulted.



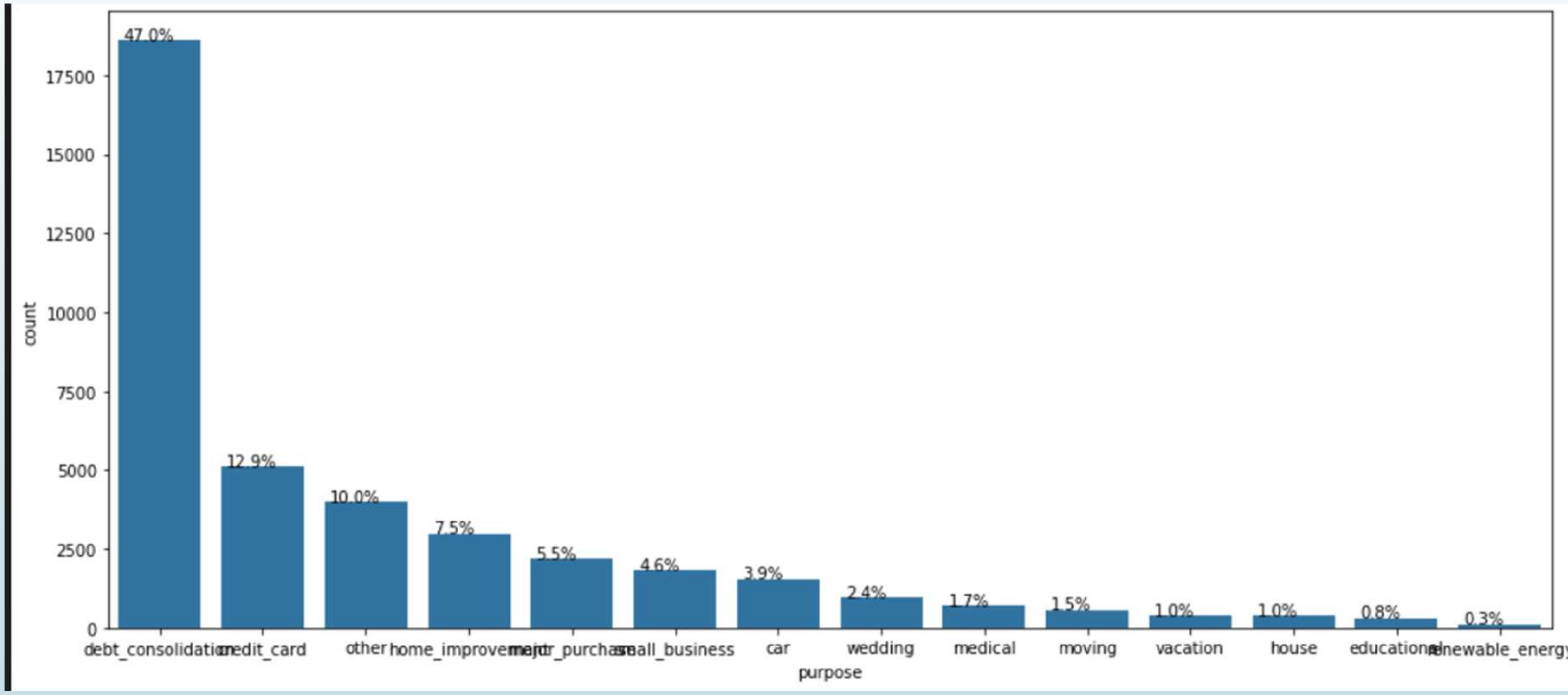
Univariate analysis

Annual Income:
Most of applicants have income less than 50000



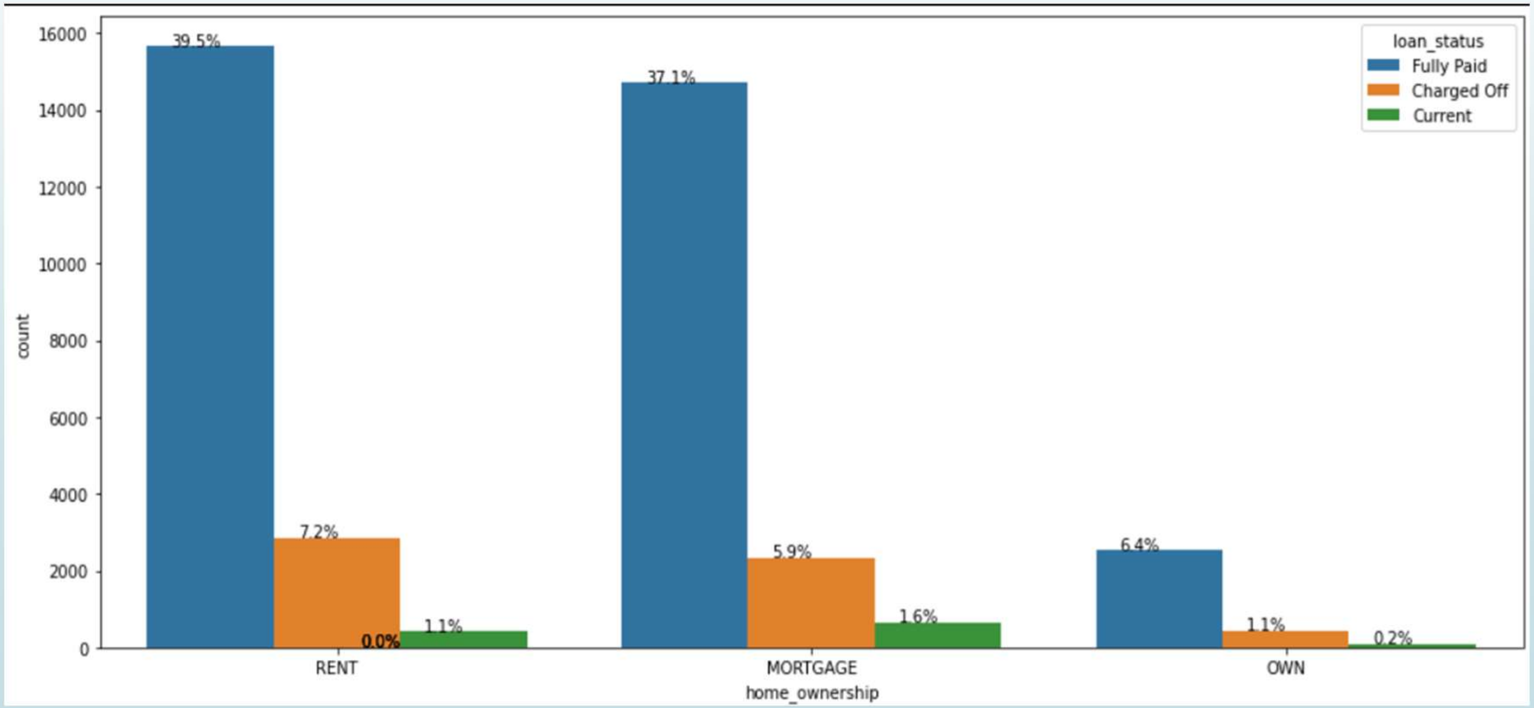
Univariate analysis

Loan Purpose:
Majority of loan - 47% falls under debt consolidation category



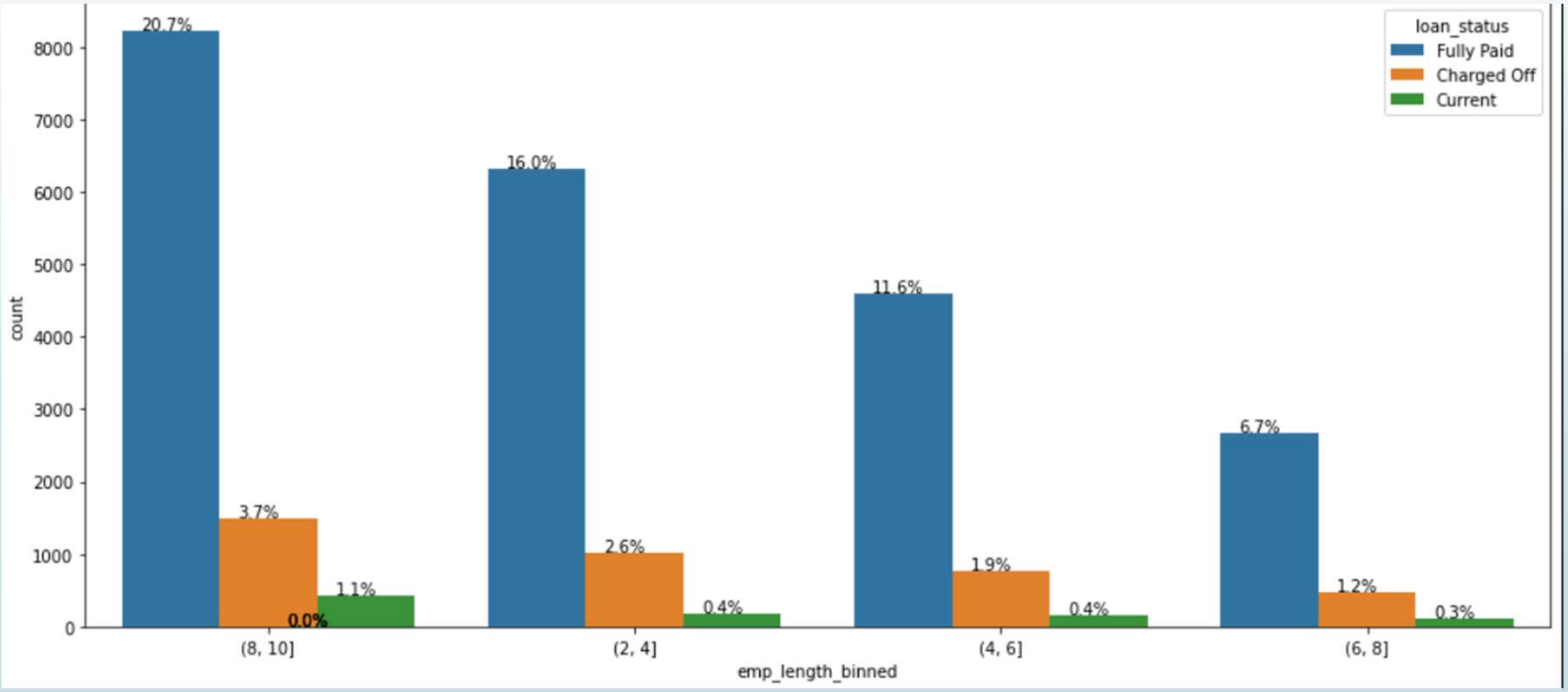
Bivariate analysis

Home Ownership vs loan status of applicants:
Approx 48% of applicants live in rented home and 45% of applicants have mortgage on their house. There are very less loan applications from house owners.



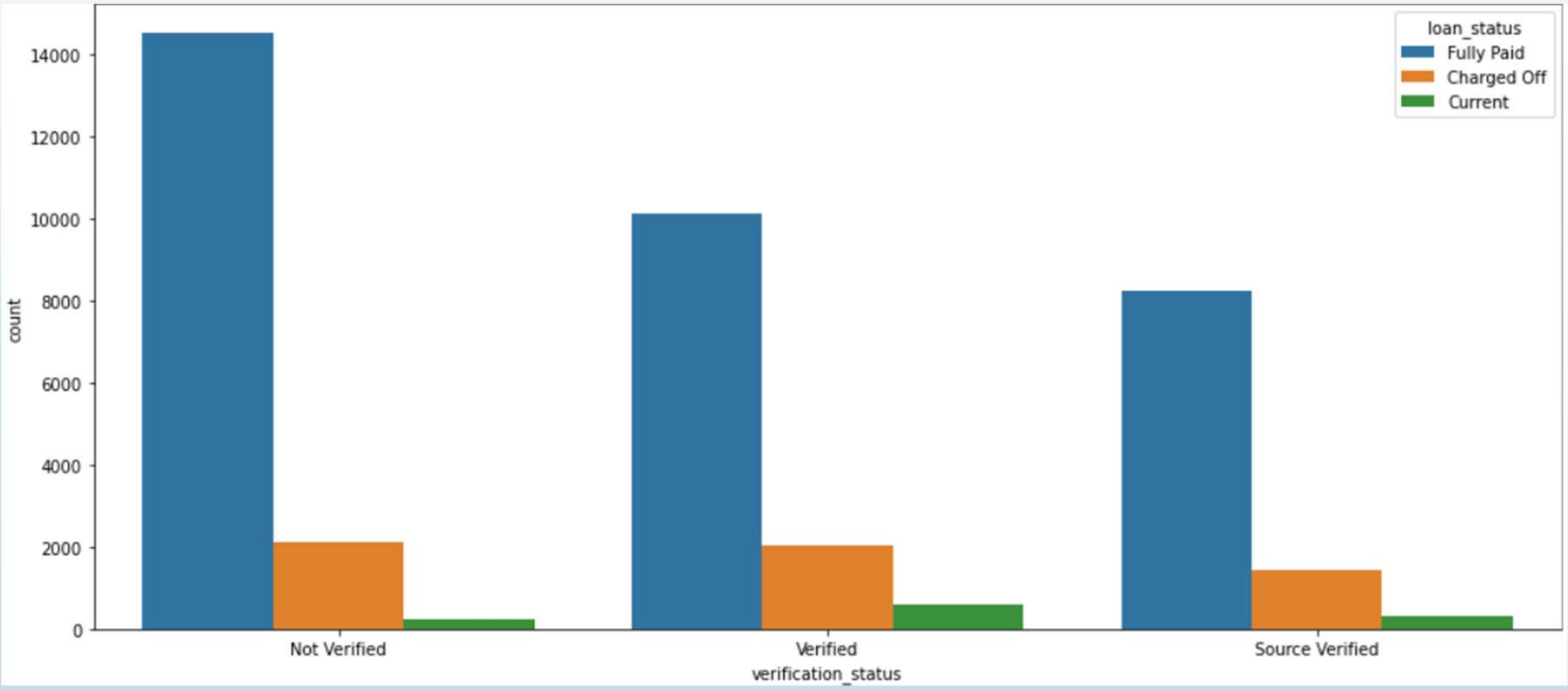
Bivariate analysis

Employment length vs Loan status of applicants:
There is not much difference in defaulters with respect employment length



Univariate analysis

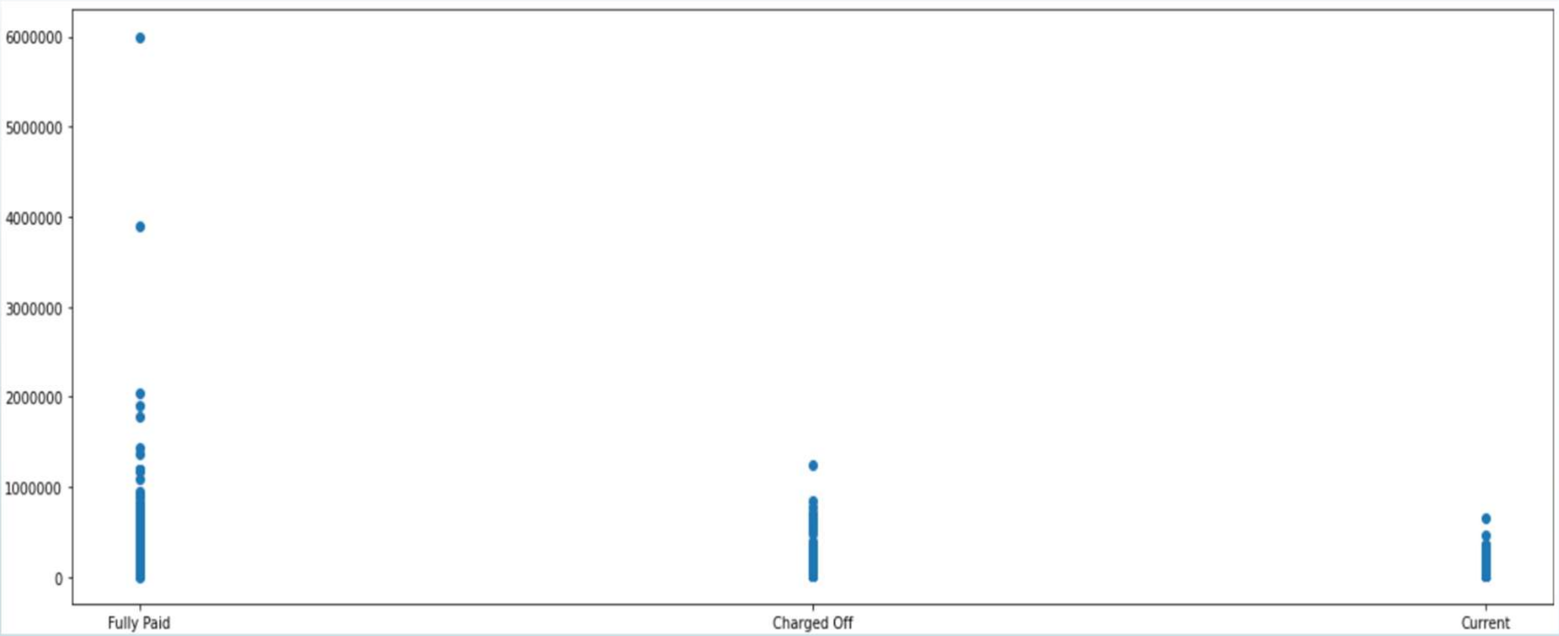
Application verification vs loan status:
From not verified, around 86% applicants fully repaid loan, apund 12.64% charged off
Charged off percentage is higher 16% in Source verified category, compared to other two.



Bivariate Analysis

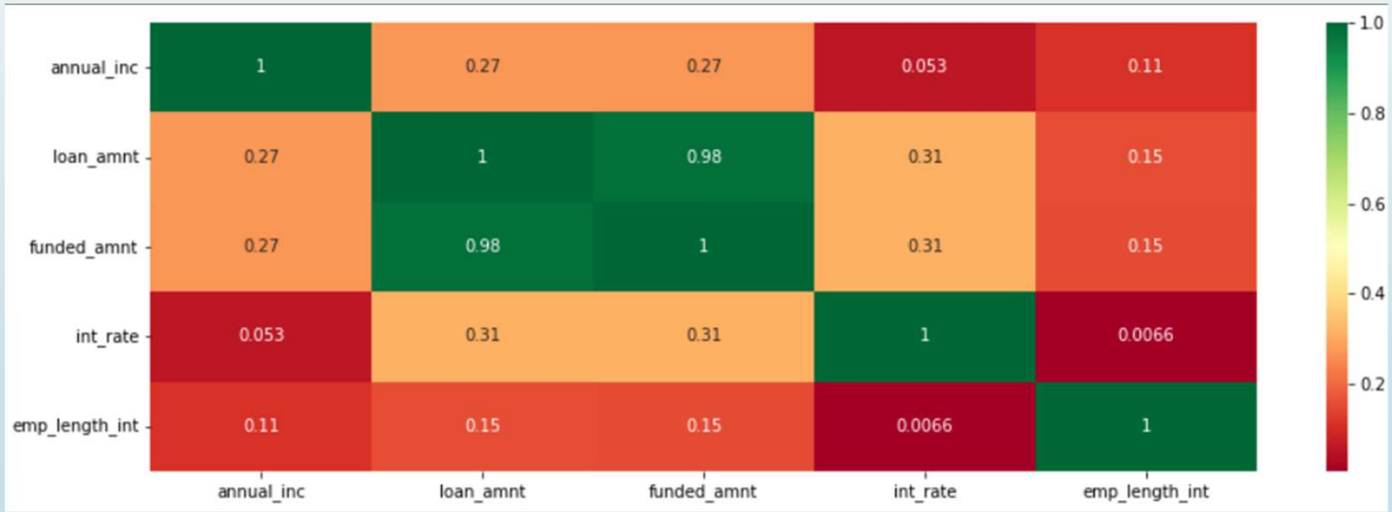
Annual Income:

All the defaulters have annual income below 150000



Correlation

- There is strong correlation between funded amount and loan amout
- Loan amount and funded amout shows positive correlation with Annual income
- Loan amount and funded amout shows positive correlation with interest rate
- Correlation is less between employment length and annual income, loan amount and funded amount.



Conclusion

Decisive Factor whether applicant will be defaulter:

1. Annual_income: Annual income below 150000 have more defaults.
2. Verification status: Source verification has less defaults than not verified and verified.
3. Housing status with Rent is having more defaults.

Thank you