LENDING CLUB CASE STUDY

SUBMISSION

Name:

- **Deepthi A R**
- **Aniruth Krishnan K**

Abstract

- A consumer finance company which specialises in lending various types of loans to urban customers has to make a decision for loan approval based on the applicant's profile when the company receives a loan application

- The aim is to identify patterns which indicate if a person is likely to default, which may be used for taking actions such as denying the loan, reducing the amount of loan, lending at a higher interest rate, etc.

Credit Risk Analysis

Two types of risks are associated with the bank's decision:

- If the applicant is **likely to repay** the loan, then not approving the loan results in a loss of business to the company

- If the applicant is not likely to repay the loan, i.e. he/she is **likely to default**, then approving the loan may lead to a financial loss for the company

Decision Making

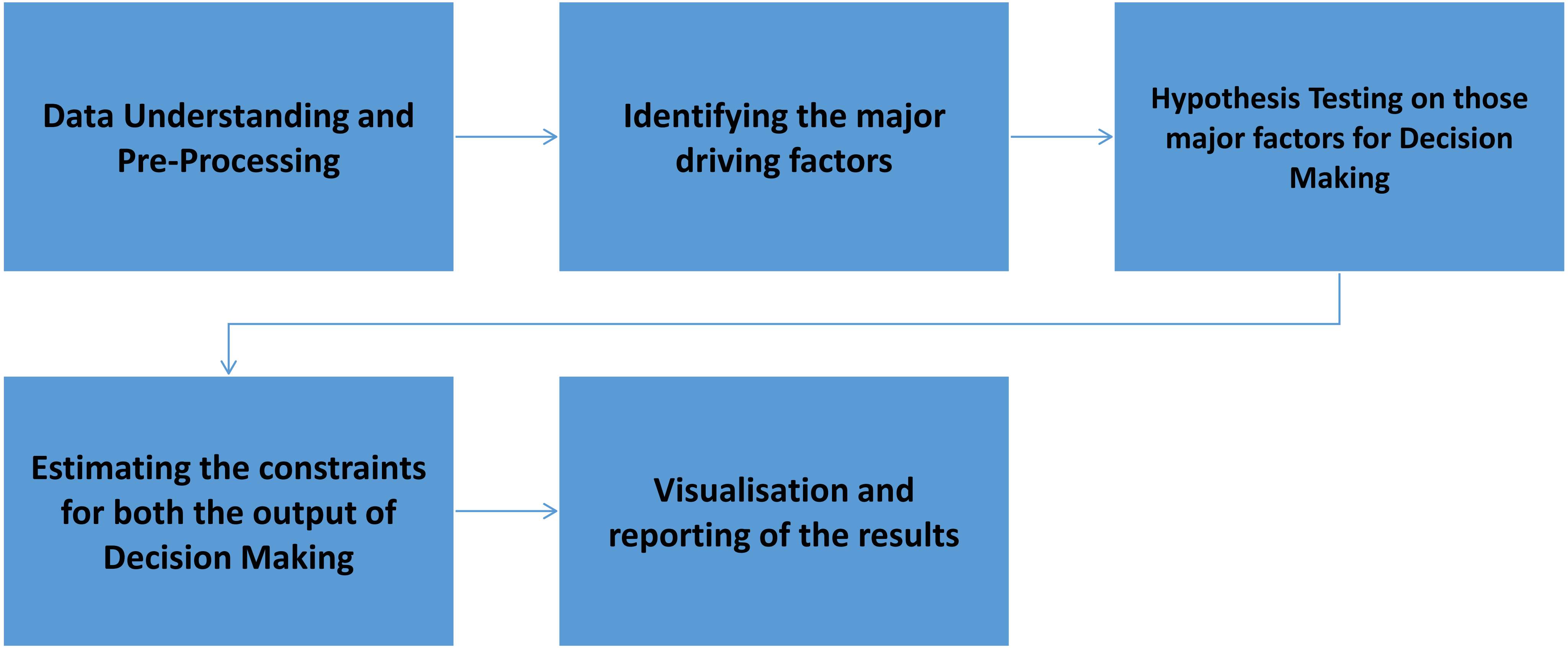
- There are two types of decisions that could be taken by the company:

1. **Loan accepted:** If the company approves the loan, there are 3 possible scenarios described below:

- **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 in due time for a long period of time

2. **Loan rejected**: The company had rejected the loan . Since the loan was rejected, there is no transactional history of those applicants with the company and so this data is not available with the company.

Problem solving methodology



Analysis (Criteria - Annual Income)

Applicant who is likely to default

- **Population** : All Charged off applicants
- **Null Hypothesis** :The applicant defaults the loan when **income <= 54,000** (Median)
- **Alternate Hypothesis** : The applicant defaults the loan when **income > 54,000** (Median)
- **Confidence Level** - 5%
- Since the **p-value (0.39)** is higher than the standard confidence level 0.05, we **fail to reject the Null hypothesis**.
- So, it is observed that if the applicant has an annual income of **54000 or less**, they are **more likely to default the loan**.

Applicant who is likely to repay

- **Population** : All Fully paid applicants
- **Null Hypothesis** : The applicant will repay the loan when **income >= 60,000** (Median)
- **Alternate Hypothesis** : The applicant will repay the loan when **income < 60,000** (Median)
- **Confidence Level** - 5%
- Since the **p-value (0.96)** is higher than the standard confidence level 0.05, we **fail to reject the Null hypothesis**
- So, it is observed that if the applicant an annual income of **60000 or more**, they will **repay the loan**.

Analysis (Criteria - Loan Amount)

Applicant who is likely to default

- **Population** : All Charged off applicants
- **Null Hypothesis** :The applicant defaults the loan when **loan amount <= 10,000** (Median)
- **Alternate Hypothesis** : The applicant defaults the loan when **loan amount > 10,000** (Median)
- **Confidence Level** - 5%
- Since the **p-value (0.0001)** is lower than the standard confidence level 0.05, we **reject the Null hypothesis.**
- So, it is observed that if the applicant gets a loan amount of **10000 or more**, they are **more likely to default the loan**.

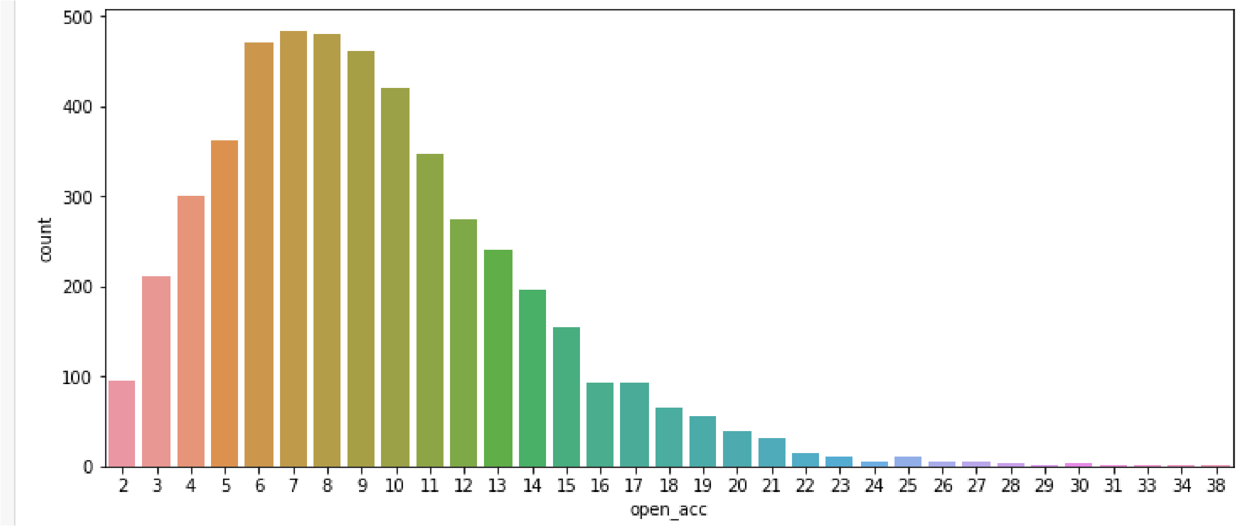
Applicant who is likely to repay

- **Population** : All Fully paid applicants
- **Null Hypothesis** : The applicant repays the loan when **loan amount <= 9600** (Median)
- **Alternate Hypothesis** : The applicant repays the loan when **loan amount > 9600** (Median)
- **Confidence Level** - 5%
- Since the **p-value (0.45)** is higher than the standard confidence level 0.05, we **fail to reject the Null hypothesis.**
- So, it is observed that if the applicant gets a loan amount of **9600 or less**, they are more **likely to repay the loan**.

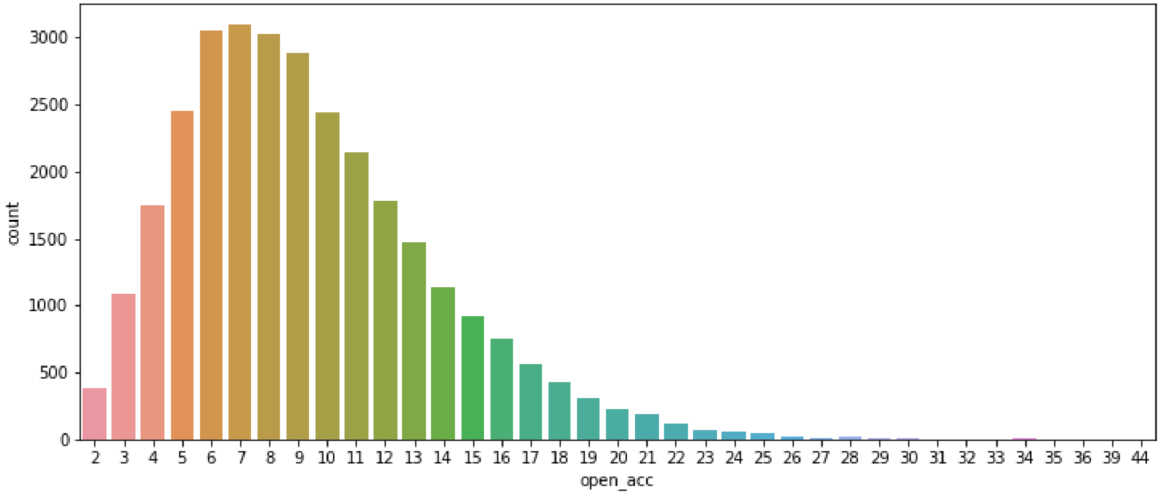
Analysis (Criteria - Home Ownership)

- When the charged off and Fully paid applicants are analysed separately based on the type of home ownership, they **give the same result.**
- But as our major concern is to reduce the % of loan acceptance to applicants who are likely to default, we consider only the charged off applicants and come to a conclusion that applicants who has a **Rented House are most likely to default**.
- But we **can't directly conclude** that loan should be rejected to people staying in rented houses. This is because there is an imbalance in proportion of data between charged off and Fully paid applicants.
- The type of home ownership can be taken into consideration when the lendor can't make a decision with the major driving factors.

Analysis (Criteria - Number of Credit lines)



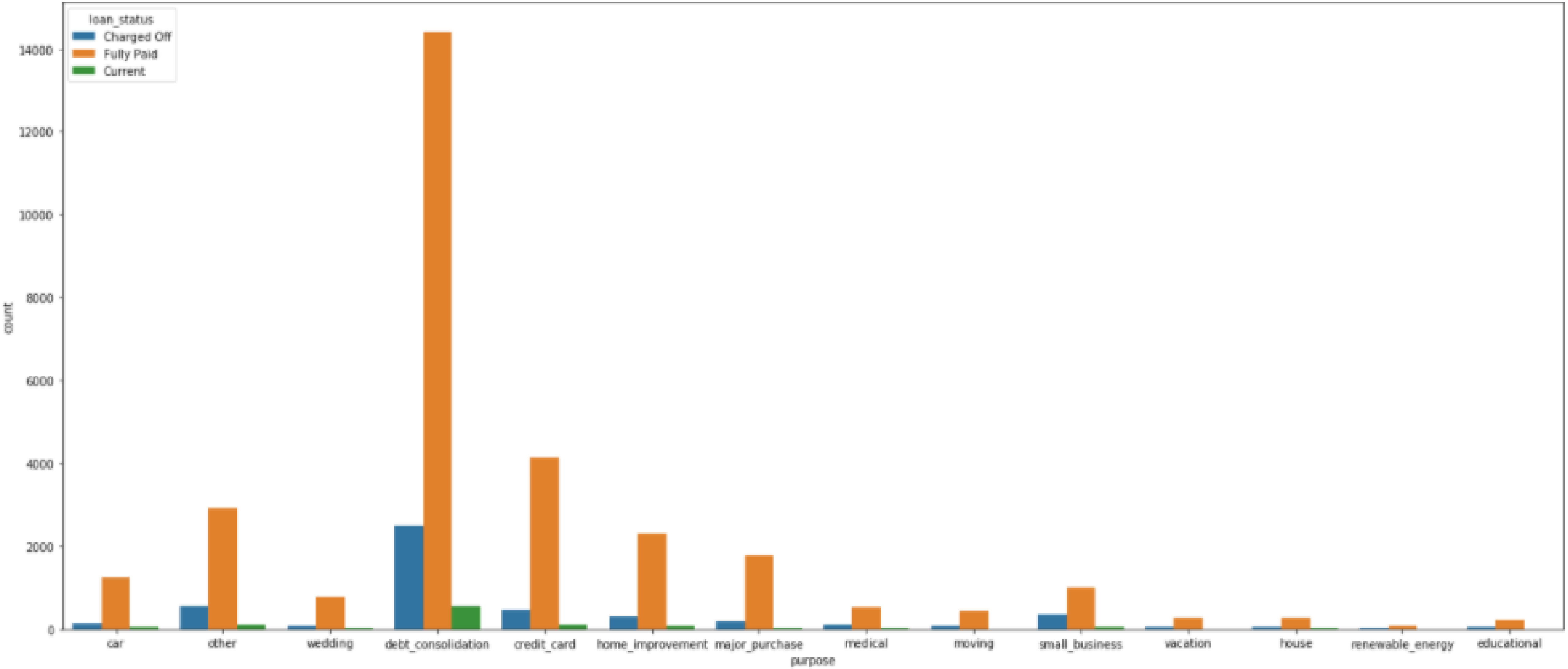
Charged-Off Applicants



Fully Paid Applicants

- When the charged off and Fully paid applicants are analysed separately based on the number of credit lines, they **give the same result**.
- But as our major concern is to reduce the % of loan acceptance to applicants who are likely to default, we consider only the charged off applicants and come to a conclusion that applicants who have **credit lines in the range of (5-12) are most likely to default.**
- But we **can't directly conclude** that loan should be rejected to people having number of credit lines in the range of (5-12). This is because there is an imbalance in proportion of data between charged off and Fully paid applicants.
- The Number of Credit Lines can be taken into consideration when the lendor can't make a decision with the major driving factors.

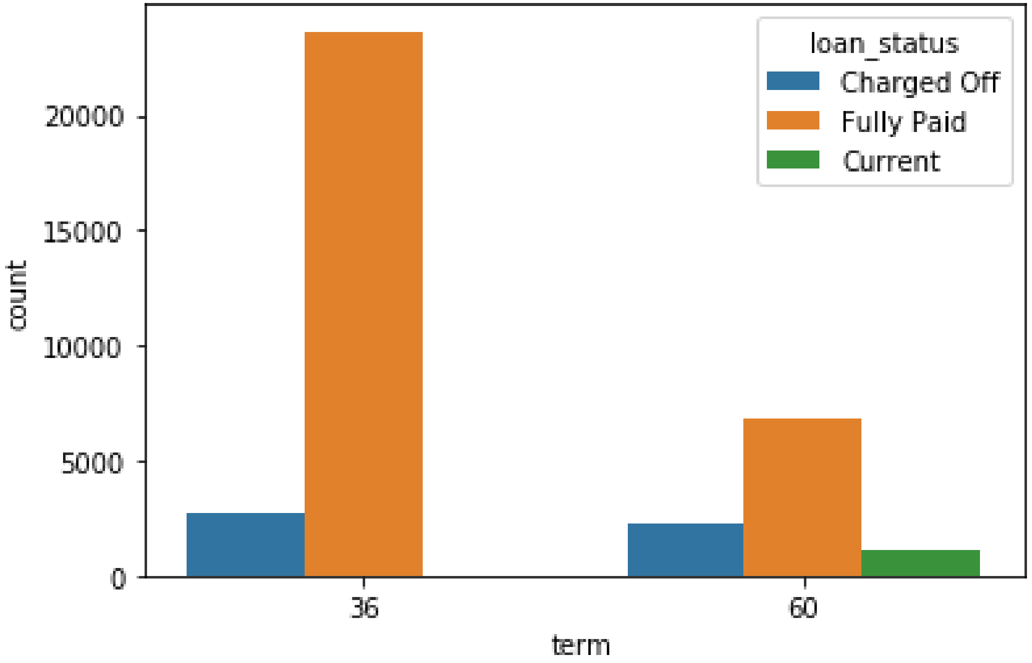
Analysis (Criteria - Purpose of Loan)



Analysis (Criteria - Purpose of Loan)

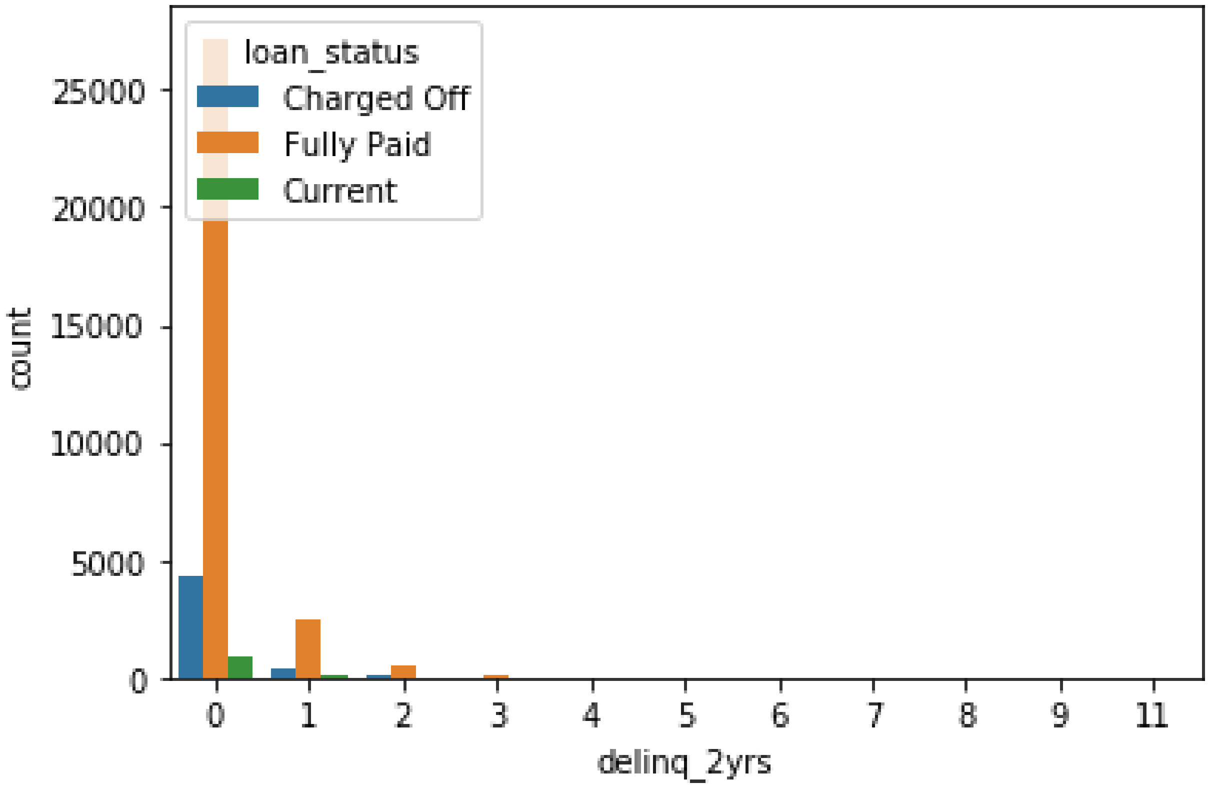
- When the charged off and Fully paid applicants are analysed separately based on the purpose of loan, they **give the same result**.
- But as our major concern is to reduce the % of loan acceptance to applicants who are likely to default, we consider only the charged off applicants and come to a conclusion that applicants who apply loan for **debt consolidation are most likely to default**.
- But we **can't directly conclude** that loan should be rejected to people applying loan for debt consolidation. This is because there is an imbalance in proportion of data between charged off and Fully paid applicants.
- But, definitely there must be much **more detail** in assessing the applicant when the loan purpose is debt consolidation.
- The Number of Credit Lines can be taken into consideration when the lendor can't make a decision with the major driving factors.

Analysis (Criteria - Term of Loan)



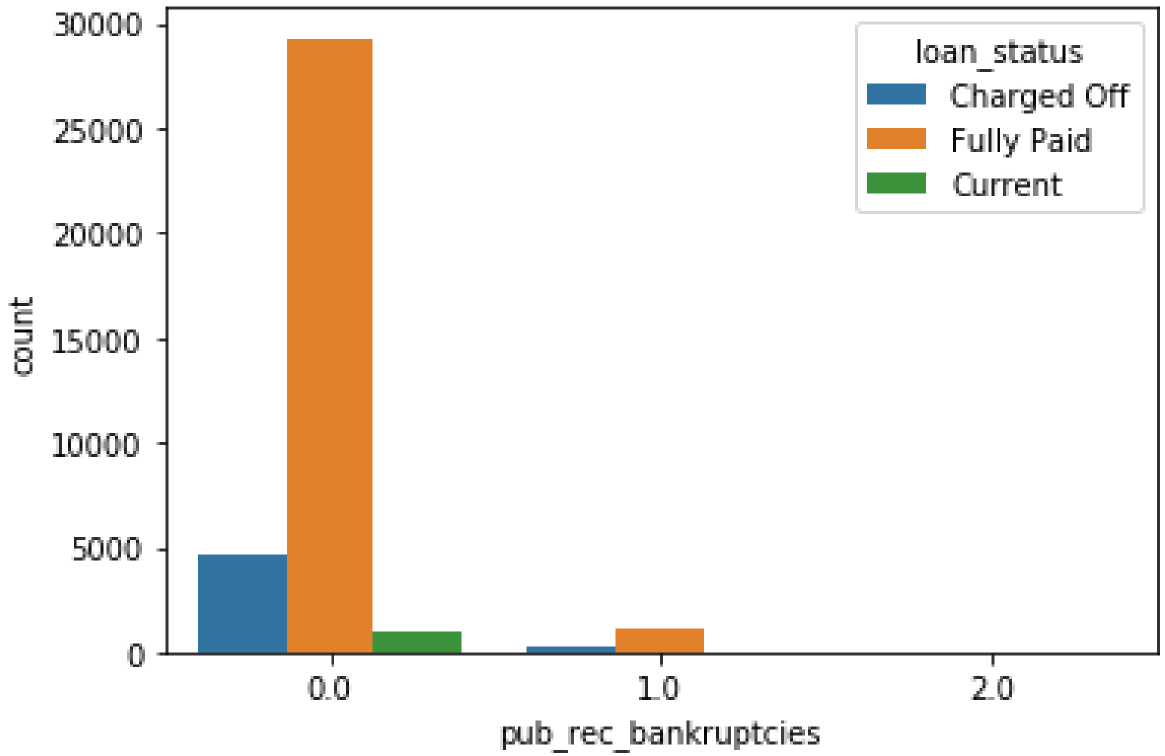
- When the charged off and Fully paid applicants are analysed separately based on the term of loan, they **give the same result**.
- But as our major concern is to reduce the % of loan acceptance to applicants who are likely to default, we consider only the charged off applicants and come to a conclusion that applicants who have **term of 36 months are most likely to default**.
- But we **can't directly conclude** that loan should be rejected to people having term of loan equal to 36 months. This is because there is an imbalance in proportion of data between charged off and Fully paid applicants.
- This can be because applying for high loan amount but having the term low can force the applicants to default the loan. So, we can determine the term of loan with the **insights we get from other factors** and be suggested to the applicants who feel to be risky.
- The Number of Credit Lines can be taken into consideration when the lendor can't make a decision with the major driving factors.

Analysis (Criteria - Number of incidences of delinquency)



- When the charged off and Fully paid applicants are analysed separately based on the Number of incidences of delinquency, they **give the same result.**
- The number of incidences of delinquency is not a major driving factor for an applicant defaulting the loan. As you could see, majority of the applicants who has defaulted the loan **hasn't had any 30+ days past due incidences of delinquency**
- But at the same time we **can't directly conclude** that **loan can be accepted** to people not having any 30+ days past due incidences of delinquency.
- The Number of incidences of delinquency can be taken into consideration when the lendor can't make a decision with the major driving factors.

Analysis (Criteria - Number of public record bankruptcies)



- When the charged off and Fully paid applicants are analysed separately based on the Number of public record bankruptcies, they **give the same result.**
- The number of incidences of delinquency is not a major driving factor for an applicant defaulting the loan. As you could see, majority of the applicants who has defaulted the loan **hasn't had any public record bankruptcies**.
- But at the same time we **can't directly conclude** that loan can be accepted to people not having any public record bankruptcies.
- The Number of public record bankruptcies can be taken into consideration when the lendor can't make a decision with the major driving factors.

Key Observations

1. From the hypothesis test made on annual income of applicants, we can observe that the applicants **default when annual income** is **less than or equal to 54,000** and **repay the loan when annual income is more than 60,000**.

2. Subsequently, from the hypothesis test made on loan amount of applicants, we can observe that the applicants **repay when loan amount** is **less than or equal to 9,600** and **default the loan when loan amount is more than 10,000**.

3. The other factors like term, purpose, number of public record bankruptcies, Number of incidences of delinquency, number of credit lines, type of home ownership **definitely has an imapct** on predicting whether the applicant would default or repay the loan. But these **aren't major factors** and doesn't give a proven insight about the amount of impact it has on the loan approval.

Conclusion

- From the hypothesis testing made on Annual income of applicants, we can estimate an optimum value by which the decison making of loan approval can be processed. As you could see the minimum anuual income for an applicant to repay the loan is 60,000 and the limit below which the applicant is said to default is 54,000. **The limit for defaultation can be set from the given hypothesis as annual income <=60,000**.
- From the hypothesis testing made on loan amount of applicants, we can estimate an optimum value by which the decison making of loan approval can be processed. As you could see the maximum loan amount for an applicant to repay the loan is 10,000 and the loan amount above which the applicant is said to default is 9,600. **The limit for defaultation can be set from the given hypothesis as loan amount >=9,600**.
- The company should be **more careful** when the purpose of loan is debt consolidation.
- The company should be **assessing** the annual income, loan amount, interest rate etc. to have an estimate about the term of loan.

Conclusion

- The number of credit lines, public record bankruptcies, incidences of delinquency should be **taken into consideration** when the lendor **can't make a decision** with the major driving factors.
- Applicants who has a **Rented House are most likely to default**. But we can't directly conclude that loan should be rejected to people staying in rented houses. Much **more detail should be given** to other factors.
- As you could see, there is **no one or two major factors** that can be used for the decison making. A lot of **factors combined** and the taking the insights of each factor into consideration will definitely **give a more clear and accurate decision** for the loan approval process.