



Lending Club Case Study:

Assessment By: Divakar & Vivek

OBJECTIVE

Identify the **driving factors (or driver variables)** behind loan default

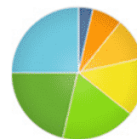
What is Lending Club?

Lending Club is a marketplace for personal loans that matches borrowers who are seeking a loan with investors looking to lend money and make a return.

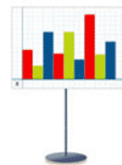
How Lending Club Works



Borrowers apply for loans.
Investors open an account.



Borrowers get funded.
Investors build a portfolio.

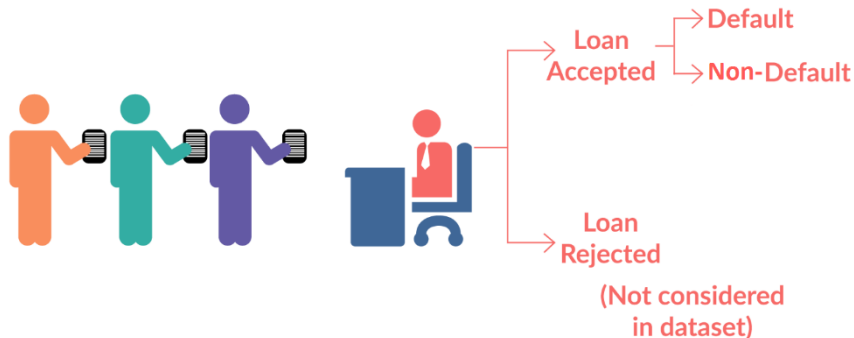


Borrowers repay automatically.
Investors earn & reinvest.

When the company receives a loan application, the company has to make a decision for loan approval based on the applicant's profile. 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
- If one can identify these risky loan applicants, then such loans can be reduced thereby cutting down the amount of credit loss.
- Identification of such applicant's using EDA is the aim of this case study

LOAN DATASET



Fully paid: Applicant has fully paid the loan (the principal and the interest rate)

Current: Applicant is in the process of paying the instalments, i.e. the tenure of the loan is not yet completed. These candidates are not labelled as 'defaulted'.

Charged-off: Applicant has not paid the instalments in due time for a long period of time, i.e. he/she has defaulted on the loan

- loan_amnt : Amount applied by potential borrowers
- funded_amnt: Amount recommended/approved by Lending Club
- funded_amnt_inv : Amount funded by investors
- dti: Debt to Income ratio
- grade: loan classification based on interest rate
- purpose: purpose of loan such as car, house, vacation..etc
- installment: monthly EMI amount
- loan_status: status of the loan Fully Paid/Charged Off/Current
- annual_inc: yearly income of the loan applicant
- int_rate: rate of interest of the availed loan
- emp_length: work experience of the loan applicant
- verification_status: income verification status of the loan applicant
- home_ownership: loan applicant home ownership status
- issue_d: date of issue of loan
- term: loan repayment EMI number of months

- year: year in which loan was applied. Extracted from “issue_d”
- month: month in which loan was applied. Extracted from “issue_d”
- monthly_inc: monthly income of the loan applicant. Calculated by “annual_inc”/12
- netcash_monthly: Net cash available with loan applicant after repaying debt monthly in percentage.

netcash_monthly=

$(\text{monthly_inc} - \text{installment} - (\text{dti} * \text{monthly_inc}) / 100) * 100 / \text{monthly_inc}$

- emp_exper : loan applicant work experience category. Calculated from “emp_length”.

emp_length (0 – 2yrs) :Beginner

emp_length (3 – 5yrs) :Junior

emp_length (6 – 9yrs) :Senior

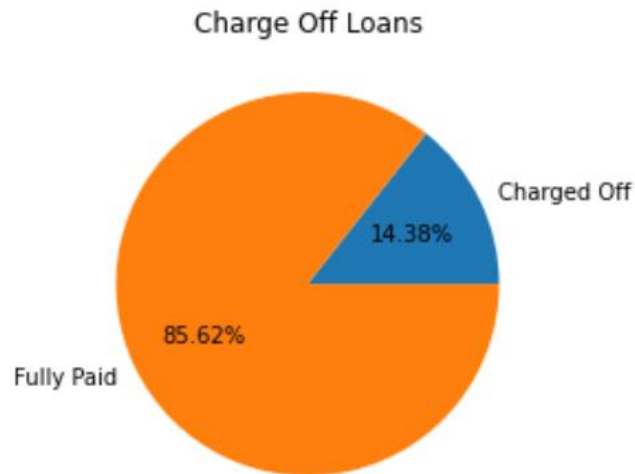
emp_length (>=10yrs) :VSenior

Total Loans from the dataset: 39717

“Fully Paid” Loans: 32950

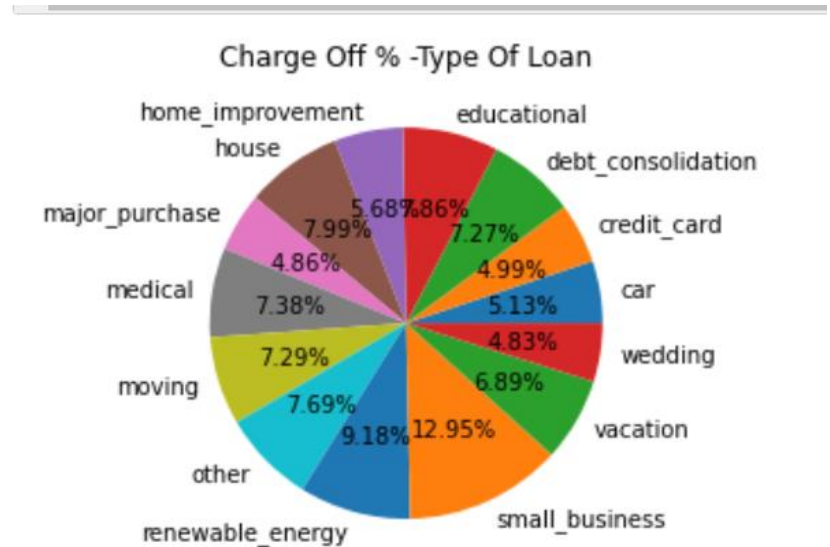
“Charged Off” Loans: 5627

“Current” Loans: 1140



Looking at the defaulter's distribution based on their loan's availed

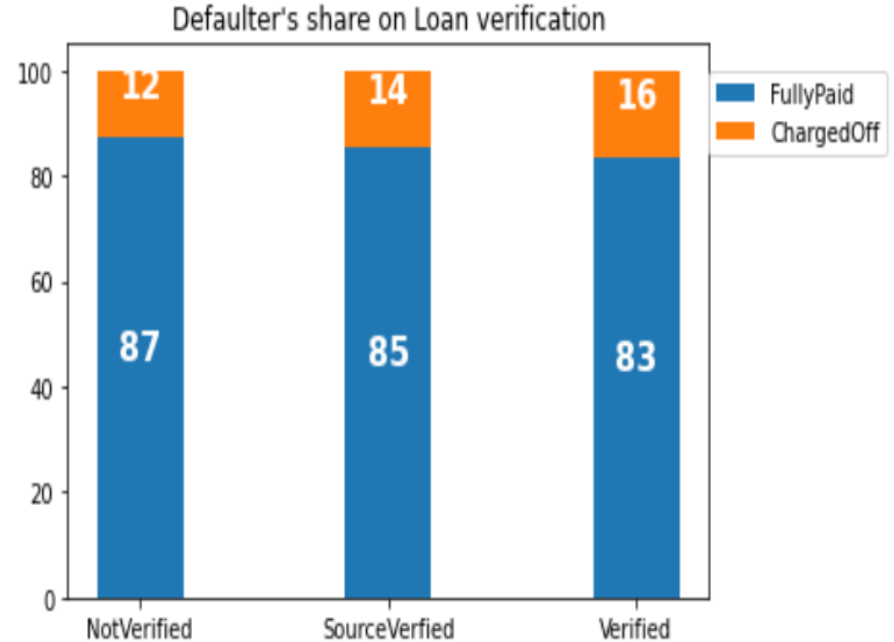
- “Small_business” type of loan contributes the highest % of defaulters
- Followed by “renewable_energy”
- House, educational, other, medical, moving, debt_consolidation, & vacation type of loans show similar % defaulters
- In terms of volume, “debt_consolidation” loan contributes to nearly 49.2% of defaulters



Lending Club: Defaulter %- On Loan verification status upGrad

Loans applicant's income are usually verified, and status is categorized as Verified, Not Verified and Source Verified

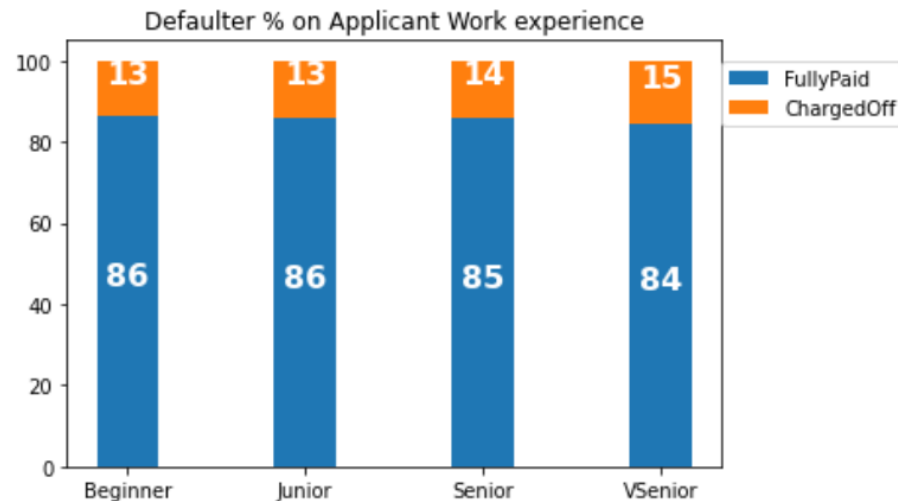
- According to the income verification status, when we plot the defaulter's distribution, we can't see much difference between "Verified" & "Not Verified" loans.
- The trend shows slightly reverse belief. Instead of "Verified", "Not-Verified" loans has slightly high defaulters.



Lending Club: Defaulter %- On Loan Applicant Experience upGrad

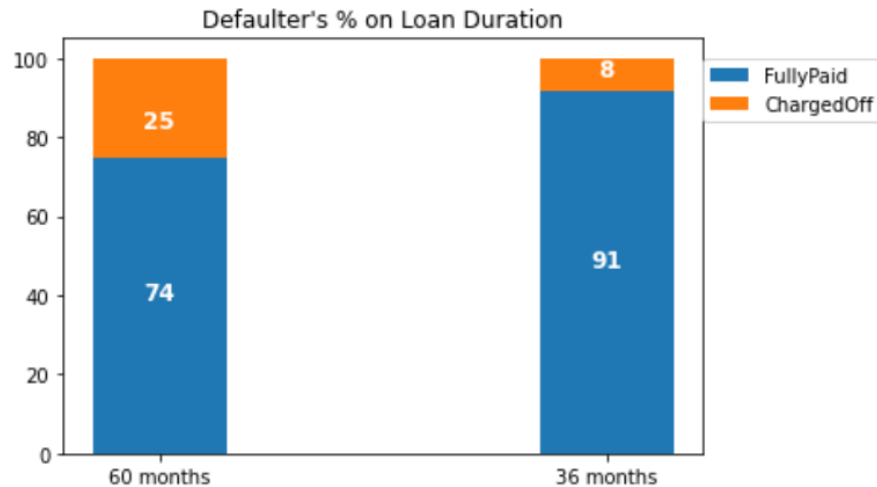
Based on applicant's employment length they are grouped as Beginners Junior, Senior and VSenior. When we plot the defaulter's % distribution based on work experience

- We don't see much difference in the applicant defaulting behavior based on their experience.
- We expected a lower defaulting % with increasing experience, but the results are slightly reverse



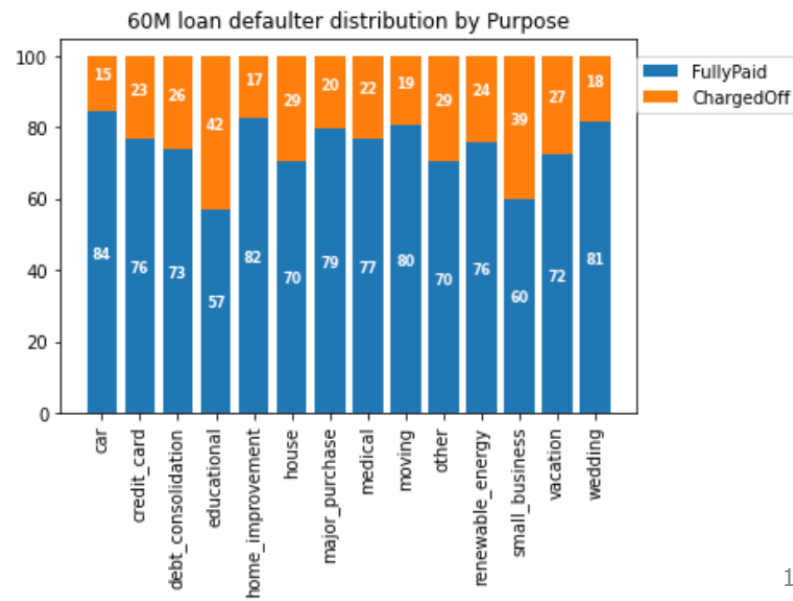
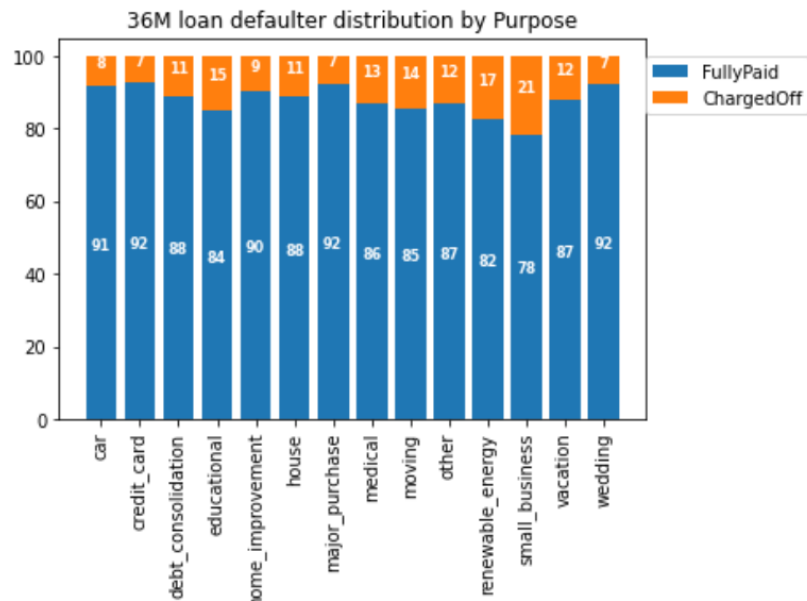
The applicant can choose between 60-month term loan or 36-month term loan. When we plot the defaulter's % distribution based on the loan term

- We see 300% more defaulters in 60 months loan when compared to 36 months loan.



When we perform bivariate analysis on loan defaulter w.r.t loan term and loan purpose, we can understand the following

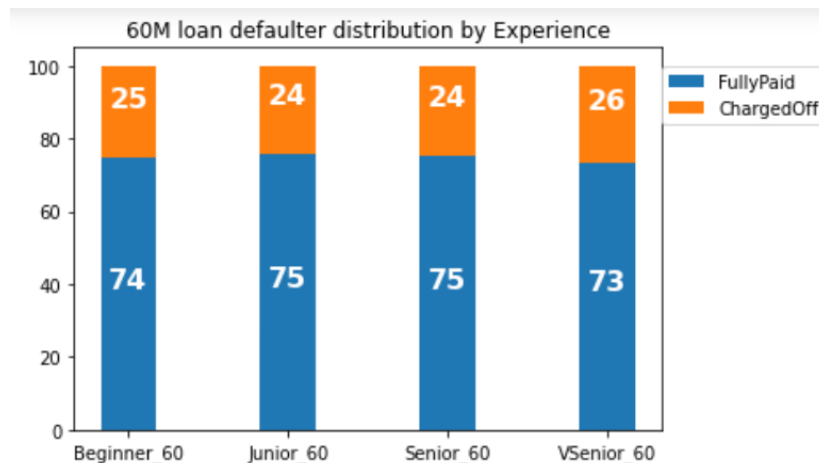
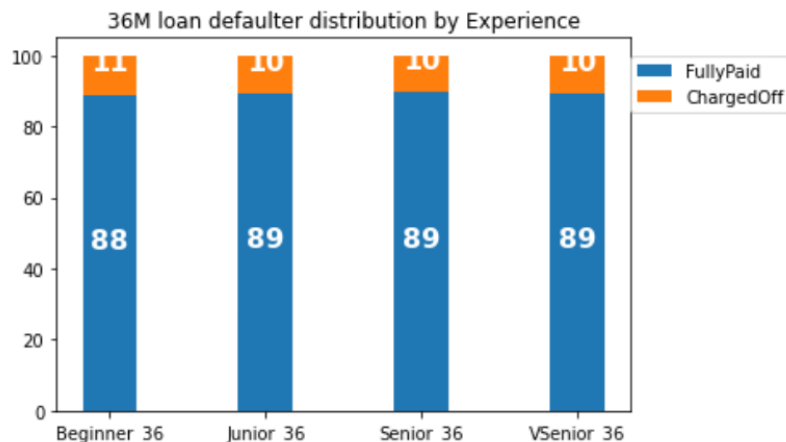
- On an average loan defaulters in 60-month term is twice/thrice that of 36-month loan irrespective of the purpose of the loan
- Educational and Small business type of loan has the highest % of defaulter



Lending Club: Defaulter %- On Loan Duration & ExperienceUpGrad

When we perform bivariate analysis on loan defaulter w.r.t loan term and applicant experience, we can understand the following

- On an average loan defaulters in 60-month term is twice/thrice that of 36-month loan irrespective of the loan applicant experience

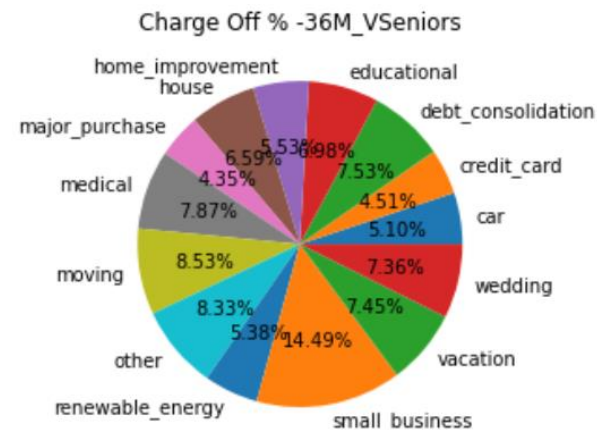
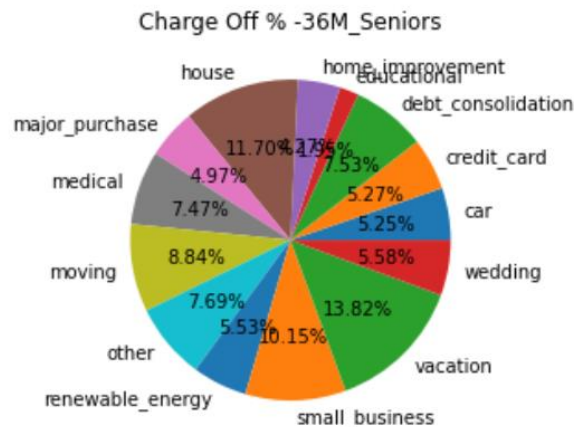
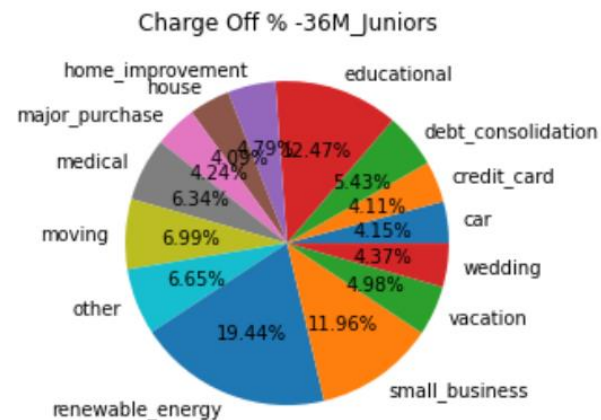
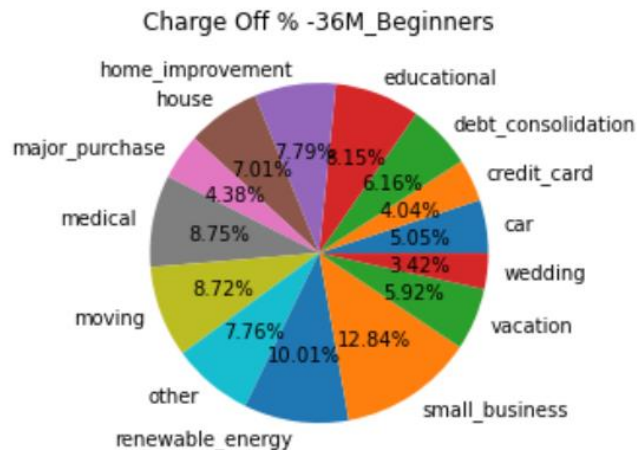


Multivariate Analysis on 36M-Defaulter %

- Loan Term, Experience & Purpose

36 month loan defaulter's

- “Renewable Energy” loan contributes max % of defaulters in Beginners and Juniors
- Defaults in “Small_business” loans are highest in all experience
- Seniors seems to default more in housing loan & and vacation loan.



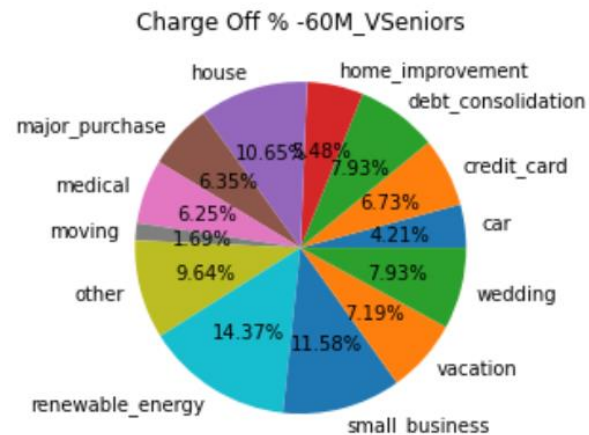
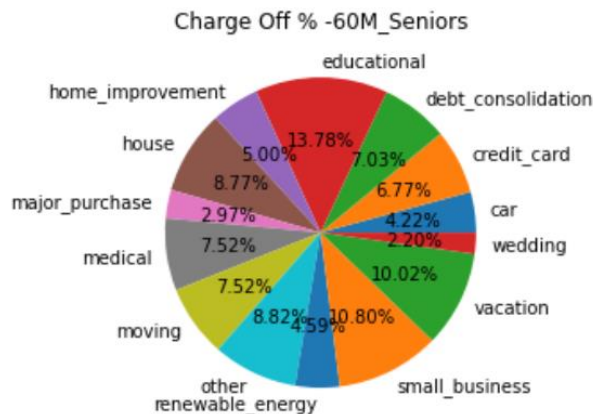
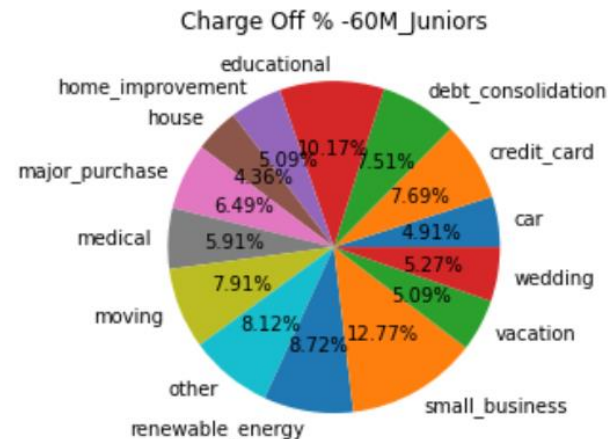
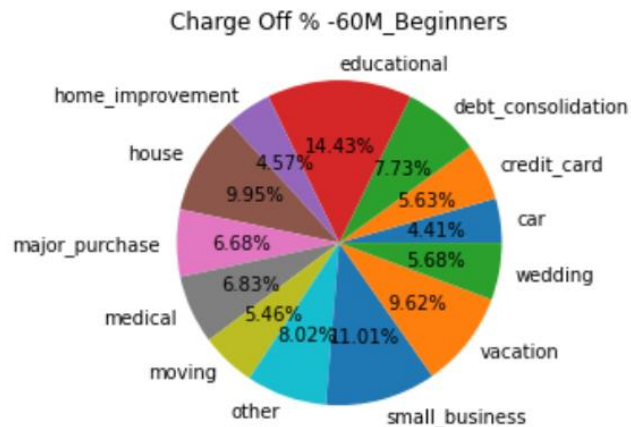
Multivariate Analysis on 60M-Defaulter %

- Loan Term, Experience & Purpose

60- month loan defaulter's

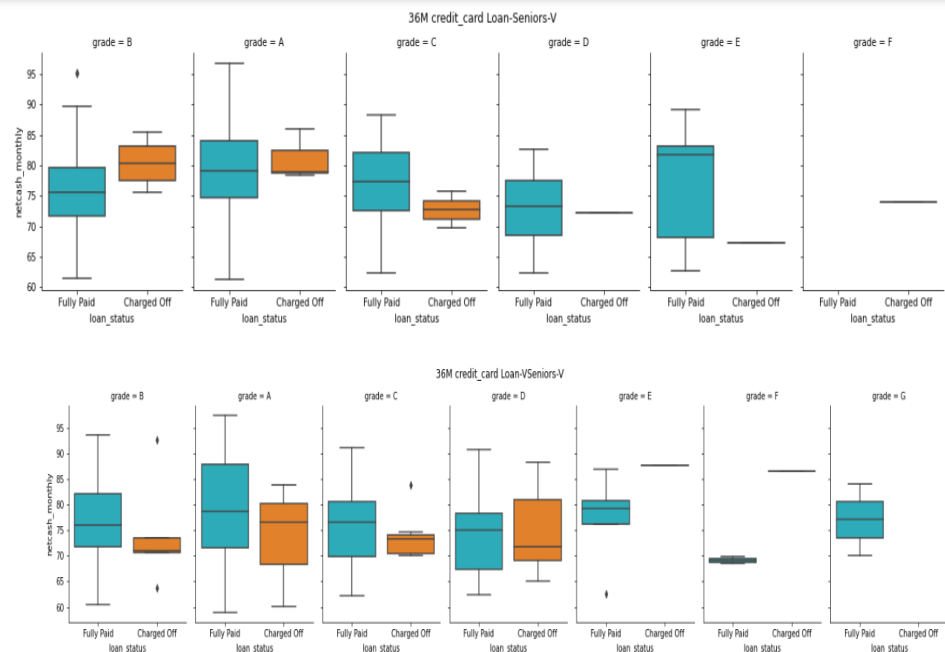
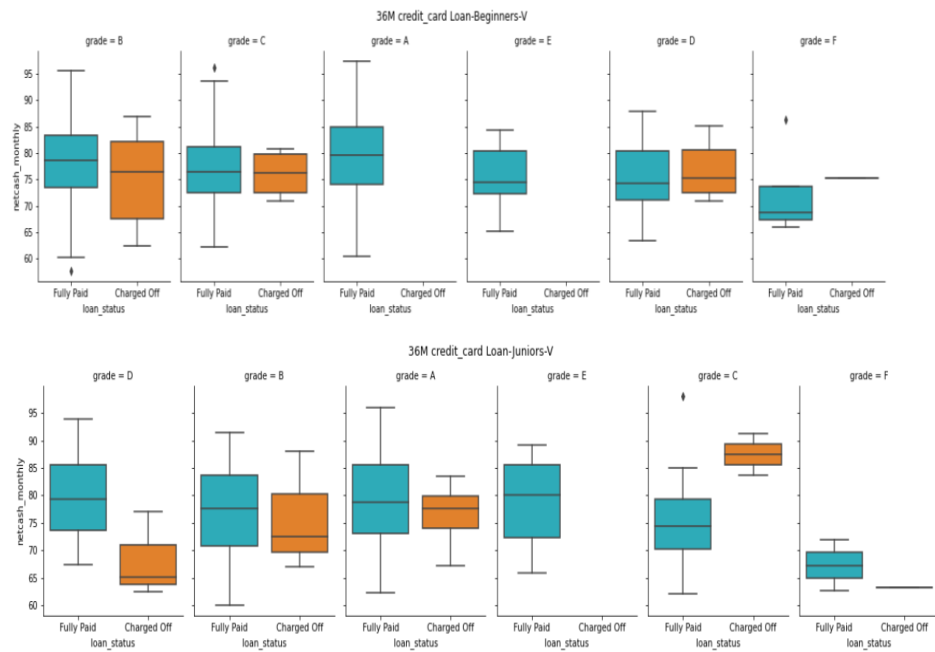
- “Educational” loan contributes max % of defaulters in Beginners, Juniors and seniors
- Defaults in “Small_business” loans are highest in all experience
- Seniors seems to default more in housing loan & and vacation loan.
- Vseniors seems to default more on renewable energy and house

11-05-2022



High possibility of default:

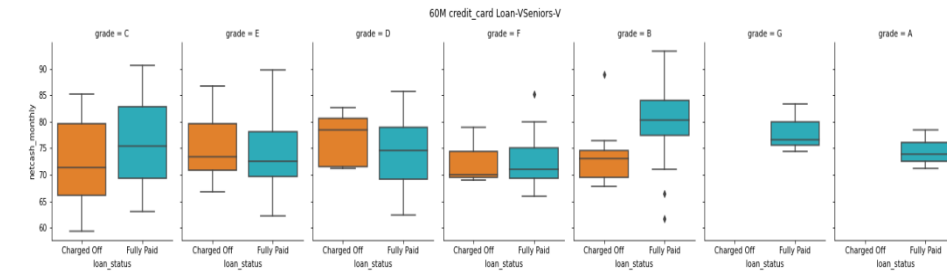
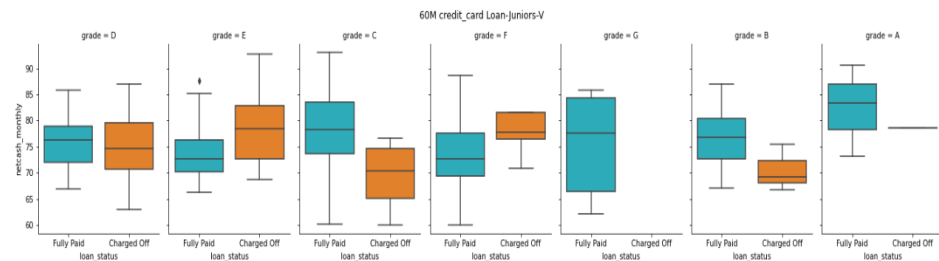
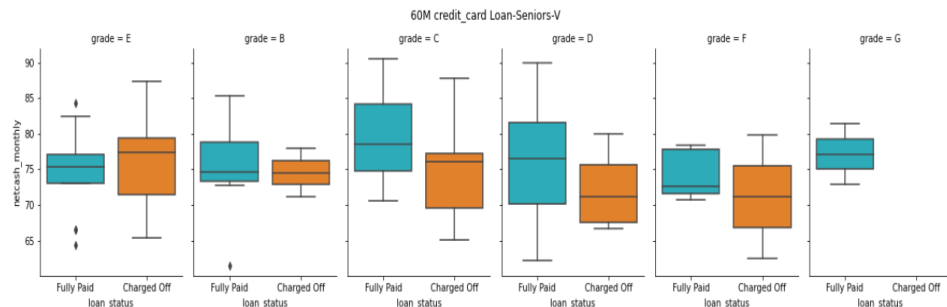
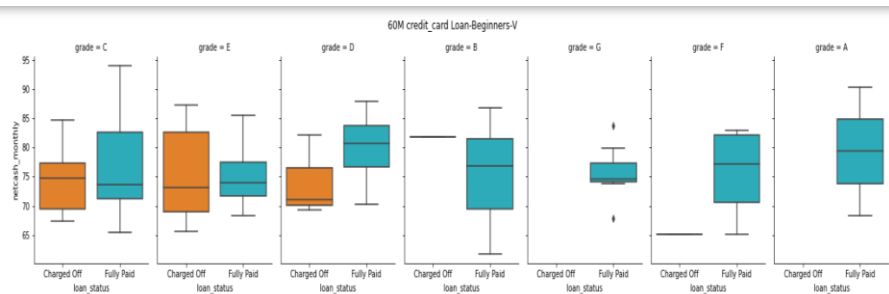
- Beginners availing “B” grade loan and posses “net cash/month” <75%
- Juniors availing “D” grade loan and posses “net cash/month” <70%
- Seniors availing “C” grade loan and posses “net cash/month” <72%
- Vseniors availing “A” grade loan and posses “net cash/month” <72%



Multivariate Analysis: 60M- Verified Credit Card Loan

High possibility of default:

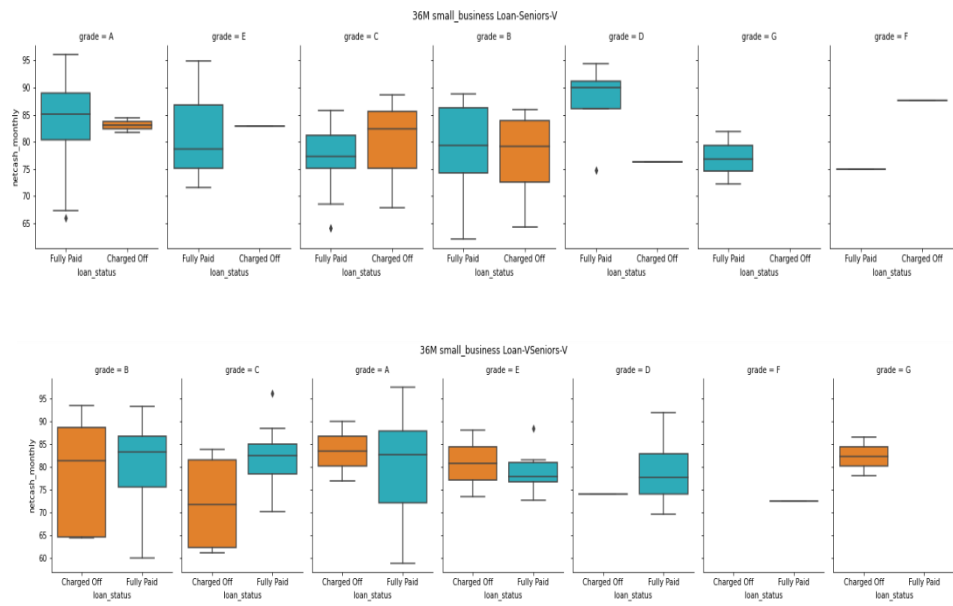
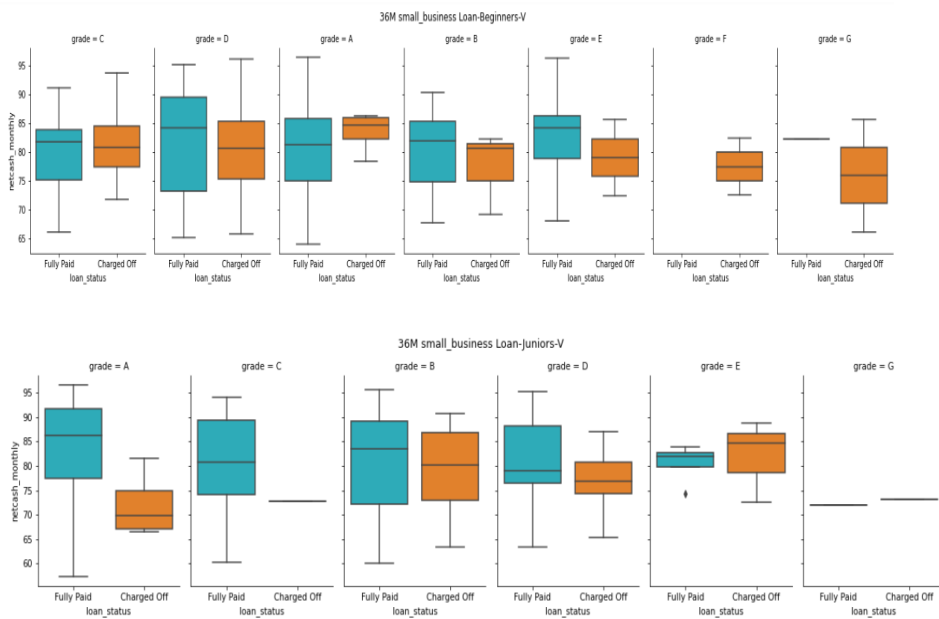
- Beginners availing “C/D/E” grade loan and posses “net cash/month” <72%
- Juniors availing “B/C/D” grade loan and posses “net cash/month” <72%
- Seniors availing “C/D/E/F” grade loan and posses “net cash/month” <70%
- Vseniors availing “C” grade loan and posses “net cash/month” <70%



Multivariate Analysis: 36M- Verified SmallBusiness Loan upGrad

High possibility of default:

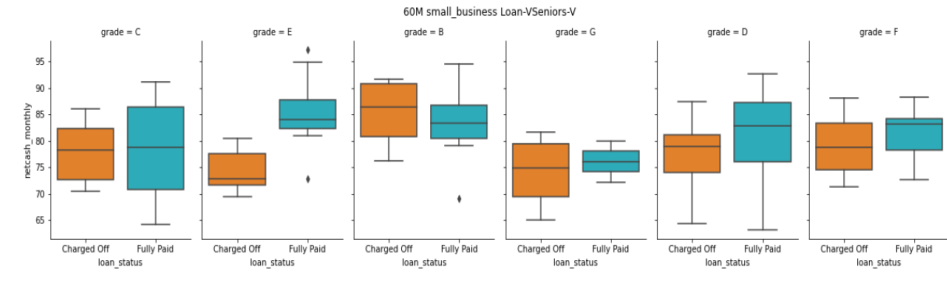
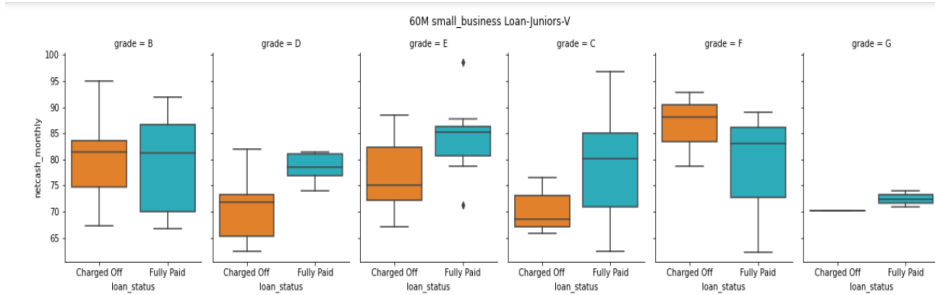
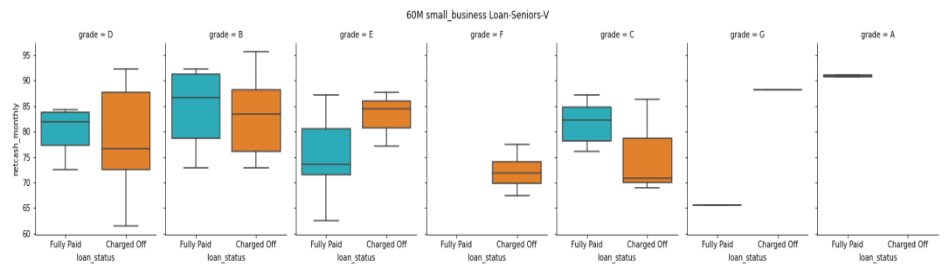
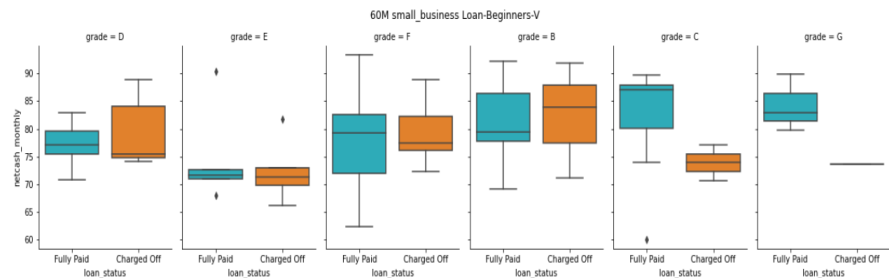
- Beginners availing “E/F/G” grade loan and posses “net cash/month” <80%
- Juniors availing “A” grade loan and posses “net cash/month” <75%
- Seniors availing “B” grade loan and posses “net cash/month” <75%
- Vseniors availing “B/C/G” grade loan and posses “net cash/month” <75%



Multivariate Analysis: 60M- Verified SmallBusiness Loan upGrad

High possibility of default:

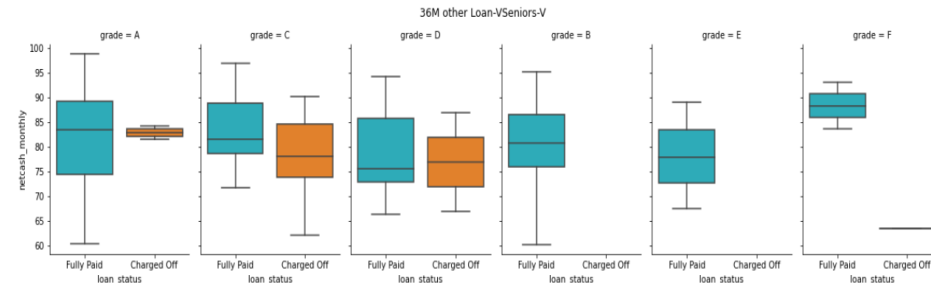
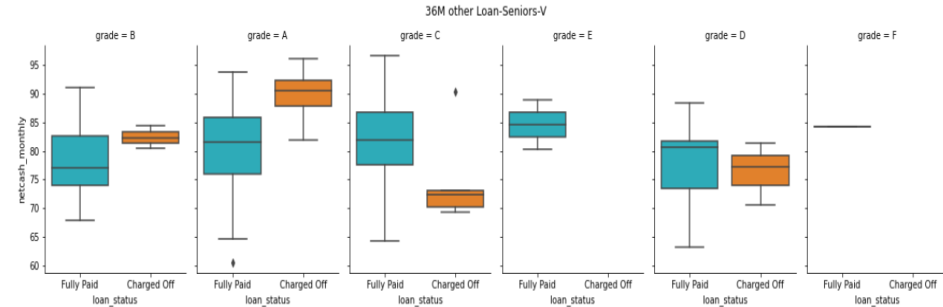
- Beginners availing “C” grade loan and posses “net cash/month” <75%
- Juniors availing “C/D/E” grade loan and posses “net cash/month” <70%
- Seniors availing “B/C/D” grade loan and posses “net cash/month” <77%
- Vseniors availing “D/E/F/G” grade loan and posses “net cash/month” <70%



Multivariate Analysis: 36M- Verified Other Loan

High possibility of default:

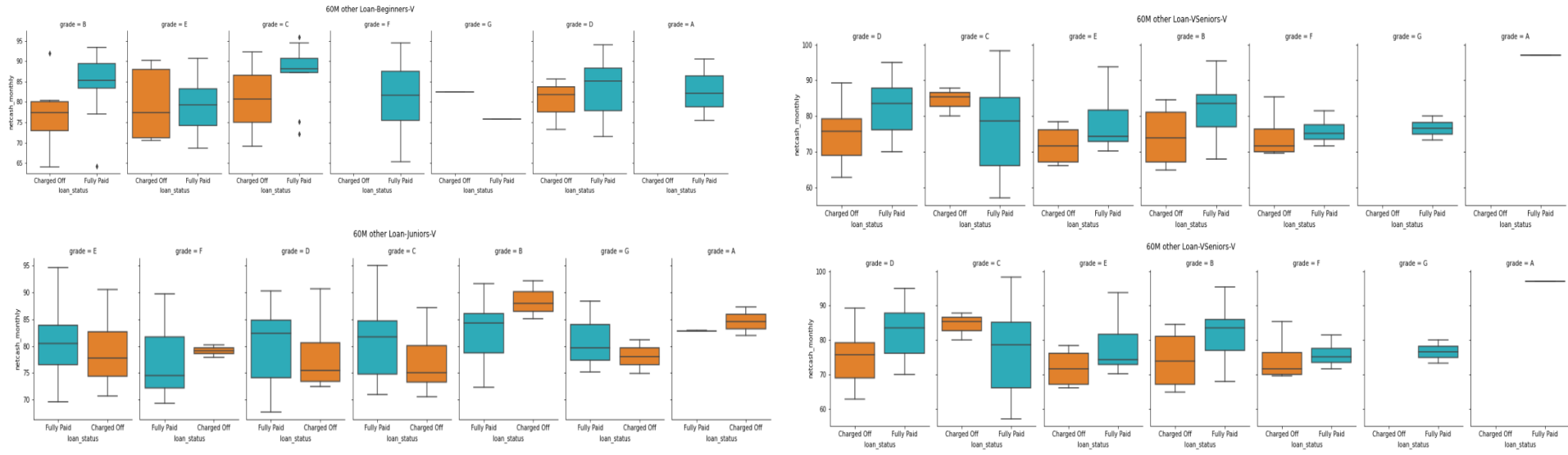
- Beginners availing “A/B” grade loan and posses “net cash/month” <75%
- Seniors availing “C” grade loan and posses “net cash/month” <72%
- Vseniors availing “D” grade loan and posses “net cash/month” <72%



Multivariate Analysis: 60M- Verified Other Loan

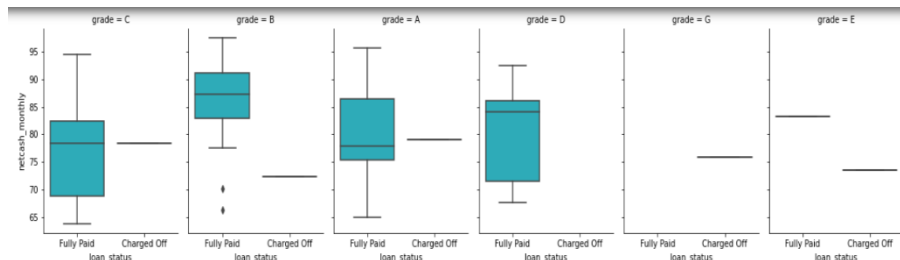
High possibility of default:

- Beginners availing “B/C/E” grade loan and posses “net cash/month” <75%
- Juniors availing “C/D/E/G” grade loan and posses “net cash/month” <74%
- Seniors availing “C” grade loan and posses “net cash/month” <72%
- Vseniors availing “B/D/E/F” grade loan and posses “net cash/month” <72%

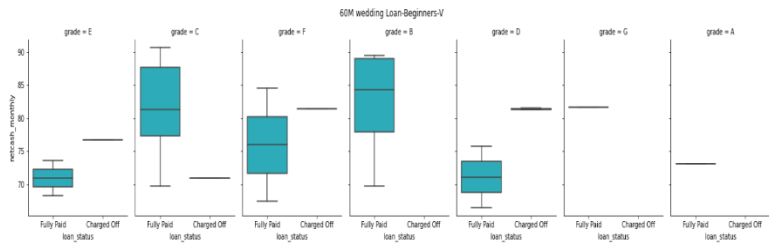
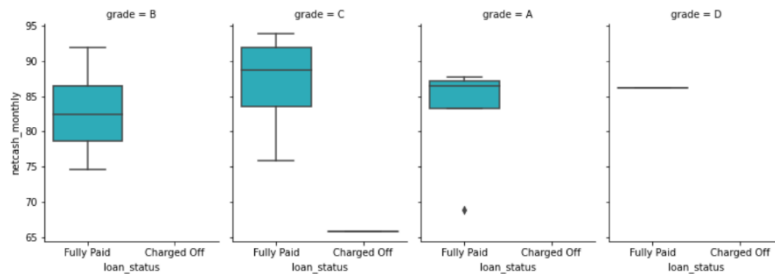


High possibility of default:

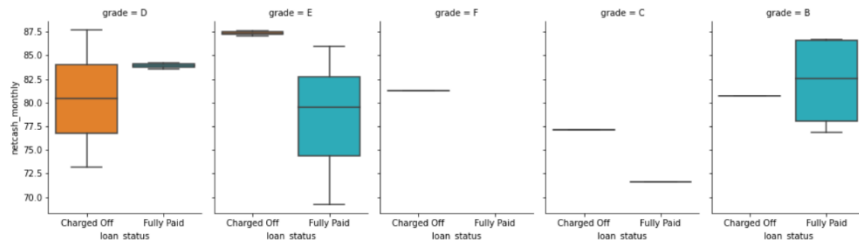
- Except Vseniors availing grade “D” loan, all others are not likely to default in wedding loan.
- Vseniors availing grade “D” loan and possess “net cash/month” <83% most likely to default



36M wedding Loan-VSeniors-V



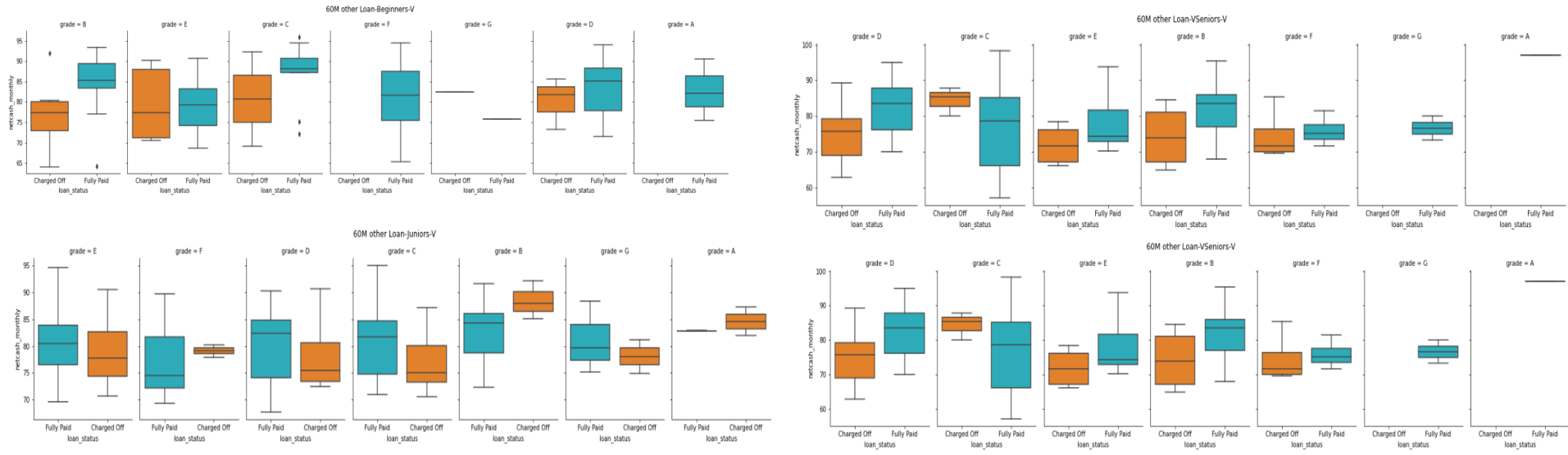
60M wedding Loan-VSeniors-V



Multivariate Analysis: 60M- Verified Wedding Loan

High possibility of default:

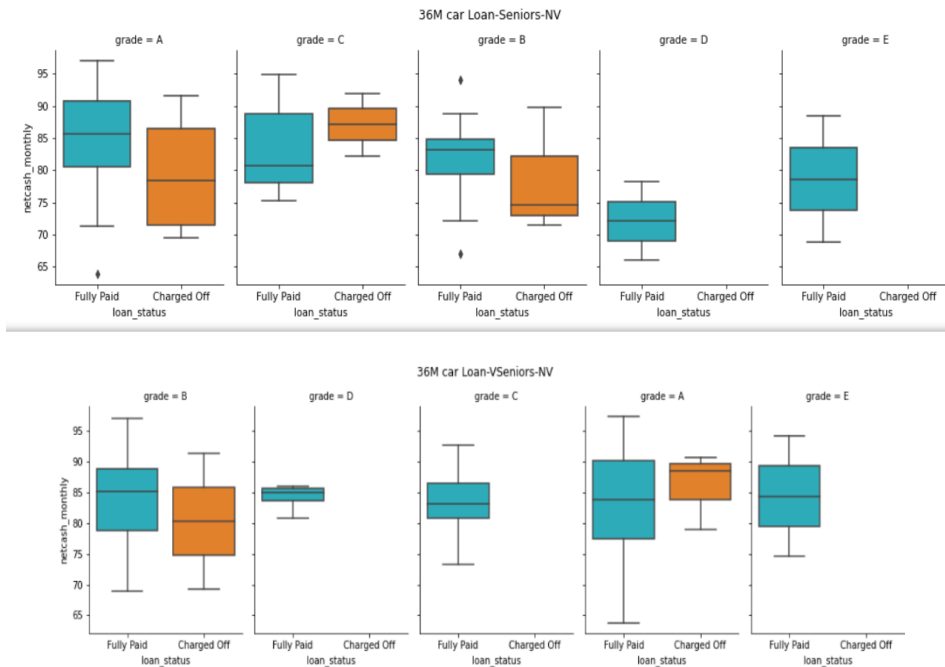
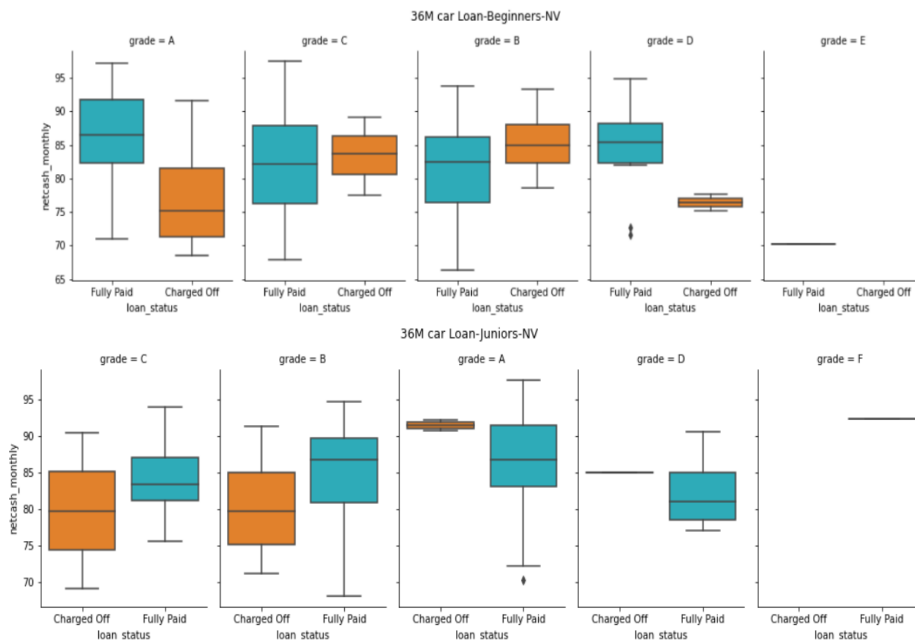
- Beginners availing “B/C/E” grade loan and posses “net cash/month” <75%
- Juniors availing “C/D/E/G” grade loan and posses “net cash/month” <74%
- Seniors availing “C” grade loan and posses “net cash/month” <72%
- Vseniors availing “B/D/E/F” grade loan and posses “net cash/month” <72%



Multivariate Analysis: 36M- Car Loan

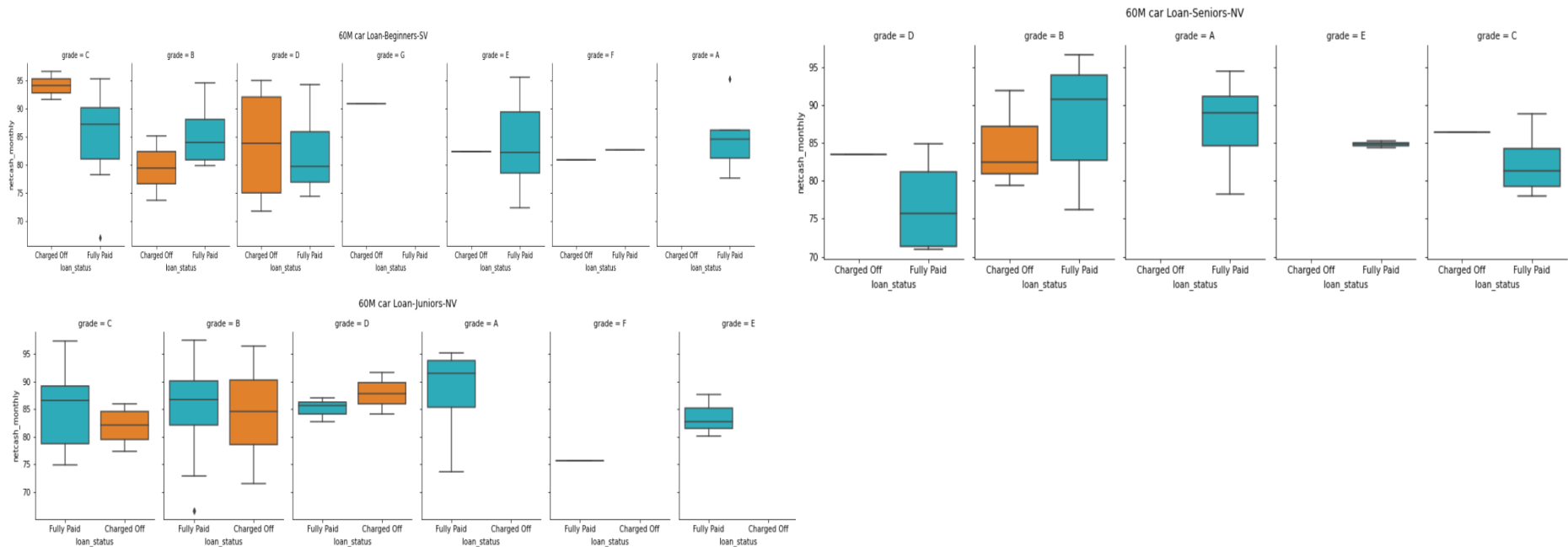
High possibility of default:

- Most of the defaults are in Not-Verified category in grade “A/B/C” loans
- Seniors availing “C” grade loan and posses “net cash/month” <73% are likely to default



High possibility of default:

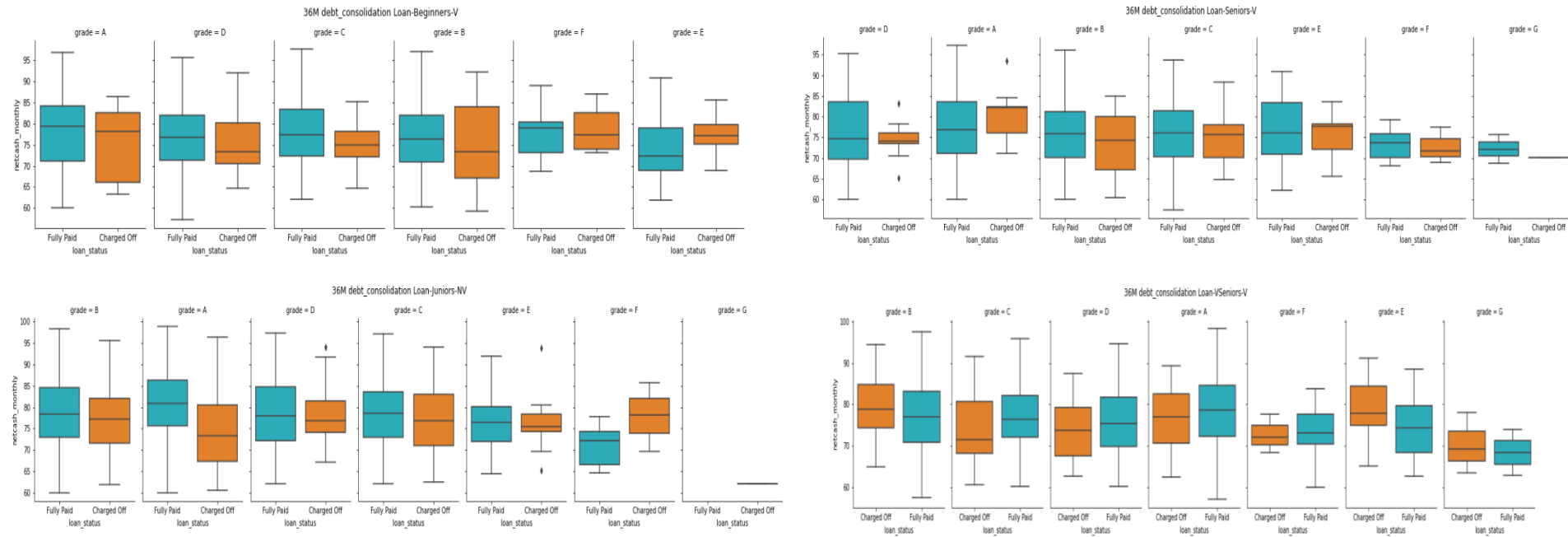
- Most of the defaults are in Not-Verified category in grade “B/D” loans



Multivariate Analysis: 36M- Debit Consolidation Loan

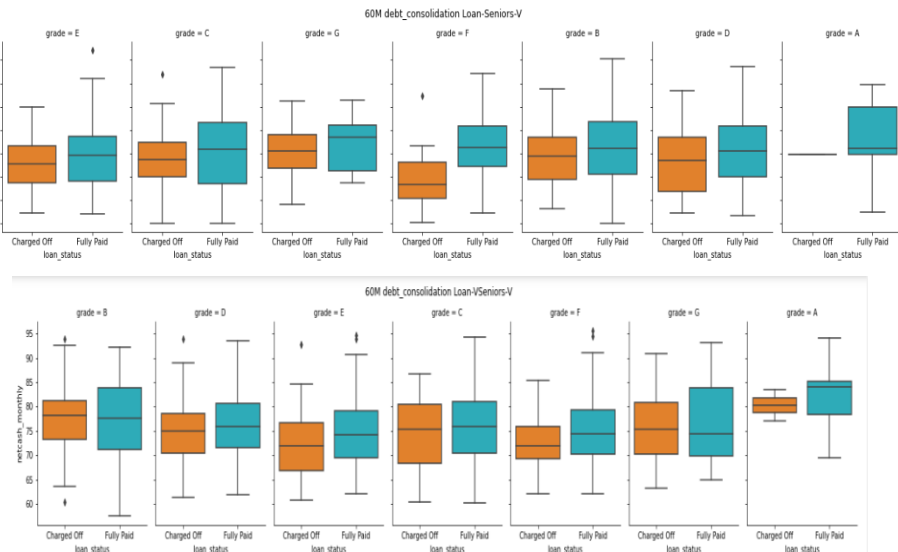
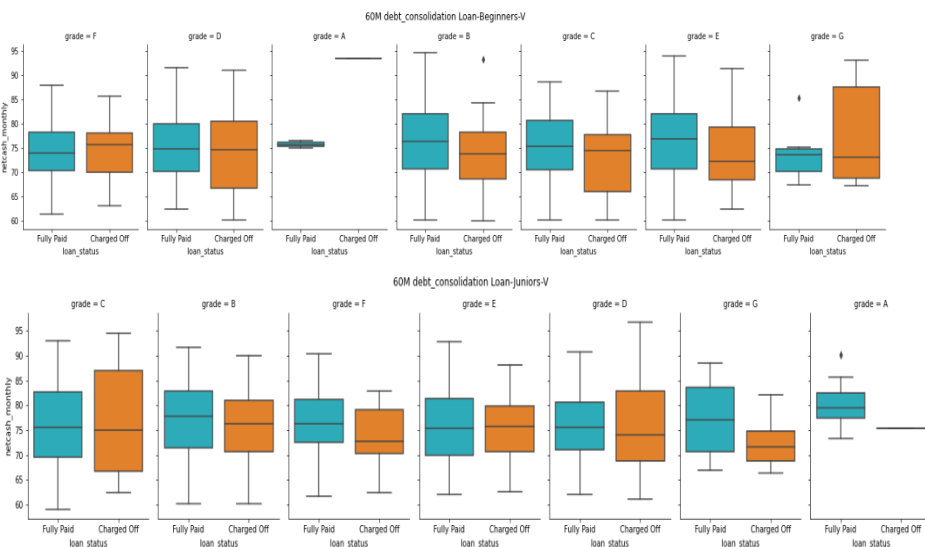
High possibility of default:

- Beginners availing “A/B” grade loan and posses “net cash/month” <73%
- Juniors availing “A/B/C” grade loan in Not Verified category and posses “net cash/month” <73%
- Seniors availing “A/B/C” grade loan and posses “net cash/month” <73%
- VSeniors availing grade “C/D” and posses “net cash/month” <70%



High possibility of default:

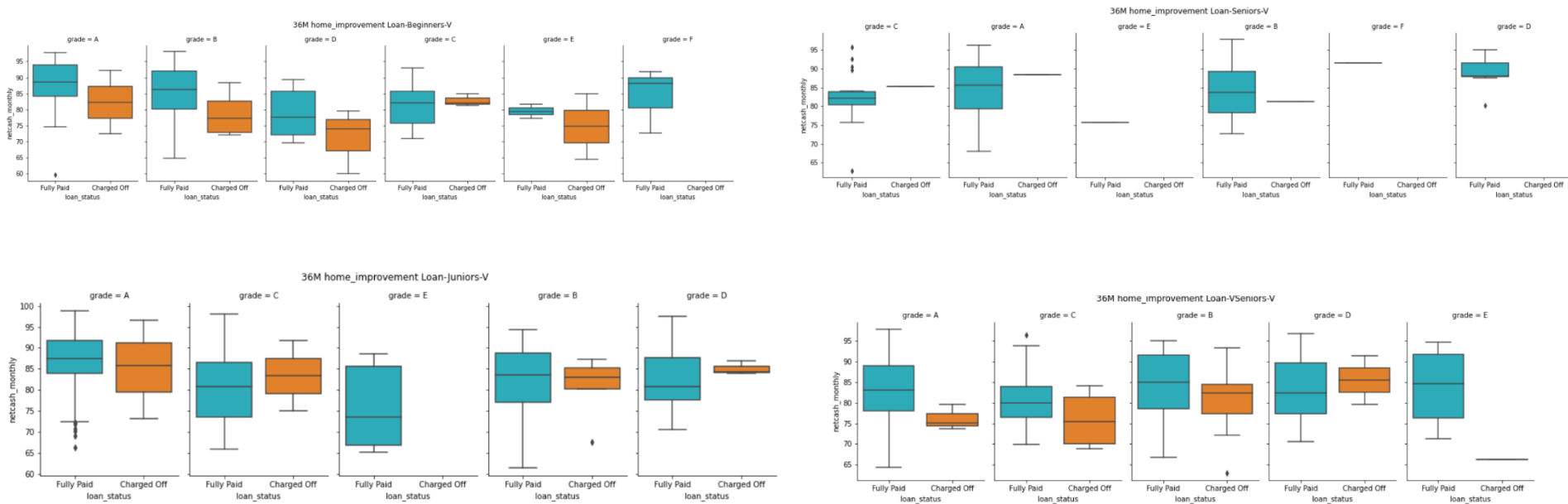
- Beginners availing loan and posses “net cash/month” <70%
- Juniors availing “C/D/F/G” grade loan and posses “net cash/month” <70%
- Seniors availing “B/D” grade loan and posses “net cash/month” <70%
- VSeniors availing grade “C/E/F” and posses “net cash/month” <70%



Multivariate Analysis: 36M- Home Improvement Loan

High possibility of default:

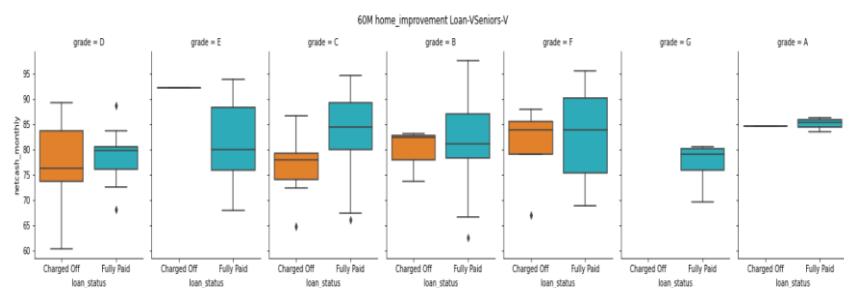
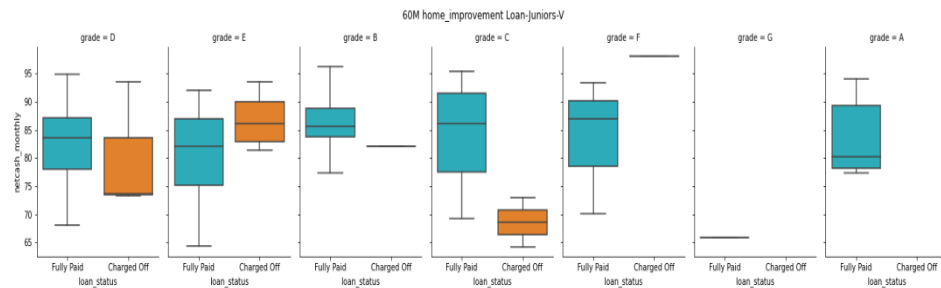
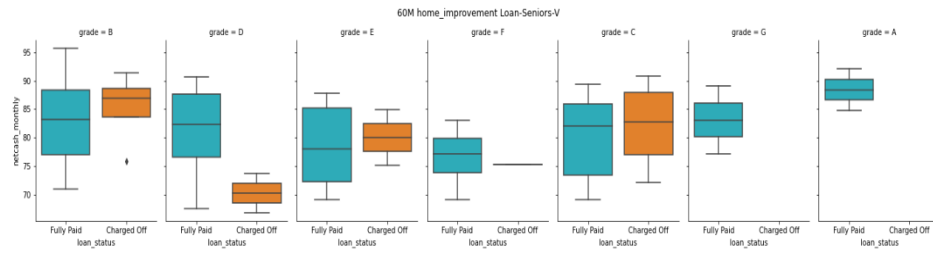
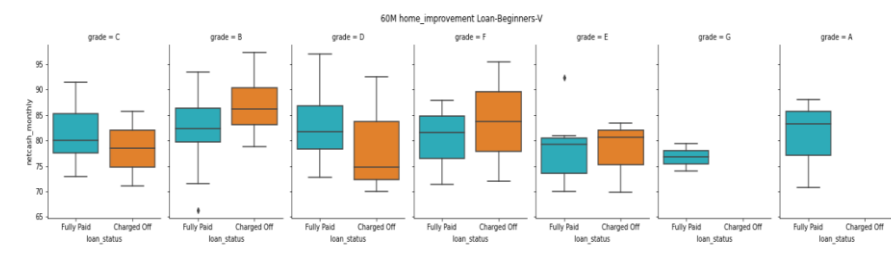
- Beginners availing “A/B/C/D” grade loan and posses “net cash/month” <82%
- Juniors availing “A” grade loan and posses “net cash/month” <82%
- Seniors availing home improvement loan not likely to default
- VSeniors availing grade “A/B/C” loan and posses “net cash/month” <75%



Multivariate Analysis: 60M- Home Improvement Loan

High possibility of default:

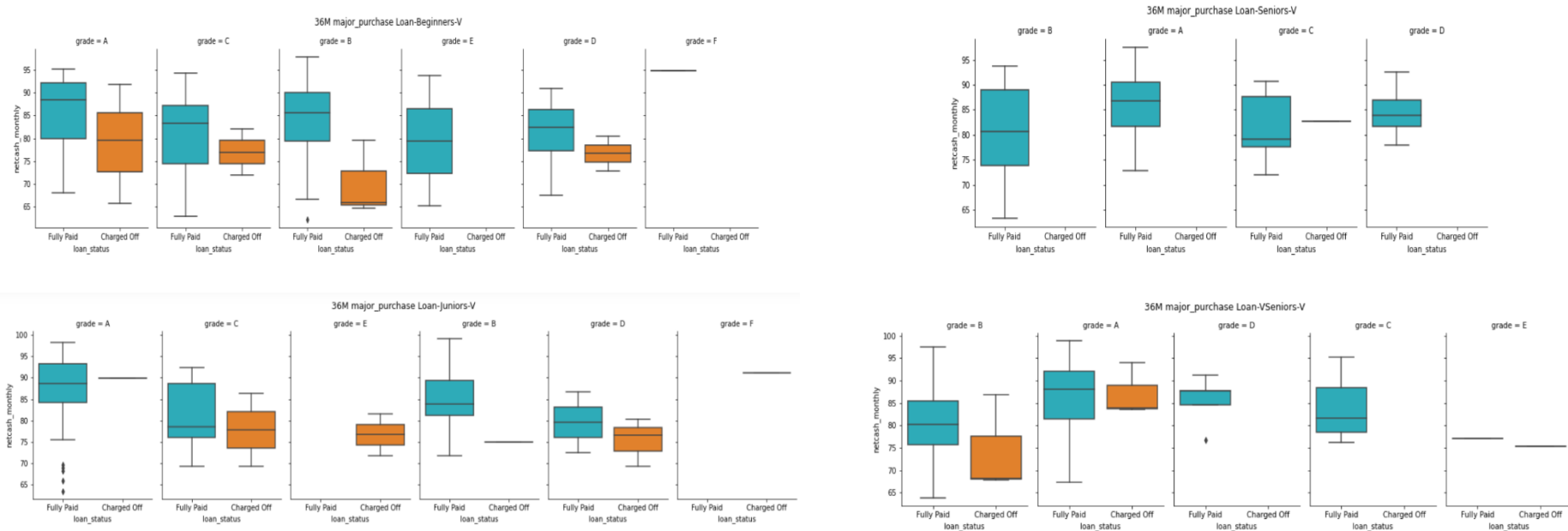
- Beginners availing “C/D” grade loan and posses “net cash/month” <78%
- Juniors availing “C/D” grade loan and posses “net cash/month” <78%
- Seniors availing “D” grade loan and posses “net cash/month” <72%
- VSeniors availing grade “C/D” loan and posses “net cash/month” <78%



Multivariate Analysis: 36M-Major Purchase Loan

High possibility of default:

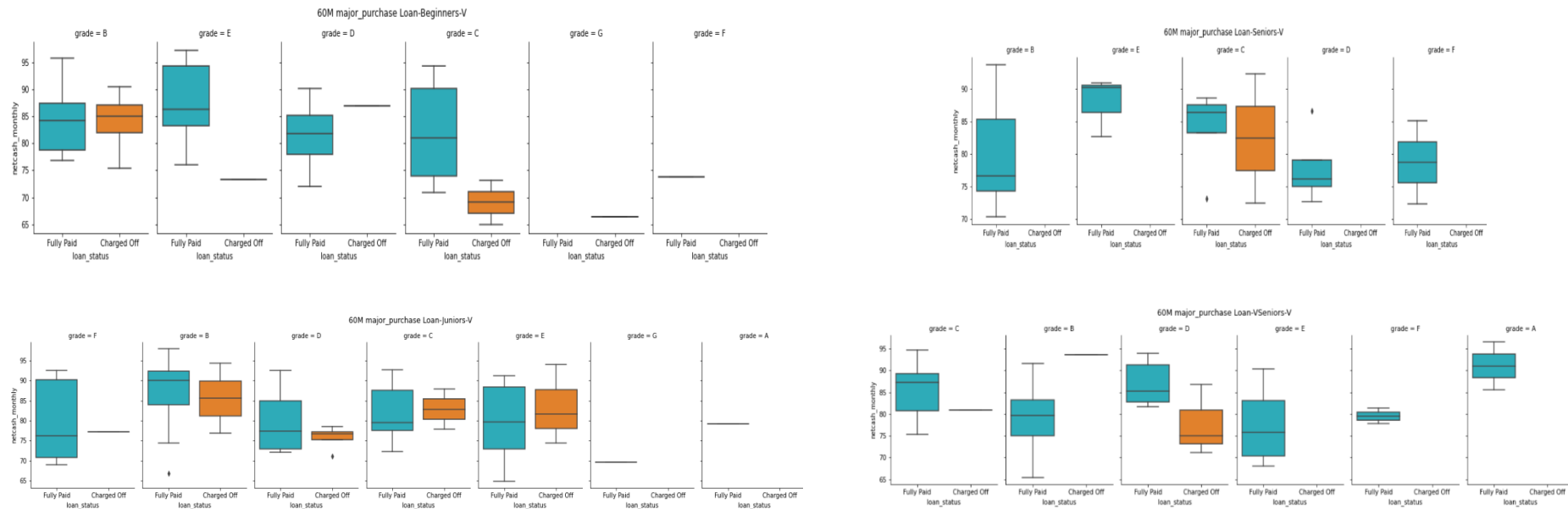
- Beginners availing “A/B/D” grade loan and posses “net cash/month” <78%
- Juniors availing “C/D/E” grade loan and posses “net cash/month” <75%
- Seniors availing home improvement loan not likely to default
- VSeniors availing grade “B” loan and posses “net cash/month” <75%



Multivariate Analysis: 60M-Major Purchase Loan

High possibility of default:

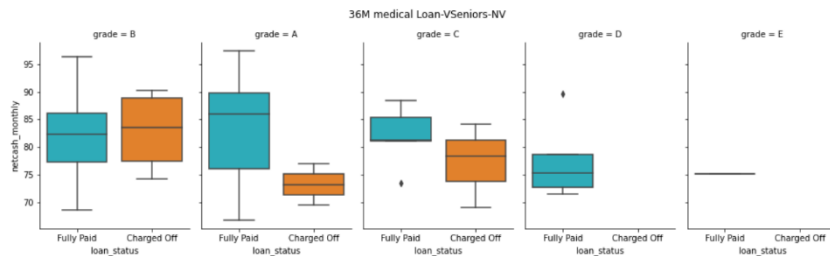
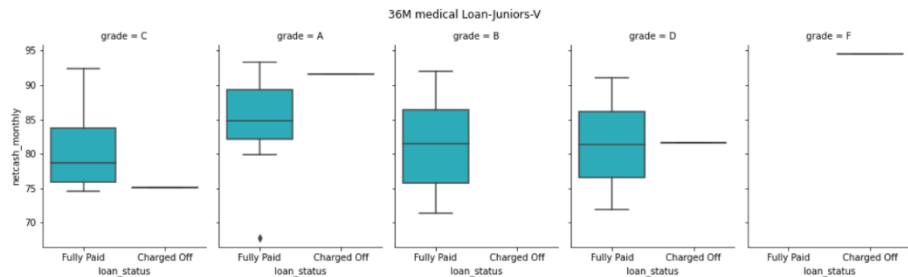
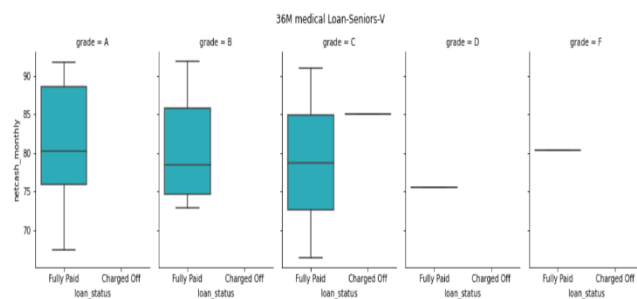
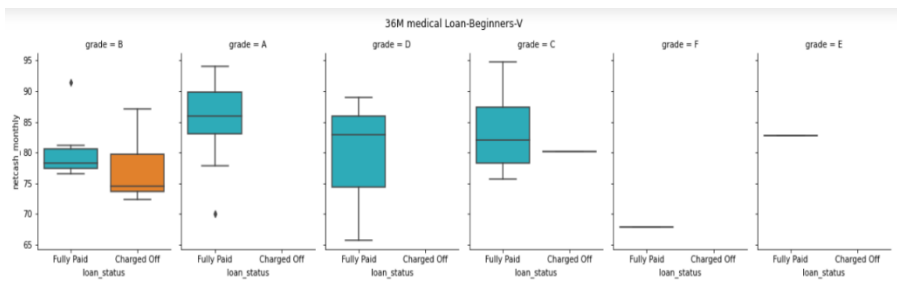
- Beginners availing “C” grade loan and posses “net cash/month” <70%
- Juniors availing “B” grade loan and posses “net cash/month” <85%
- Seniors availing “C” grade loan and posses “net cash/month” <82%
- VSeniors availing grade “D” loan and posses “net cash/month” <80%



Multivariate Analysis: 36M-Medical Loan

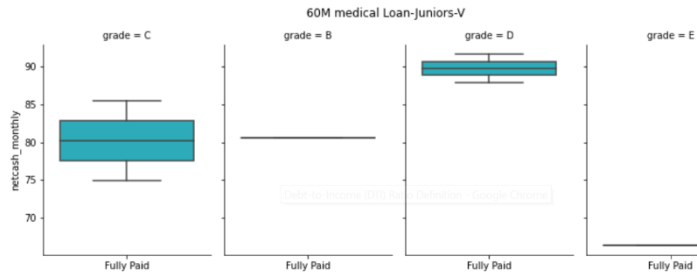
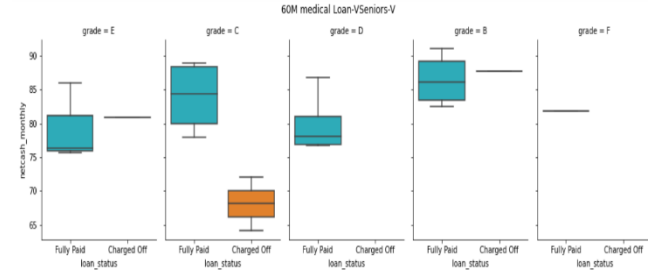
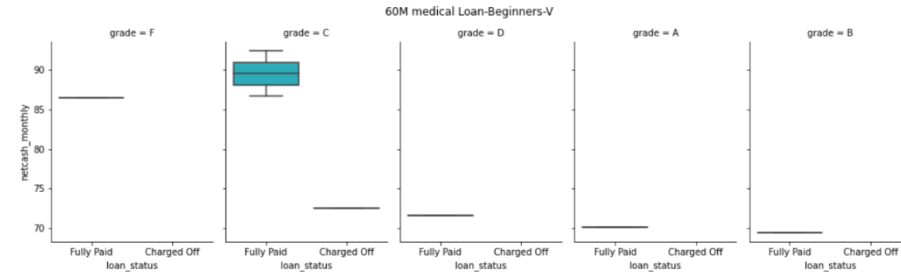
High possibility of default:

- Beginners availing “B” grade loan and posses “net cash/month” <78%
- Verified juniors, seniors and vseniors are not likely to default
- Most of the defaulters in medical loan are in Not-Verified category



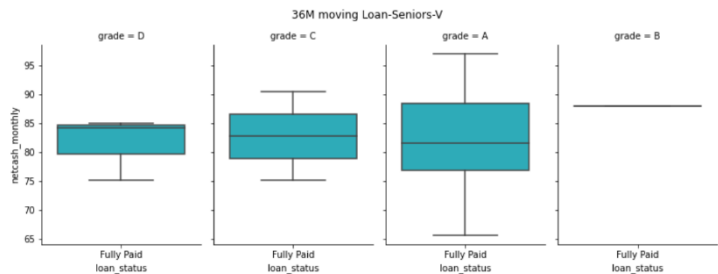
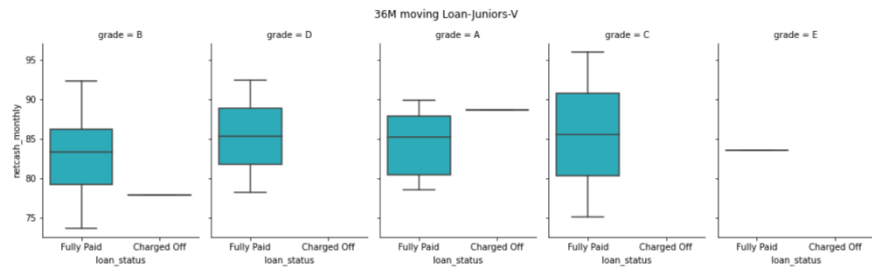
High possibility of default:

- Verified beginners, juniors and seniors are not likely to default
- Most of the defaulters in medical loan are in Not-Verified category
- Vseniors availing grade “C” loan and posses “net cash/month” <70%



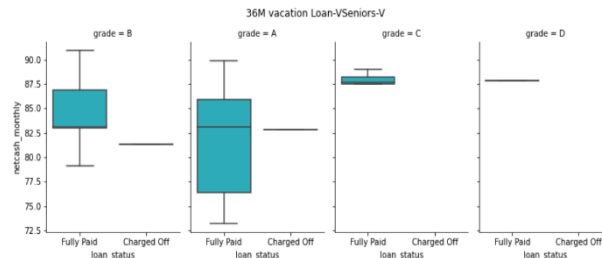
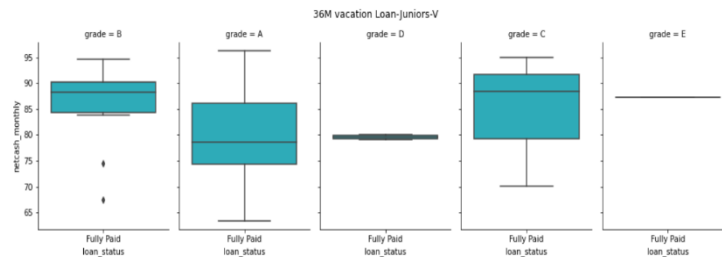
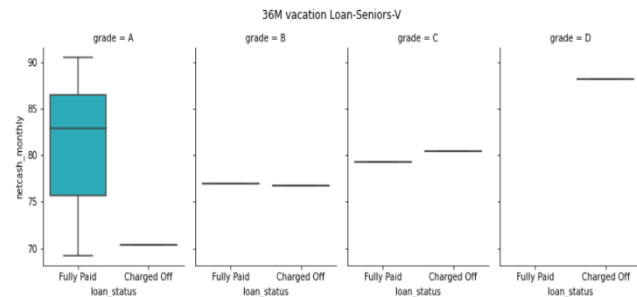
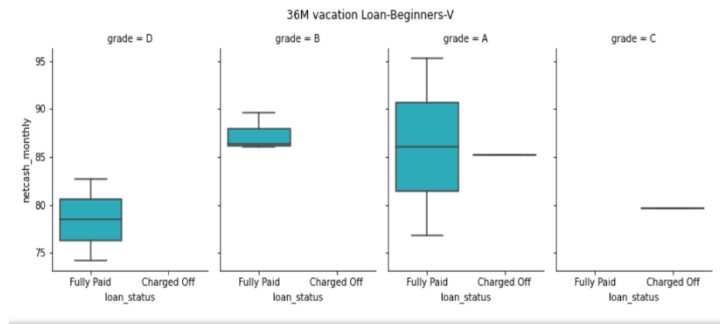
High possibility of default:

- Most of the Verified loan applicants are not likely to default
- Most of the defaulters in moving loan are in Not-Verified category



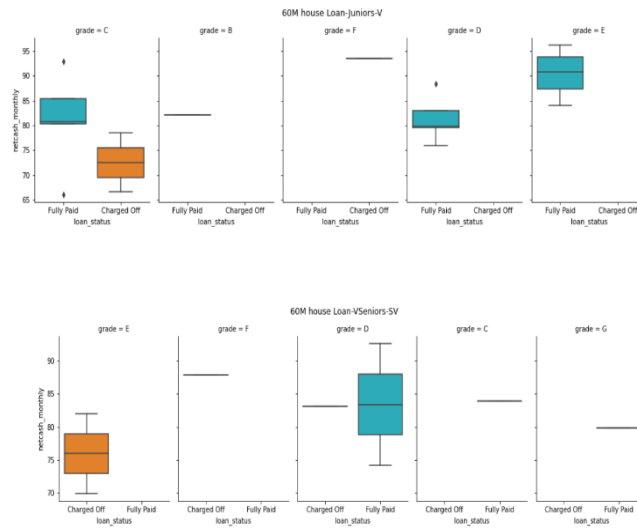
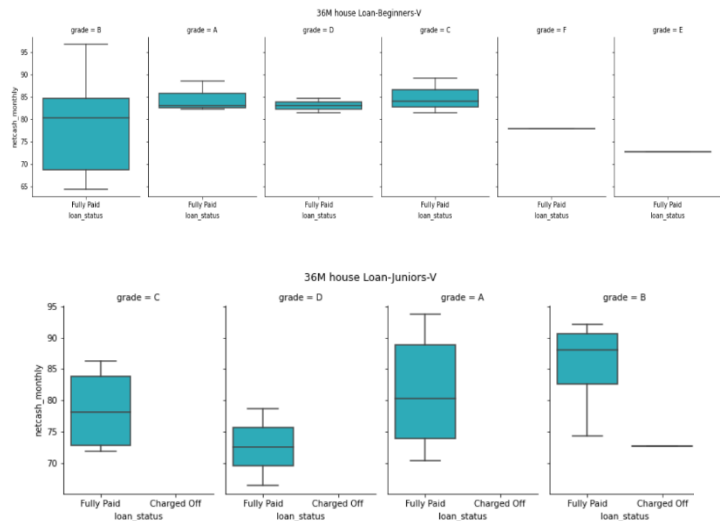
High possibility of default:

- Most of the Verified loan applicants are not likely to default
- Most of the defaulters in vacation loan are in Not-Verified category



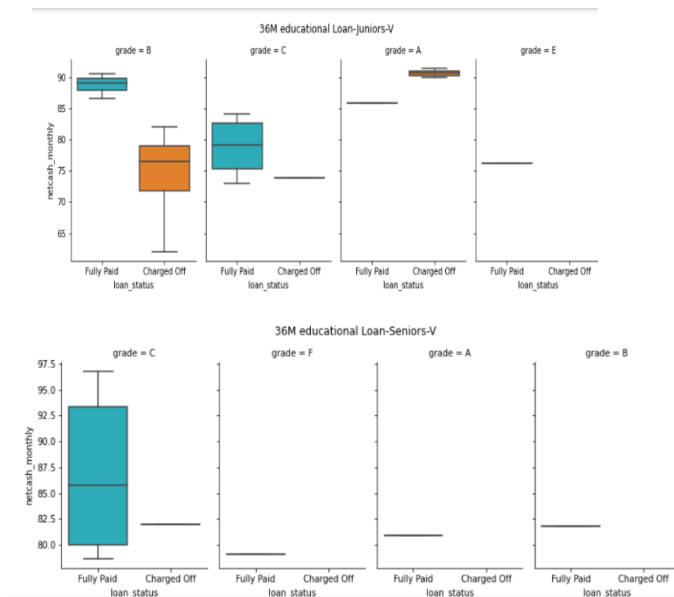
High possibility of default:

- Most of the Verified loan applicants are not likely to default
- 60M loan availed by Juniors under grade “C” loan is likely to default under 70% net cash%
- 60M loan availed by Vseniors under grade “E” loan is likely to default



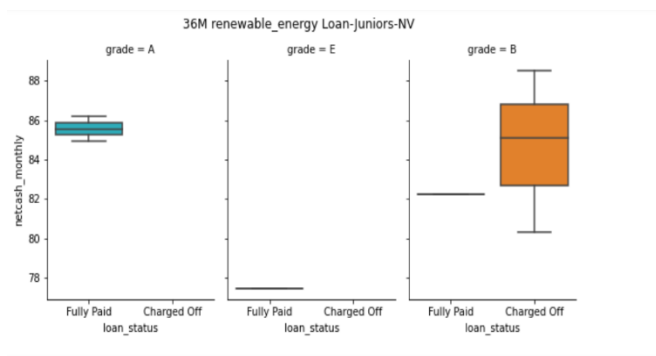
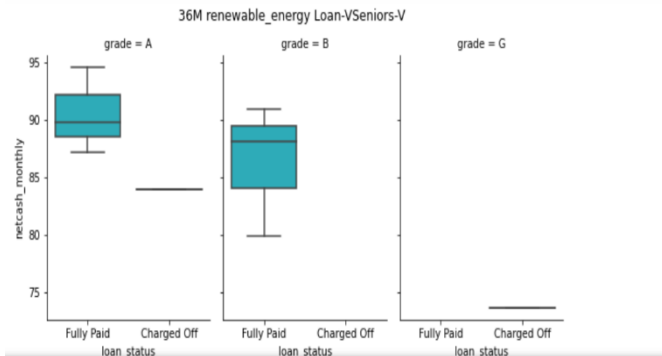
High possibility of default:

- Most of the loan applicants are not likely to default
- Juniors availing loan under grade “B” is likely to default under 78% net cash%



High possibility of default:

- Most of the verified loan applicants are not likely to default
- Most likely defaulters of RE loans are in Not Verified category





Thank You!