Portfolio Analysis by Onyeka Okonkwo

#BUSINESS INFO AND PROBLEM Data is for a loan company serving the under-served market. The company provides credit facilities to customers for uses ranging from Business, Education, Groceries and Personal effects.

#TASK 1. Descriptive analytics of the data 2. PAR Analysis showing evolution & recommendations, for this analysis please use PAR7, PAR15, PAR30 and PAR60

#STEPS TAKEN 1. Data import 2. Preprocessing - Cleaning 3. Exploratory data analysis & Visualisation

Each section includes Notes.

#IMPORT DATA

Import, Load libraries and View data

```
library(readr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```
df <- read_csv("~/Documents/Code/Analytics/Portfolio Analysis/data_case_study.csv")
```

```
## Rows: 350844 Columns: 18
```

```
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (13): date, loan_id, loan_status, product_type, reason, approval_date, l...
## dbl  (3): user_id, repaid, days_late
```

```
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
View(df)
```

```
## Warning: One or more parsing issues, see `problems()` for details
```

Data structure

```
str(df)
```

```
## spec_tbl_df [350,844 x 18] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ date             : chr [1:350844] "15/03/2021" "15/03/2021" "15/03/2021" "15/03/2021" ...
##  $ user_id          : num [1:350844] 1483192 1173117 1352358 1290014 1504236 ...
##  $ loan_id          : chr [1:350844] "e1f35912-301a-4e7f-b769-4c0ae4482963" "d465a501-ed4b-432d-b7b3
##  $ principal        : num [1:350844] 14286 38095 11905 11905 11905 ...
##  $ balance          : num [1:350844] 14286 38095 11905 11905 11905 ...
##  $ repaid           : num [1:350844] 0 0 0 0 0 ...
##  $ days_late        : num [1:350844] NA NA NA NA NA NA NA NA NA 20 ...
##  $ loan_status      : chr [1:350844] "On Time" "On Time" "On Time" "On Time" ...
##  $ product_type     : chr [1:350844] "SHORT" "SHORT" "SHORT" "SHORT" ...
##  $ reason           : chr [1:350844] "Business" "Business" "Business" "Medical fees" ...
##  $ approval_date    : chr [1:350844] "10/03/2021" "10/03/2021" "10/03/2021" "10/03/2021" ...
##  $ last_payment_date: chr [1:350844] "25/03/2021" "25/03/2021" "09/04/2021" "09/04/2021" ...
##  $ default_date     : chr [1:350844] "23/06/2021" "23/06/2021" "08/07/2021" "08/07/2021" ...
##  $ bank             : chr [1:350844] "G" "G" "O" "C" ...
##  $ gender           : chr [1:350844] "male" "male" "female" "male" ...
##  $ state            : chr [1:350844] "Y25" "Y25" "BY" "D4" ...
##  $ date_of_birth    : chr [1:350844] "23/07/1983" "25/11/1972" "06/05/1987" "19/01/1992" ...
##  $ employment_status: chr [1:350844] "SELF-EMPLOYED" "SELF-EMPLOYED" "SELF-EMPLOYED" "SELF-EMPLOYED"
##  - attr(*, "spec")=
##   .. cols(
##   ..   date = col_character(),
##   ..   user_id = col_double(),
##   ..   loan_id = col_character(),
##   ..   principal = col_number(),
##   ..   balance = col_number(),
##   ..   repaid = col_double(),
##   ..   days_late = col_double(),
##   ..   loan_status = col_character(),
##   ..   product_type = col_character(),
##   ..   reason = col_character(),
##   ..   approval_date = col_character(),
##   ..   last_payment_date = col_character(),
##   ..   default_date = col_character(),
##   ..   bank = col_character(),
##   ..   gender = col_character(),
##   ..   state = col_character(),
##   ..   date_of_birth = col_character(),
##   ..   employment_status = col_character()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

#DATA CLEANING AND PREP

###Change class of variables

rounding numeric values to 2 decimal

```
df[,4:6] <- round(df[,4:6], digits = 2)
```

Characters to Factors

```
df[,8:10] <- lapply(df[,8:10], as.factor)
df$gender <- as.factor(df$gender)
df$employment_status <- as.factor(df$employment_status)
```

Character to Dates

```
df$date_of_birth <- dmy(df$date_of_birth)
df$approval_date <- dmy(df$approval_date)
```

```
df$date <- dmy(df$date)
df$last_payment_date <- dmy(df$last_payment_date)
df$default_date <- dmy(df$default_date)
```

Arrange Date column in chronological order

```
df %>% arrange(date)
```

```
## # A tibble: 350,844 x 18
##    date       user_id loan_id     principal balance repaid days_late loan_status
##    <date>       <dbl> <chr>           <dbl>   <dbl>  <dbl>     <dbl> <fct>
##  1 2021-03-15 1483192 e1f35912-3~    14286.  14286.      0         NA On Time
##  2 2021-03-15 1173117 d465a501-e~    38095.  38095.      0         NA On Time
##  3 2021-03-15 1352358 3cc12530-9~    11905.  11905.      0         NA On Time
##  4 2021-03-15 1290014 0c433515-d~    11905.  11905.      0         NA On Time
##  5 2021-03-15 1504236 4a498d09-e~    11905.  11905.      0         NA On Time
##  6 2021-03-15 1099554 f6426a8c-2~    14286.  14286.      0         NA On Time
##  7 2021-03-15 1488311 5b485d9c-9~     7143.   7143.      0         NA On Time
##  8 2021-03-15  348033 15832e96-6~    52381   52381       0         NA On Time
##  9 2021-03-15  409808 476ff167-7~    71429.  71429.      0         NA On Time
## 10 2021-03-15 1243070 2f844e03-b~    64286.  64286. 11905.        20 Late
## # ... with 350,834 more rows, and 10 more variables: product_type <fct>,
## #   reason <fct>, approval_date <date>, last_payment_date <date>,
## #   default_date <date>, bank <chr>, gender <fct>, state <chr>,
## #   date_of_birth <date>, employment_status <fct>
```

Search for missing values, identifies how many and what columns they're in

```
sum(is.na(df))
```

```
## [1] 217878
```

```
names(df[, !complete.cases(t(df))])
```

```
## [1] "balance"       "days_late"     "date_of_birth"
```

Summary of Data

```
summary(df)
```

```
##       date                user_id          loan_id            principal
##  Min.   :2021-03-15   Min.   :     26   Length:350844      Min.   :  7143
##  1st Qu.:2021-03-29   1st Qu.: 517404   Class :character   1st Qu.: 11905
##  Median :2021-04-12   Median :1187943   Mode  :character   Median : 23810
##  Mean   :2021-04-08   Mean   : 992014                      Mean   : 33211
##  3rd Qu.:2021-04-26   3rd Qu.:1433756                      3rd Qu.: 52381
##  Max.   :2021-05-03   Max.   :1627539                      Max.   :273810
##
##     balance             repaid         days_late       loan_status
##  Min.   :     1.2   Min.   :     0   Min.   : 1.0     Late   :133118
```

```
##  1st Qu.: 11904.8   1st Qu.:     0   1st Qu.:14.0     On Time:217726
##  Median : 23809.5   Median :     0   Median :33.0
##  Mean   : 32530.2   Mean   :  1591   Mean   :37.2
##  3rd Qu.: 52381.0   3rd Qu.:     0   3rd Qu.:59.0
##  Max.   :273809.5   Max.   :250000   Max.   :90.0
##  NA's   :144                         NA's   :217726
##   product_type                      reason       approval_date
##  LONG   :  2596   Business             :150619   Min.   :2020-10-30
##  SCALING: 67164   Household Goods      : 39320   1st Qu.:2021-02-22
##  SHORT  :281084   Medical fees         : 34397   Median :2021-03-15
##                   Personal/Confidential: 34382   Mean   :2021-03-09
##                   Emergency            : 29284   3rd Qu.:2021-04-02
##                   Education            : 18162   Max.   :2021-05-03
##                   (Other)              : 44680
##  last_payment_date     default_date            bank              gender
##  Min.   :2020-12-16   Min.   :2021-03-16   Length:350844      female:110833
##  1st Qu.:2021-03-18   1st Qu.:2021-06-16   Class :character   male  :240011
##  Median :2021-04-09   Median :2021-07-08   Mode  :character
##  Mean   :2021-04-03   Mean   :2021-07-02
##  3rd Qu.:2021-04-29   3rd Qu.:2021-07-28
##  Max.   :2021-12-18   Max.   :2022-03-18
##
##     state           date_of_birth           employment_status
##  Length:350844      Min.   :1970-01-01   EMPLOYED     :162737
##  Class :character   1st Qu.:1981-03-03   SELF-EMPLOYED:188107
##  Mode  :character   Median :1987-02-14
##                     Mean   :1986-07-04
##                     3rd Qu.:1992-05-12
##                     Max.   :2003-04-14
##                     NA's   :8
```

###NOTES

1. Data length is 350844 rows and 18 columns (created additional for Age)
2. Date ranges from 15/3/2021 to 3/05/2021
3. Highest amount disbursed was N273,810 and lowest was N7,143
4. 37.9% of customers were late on payment
5. Company has 3 product category - Short, Scaling and Long. Majority of customers (80%) took Short product. This increases liquidity and availability of working capital for the company if payment is timely.
6. 42.9% required loan for business, while between 5% and 11% needed a loan for Household goods, Personal, Emergency, Education and Medical Fees.
7. Gender of customers was 68% male and 31% female.
8. 53.6% were self-employed and 46.3% were employed.
9. Customers age range from 18 to 51.

Check unique values in loan id, user id, state and bank

```
length(unique(df$user_id))
```

```
## [1] 59988
```

```
length(unique(df$loan_id))
```

```
## [1] 108752
```

```
length(unique(df$state))
```

```
## [1] 37
```

```
length(unique(df$bank))
```

```
## [1] 19
```

###NOTES:

1. 59998 customers over the period
2. 108752 unique loan IDs i.e loans disbursed during the period
3. Customers take multiple loans, often without paying up the prior loan. See examples in users 1483192 and 1488311
4. Customers are resident in 37 states
5. Loan was disbursed into 19 different banks

#TREATMENT OF MISSING VALUES (NA)

Date of Birth (8) impute with median value

```
df$date_of_birth[is.na(df$date_of_birth)] <- median(df$date_of_birth, na.rm = TRUE)
```

User ID 439447 (1258b7a2-6a23-4146-aed4-e0117ea29234) has no Date of Birth recorded.

Days Late (217726) Calculate for values i.e. if last payment date is less than date, then calculate days late, otherwise return value as 0.

```
df$days_late <- ifelse((df$last_payment_date < df$date), (df$date - df$last_payment_date), 0)
```

Balance (144) - calculate field and fill. We'll run multiple test conditions for this.

###Test 1 (144 NA) Replace with corresponding principal value when repayment is 0

```
df$balance <- ifelse(df$repaid==0 & is.na(df$balance), df$principal, df$balance)
```

###Test 2 (135 NA) Group by User ID and Loan ID, then fill NA in balance with Principal if the repaid value is same as above

```
df2 <- df%>%
  group_by(user_id, loan_id) %>%
  mutate(balance = ifelse(is.na(balance) & repaid == lag(repaid, n=1), principal, balance))
```

###(contd. Test 2 - 76 NA) Group by User ID and Loan ID, then fill NA in balance with Principal if the repaid value is same as below

```
df3 <- df2%>%
  group_by(user_id, loan_id) %>%
  mutate(balance = ifelse(is.na(balance) & repaid == lead(repaid, n=1), principal, balance))
```

###Test 3 (52 NA) Group by User ID and Loan ID, then fill NA in Balance with 0 if customer paid more than existing loan balance, otherwise leave value as NA.

```
df4 <- df3 %>%
  group_by(user_id, loan_id) %>%
  mutate(balance = ifelse(is.na(balance) & (repaid - lag(repaid, n=1))>lag(balance, n=1), 0, balance))
```

###Test 4 (15 NA) Group by user Id and Loan ID, if the repaid value is greater than existing loan balance, then fill with 0, otherwise leave as NA

```
df5 <- df4%>%
  group_by(user_id, loan_id) %>%
  mutate(balance = ifelse(is.na(balance) & repaid > lag(balance, n=1), 0, balance))
```

This code seems similar to the previous chunk so no NAs were affected. May be okay to omit, but safe to keep it.

###Test 5 (15 NA) Return 0 if repaid value is greater than loan principal

```
df6 <- df5%>%
  group_by(user_id, loan_id) %>%
  mutate(balance = ifelse(is.na(balance) & repaid > principal, 0, balance))
```

###check if there's any NA left

```
sum(is.na(df6))
```

```
## [1] 0
```

```
names(df6[, !complete.cases(t(df6))])
```

```
## character(0)
```

All cleared!! Now we can move forward.

Create New column for Age of Customers using Approval Date and DOB

```
library(dplyr)
calc_age <- function(birthDate, refDate = Sys.Date(), unit = "year") {

  require(lubridate)

  if(grepl(x = unit, pattern = "year")) {
    as.period(interval(birthDate, refDate), unit = 'year')$year
  } else if(grepl(x = unit, pattern = "month")) {
    as.period(interval(birthDate, refDate), unit = 'month')$month
  } else if(grepl(x = unit, pattern = "week")) {
    floor(as.period(interval(birthDate, refDate), unit = 'day')$day / 7)
  } else if(grepl(x = unit, pattern = "day")) {
    as.period(interval(birthDate, refDate), unit = 'day')$day
  } else {
    print("Argument 'unit' must be one of 'year', 'month', 'week', or 'day'")
    NA
  }

}
df6$Age = calc_age(birthDate = df6$date_of_birth, refDate = df6$approval_date, unit = "year")
```

rename df6

```
Cleandf <- df6
```

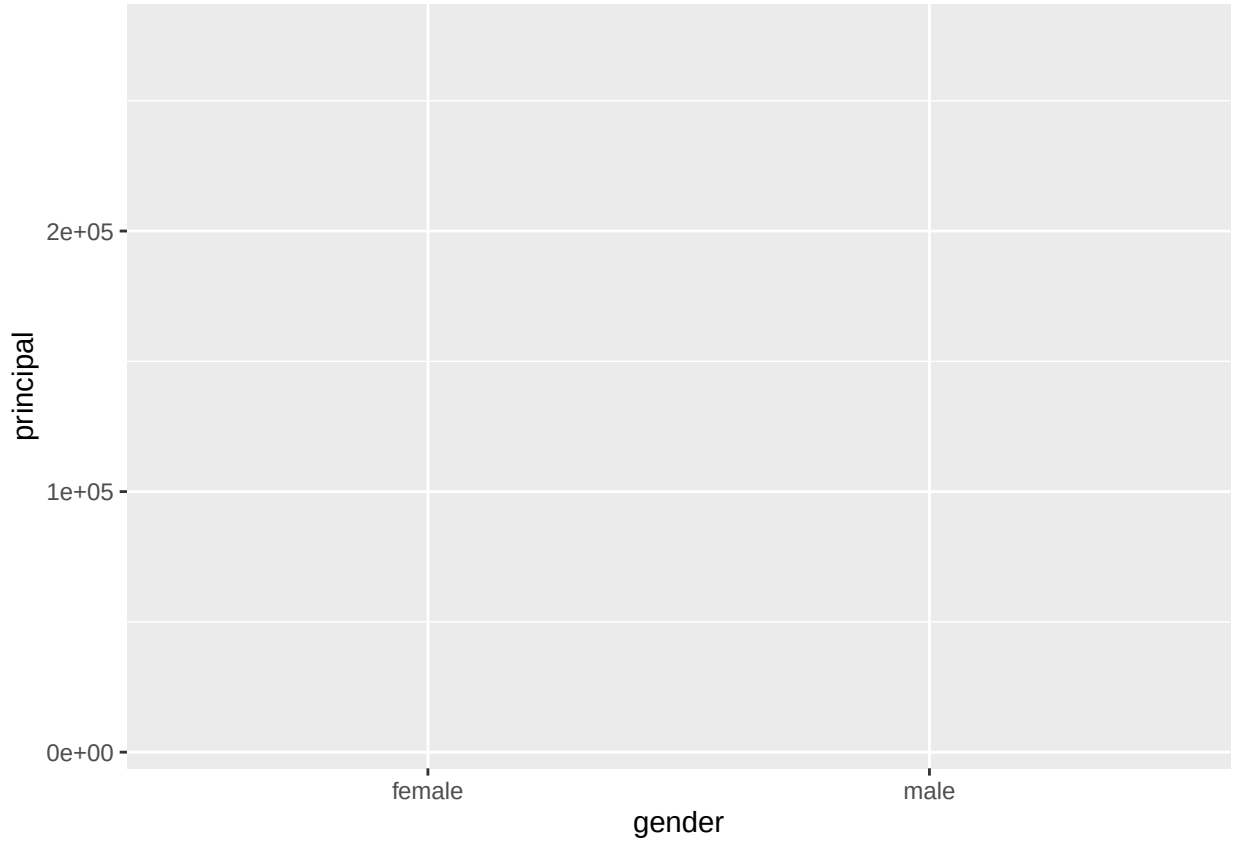
VIEW DATA

```
View(Cleandf)
```

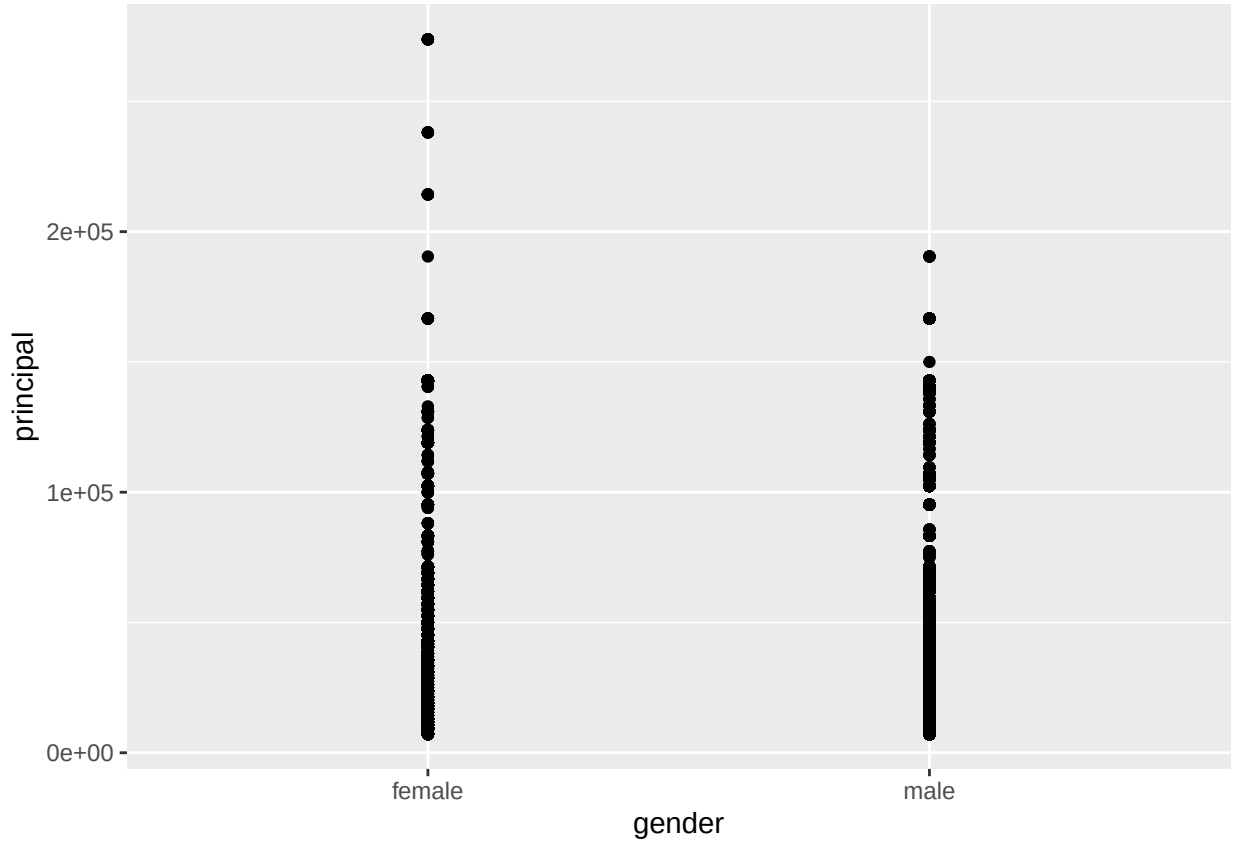
#DATA VISUALISATION AND EDA

```
library(ggplot2)
library(DataExplorer)
```

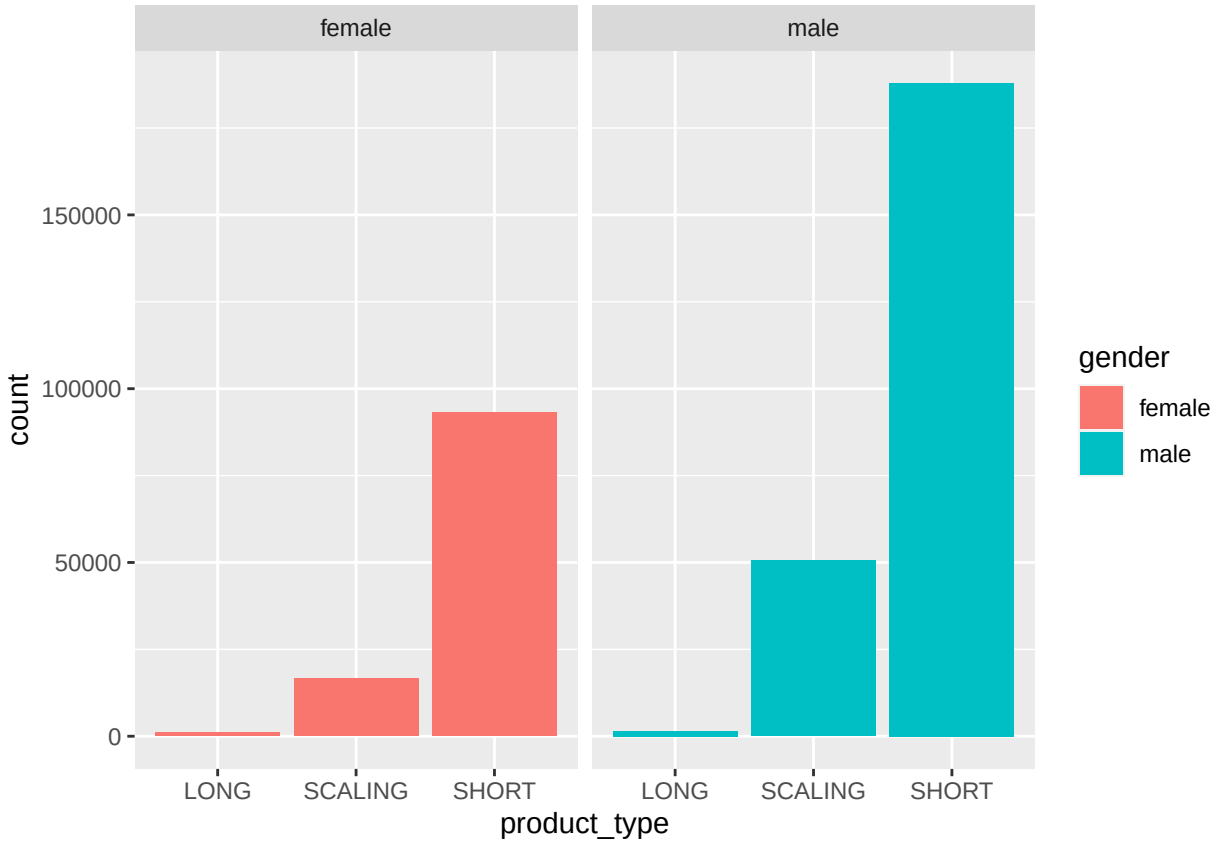
```
p <- ggplot(data = Cleandf, aes(x = gender , y = principal))
print(p)
```




```
print(p + geom_point())
```

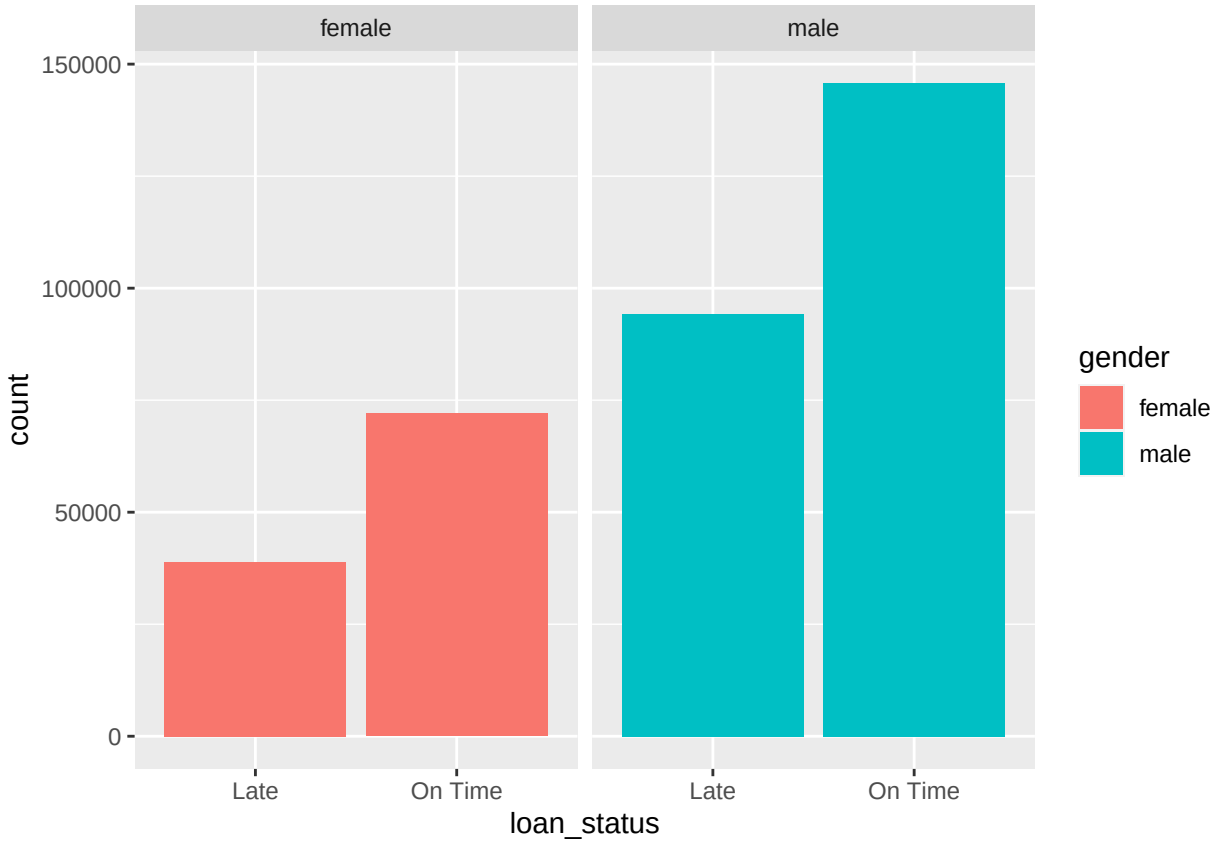



```
ggplot(group_by(Cleandf, loan_id), aes(x = product_type, fill = gender))+
  geom_bar() +
  facet_wrap(~ gender)
```



Between the 3 product categories for both genders, more customers took Short loans, and men took more loans in general than women.

```
ggplot(data = Cleandf, aes(x = loan_status, fill = gender))+
  geom_bar() +
  facet_wrap(~ gender)
```

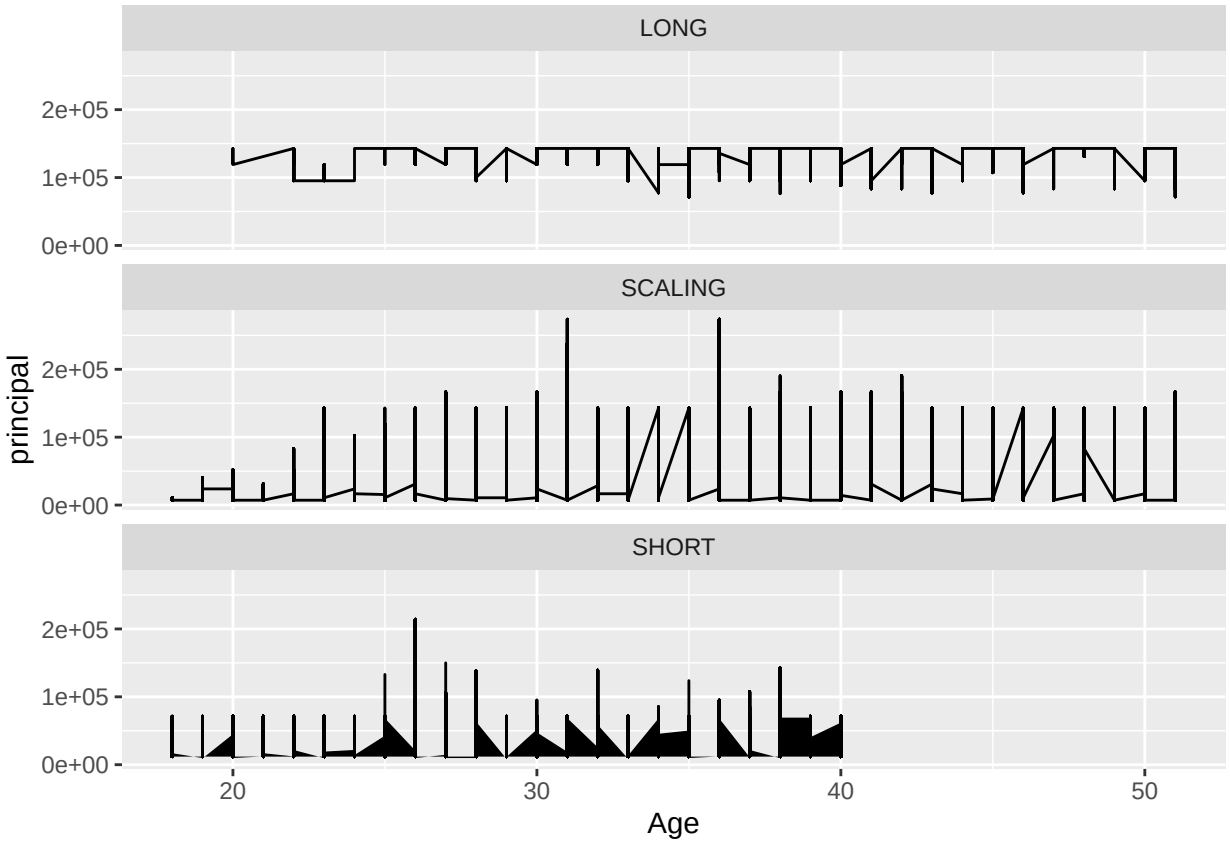


About 62% women pay on time, compared to about 60% of men. The difference in ability to pay on time does not appear to be significant.

```
ggplot(group_by(Cleandf, loan_id), aes(x = gender, fill = gender))+
  geom_bar() +
  facet_wrap(~ reason, nrow = 3)
```

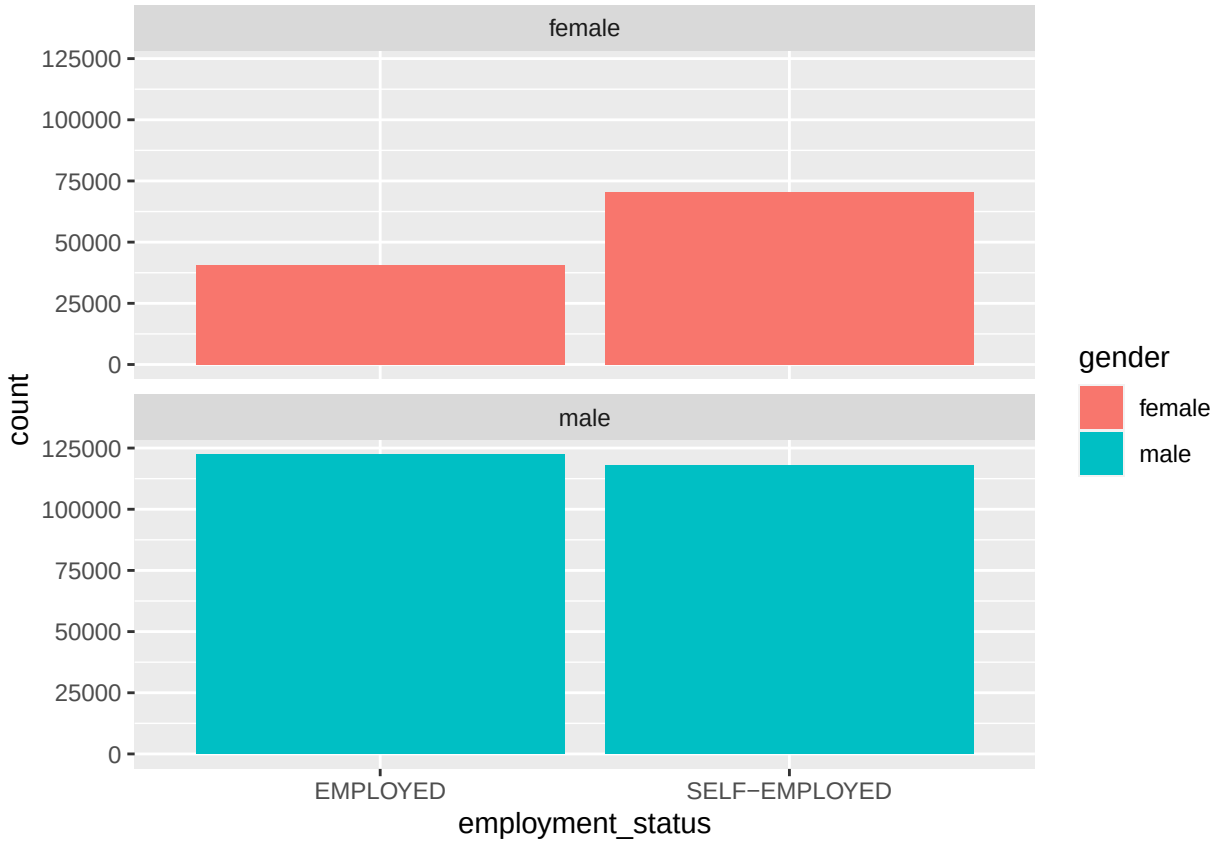
Both gender took more business loans, and others in these category topped reasons for loans collected - emergency, household goods, medical fees and person/confidential reasons.

```
ggplot(group_by(Cleandf, loan_id), aes(x = Age, y = principal))+
  geom_line()+
  facet_wrap(~ product_type, nrow = 3)
```



In scaling category, customers between ages 30 and 40 took the most loans. For short loans ages 25 - 30 took more loans. Collection of long loans are evenly distributed across the age groups.

```
ggplot(group_by(Cleandf, loan_id), aes(employment_status, fill = gender))+
  geom_bar() +
  facet_wrap(~ gender, nrow = 2)
```



Among the customers, there are more self-employed women and more employed men.

```
create_report(Cleandf)
```

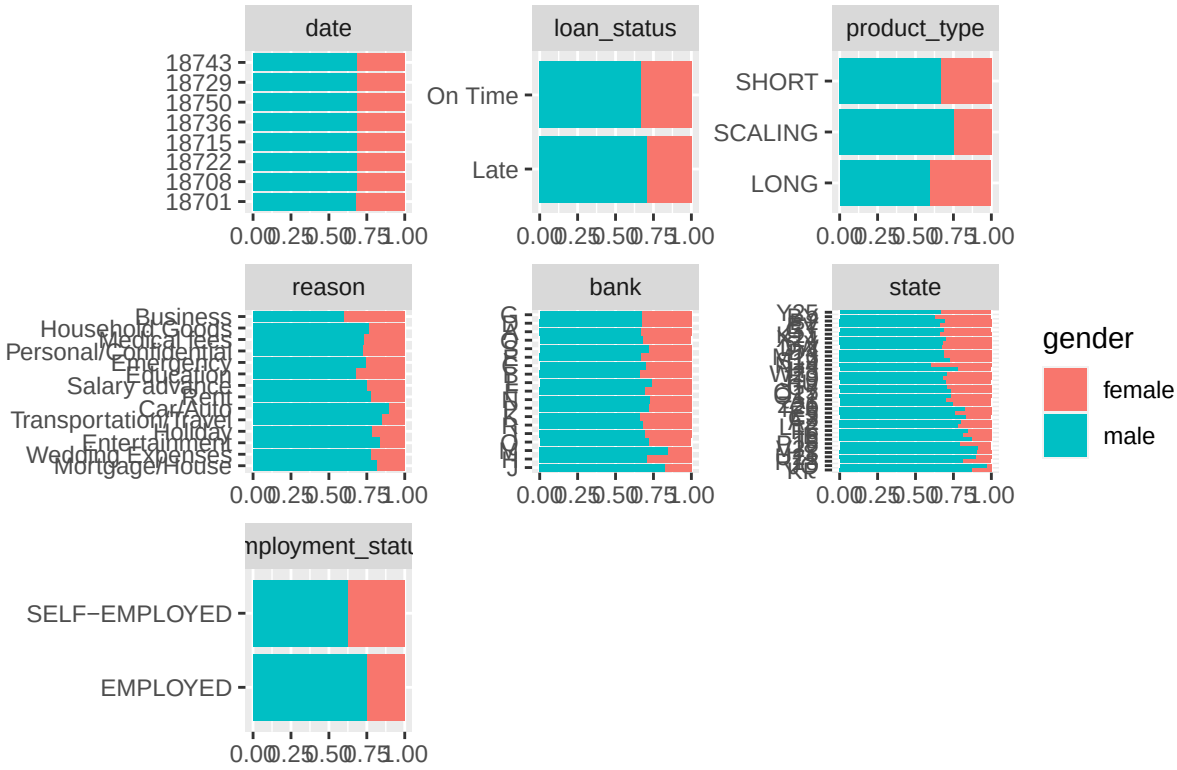
```
##
##
## processing file: report.rmd
##   |                                                                      |
##    inline R code fragments
##
##   |                                                                      |...
## label: global_options (with options)
## List of 1
##  $ include: logi FALSE
##
##   |                                                                      |.....
##   ordinary text without R code
##
##   |                                                                      |.......
## label: introduce
##   |                                                                      |........
##   ordinary text without R code
##
##   |                                                                      |..........
## label: plot_intro
##   |                                                                      |............
```

```
##   ordinary text without R code
##
##   |                                                                      |.............
## label: data_structure
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: missing_profile
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: univariate_distribution_header
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: plot_histogram
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: plot_density
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: plot_frequency_bar
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: plot_response_bar
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: plot_with_bar
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: plot_normal_qq
##   |                                                                      |.............
##   ordinary text without R code
##
##   |                                                                      |.............
## label: plot_response_qq
##   |                                                                      |.............
##   ordinary text without R code
##
```

```
##   |                                                                      |.................
## label: plot_by_qq
##   |                                                                      |.................
##   ordinary text without R code
##
##   |                                                                      |.................
## label: correlation_analysis
##   |                                                                      |.................
##   ordinary text without R code
##
##   |                                                                      |.................
## label: principal_component_analysis
##   |                                                                      |.................
##   ordinary text without R code
##
##   |                                                                      |.................
## label: bivariate_distribution_header
##   |                                                                      |.................
##   ordinary text without R code
##
##   |                                                                      |.................
## label: plot_response_boxplot
##   |                                                                      |.................
##   ordinary text without R code
##
##   |                                                                      |.................
## label: plot_by_boxplot
##   |                                                                      |.................
##   ordinary text without R code
##
##   |                                                                      |.................
## label: plot_response_scatterplot
##   |                                                                      |.................
##   ordinary text without R code
##
##   |                                                                      |.................
## label: plot_by_scatterplot
## output file: /Users/user/Documents/report.knit.md
## /Applications/RStudio.app/Contents/MacOS/pandoc/pandoc +RTS -K512m -RTS /Users/user/Documents/report
##
## Output created: report.html
```

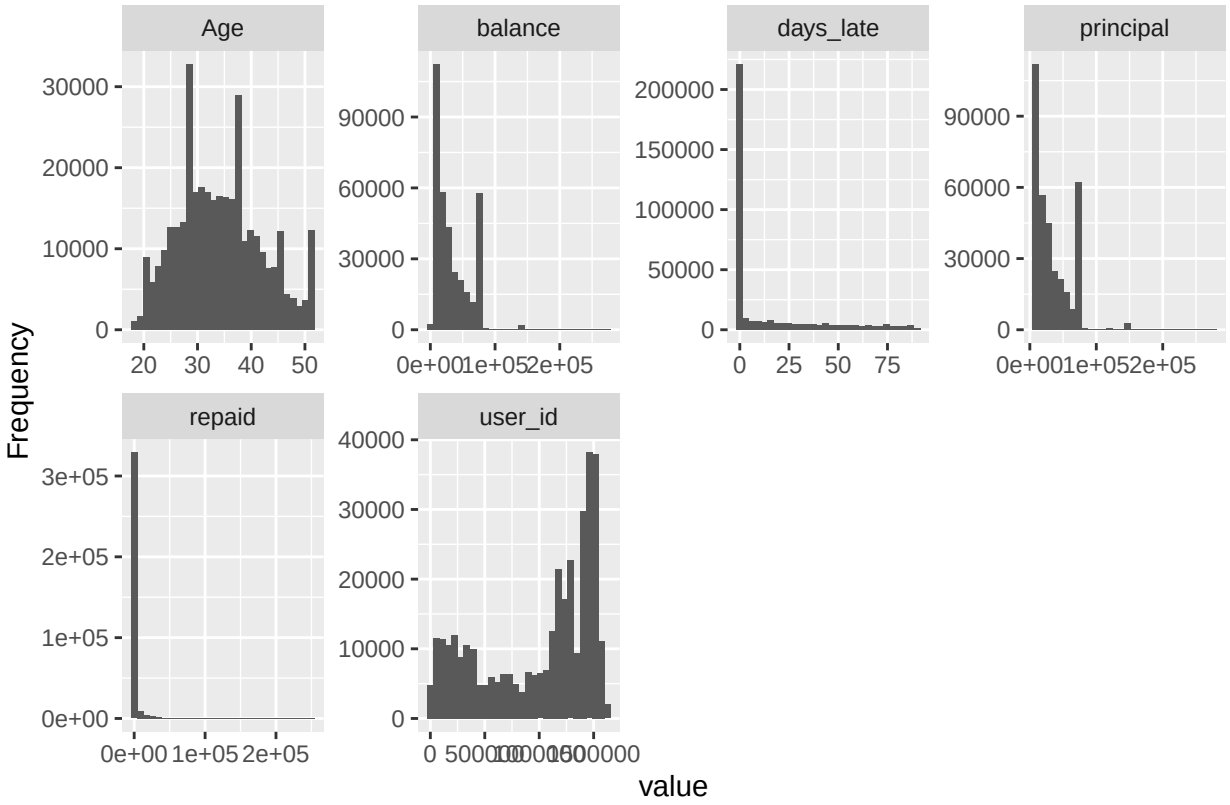
```r
plot_bar(Cleandf, by = "gender")
```

```
## 5 columns ignored with more than 50 categories.
## loan_id: 108752 categories
## approval_date: 173 categories
## last_payment_date: 229 categories
## default_date: 229 categories
## date_of_birth: 11177 categories
```



Loan Status - more women paid on time than men. Product Type - men took more scaling loan product, while women took more of Long product. Reason - women took more loans for business and education, and men for car/auto and transport/travel. Employment Status - More self-employed women and employed men.

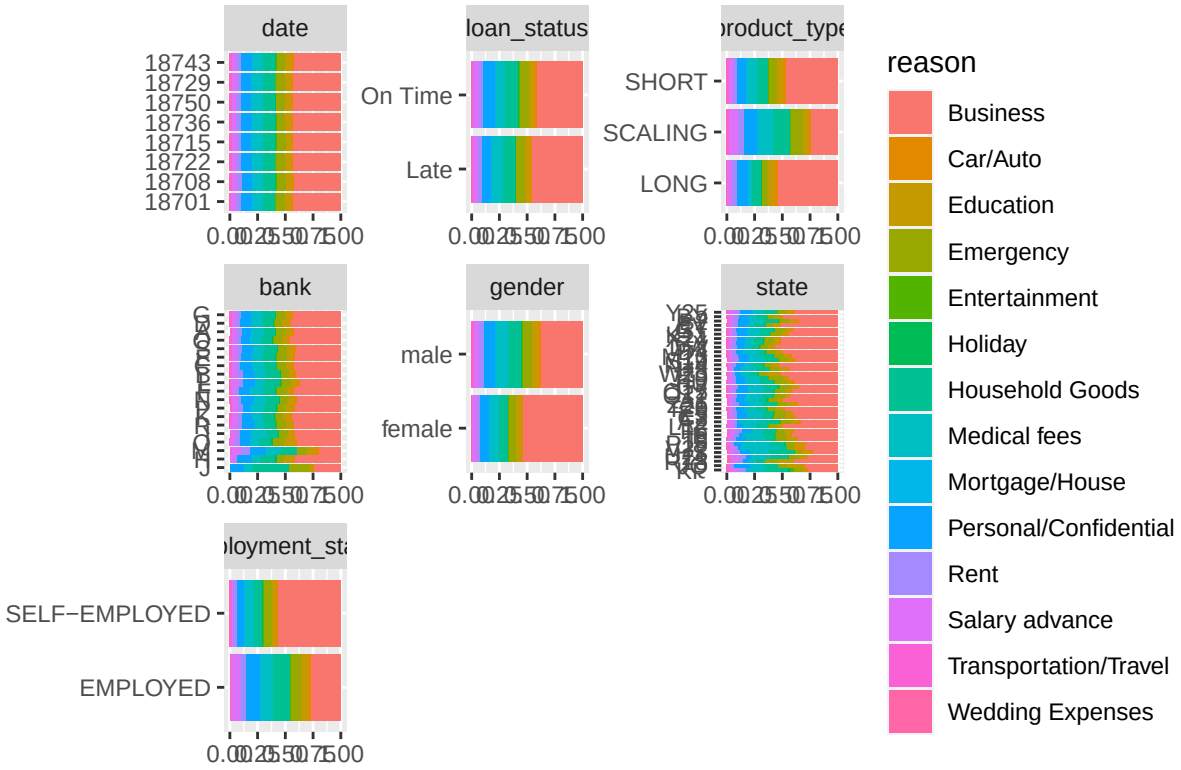
```
plot_histogram(Cleandf)
```



Age - most customers between 28 and 38

```
plot_bar(Cleandf, by = "reason")
```

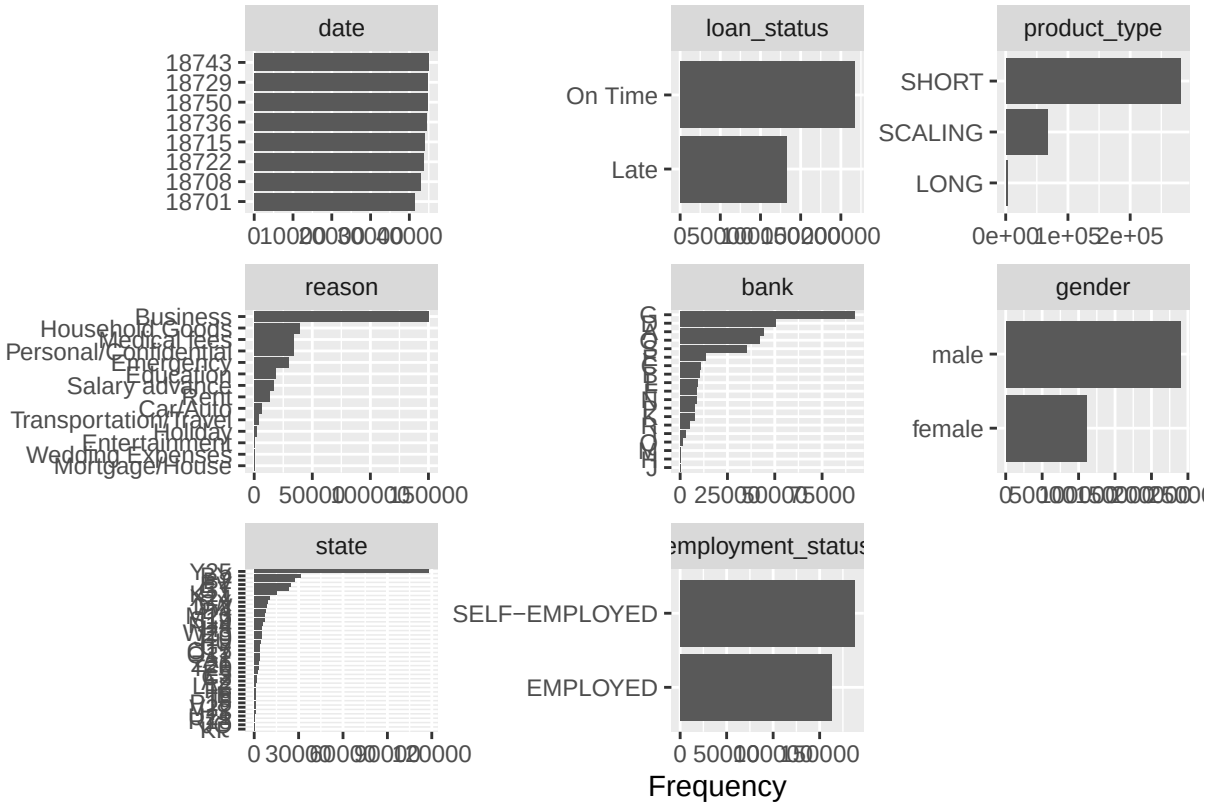
```
## 5 columns ignored with more than 50 categories.
## loan_id: 108752 categories
## approval_date: 173 categories
## last_payment_date: 229 categories
## default_date: 229 categories
## date_of_birth: 11177 categories
```



Product type - More long product taken for business reason Employment status - Self-employed customers took more business loans

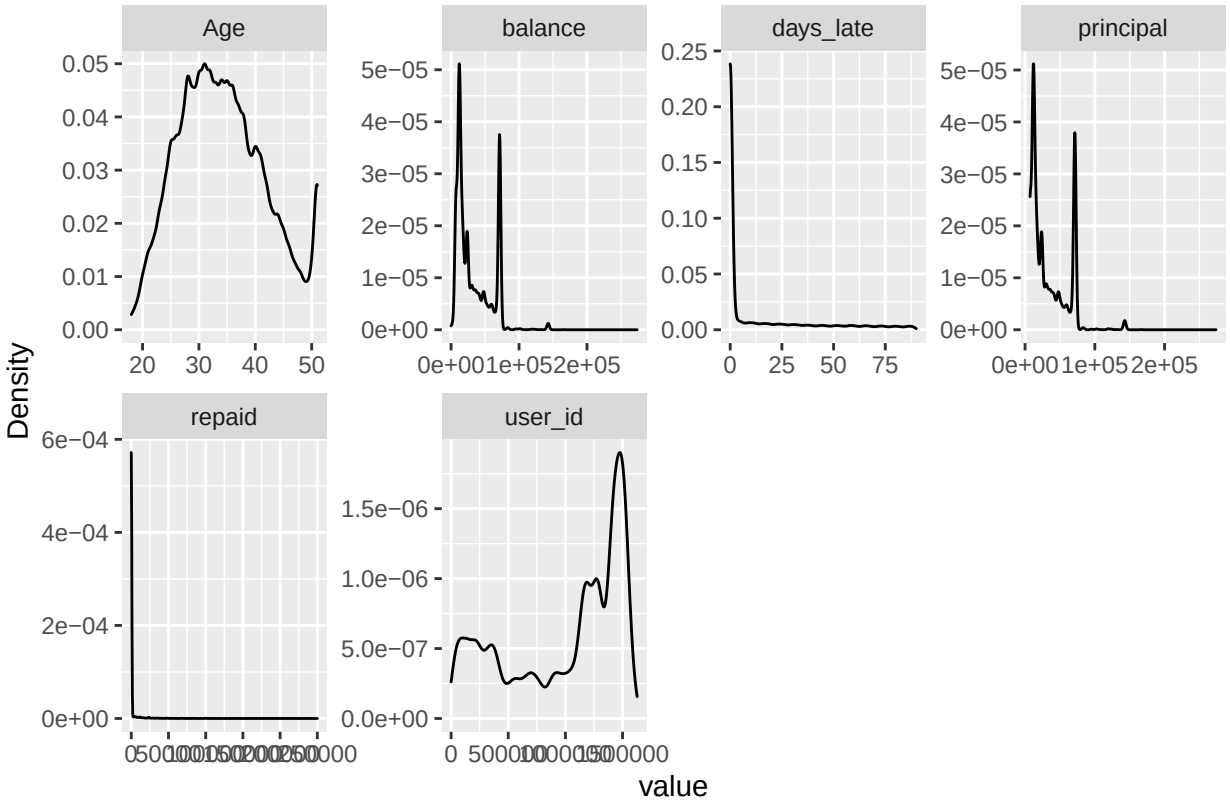
```
plot_bar(Cleandf)
```

```
## 5 columns ignored with more than 50 categories.
## loan_id: 108752 categories
## approval_date: 173 categories
## last_payment_date: 229 categories
## default_date: 229 categories
## date_of_birth: 11177 categories
```



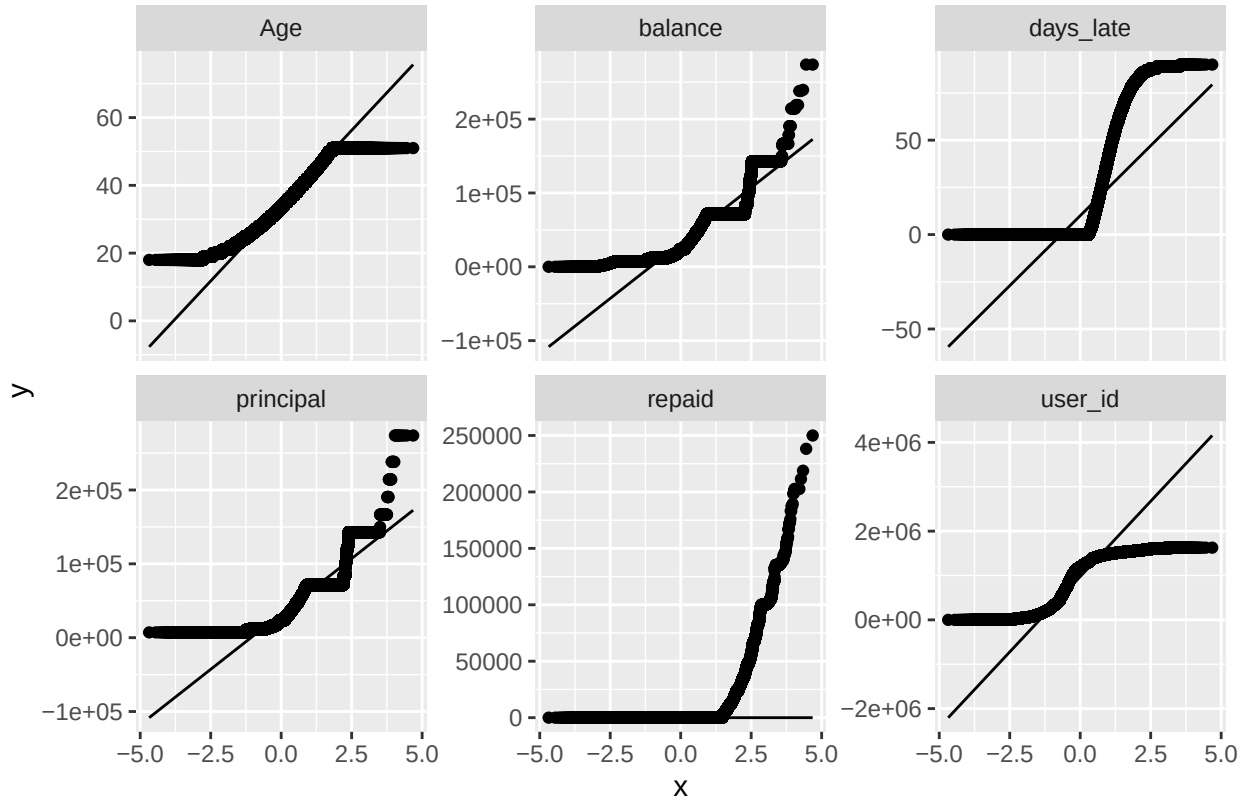
Loan status - more loans are paid on time. Gender - more than 50% more men than female customers. expand customer geographic by sex State - High concentration of customers in state Y25. expand customer geographics by location Bank - Majority of customers use bank C. consider partnerships with other banks

```
plot_density(Cleandf)
```

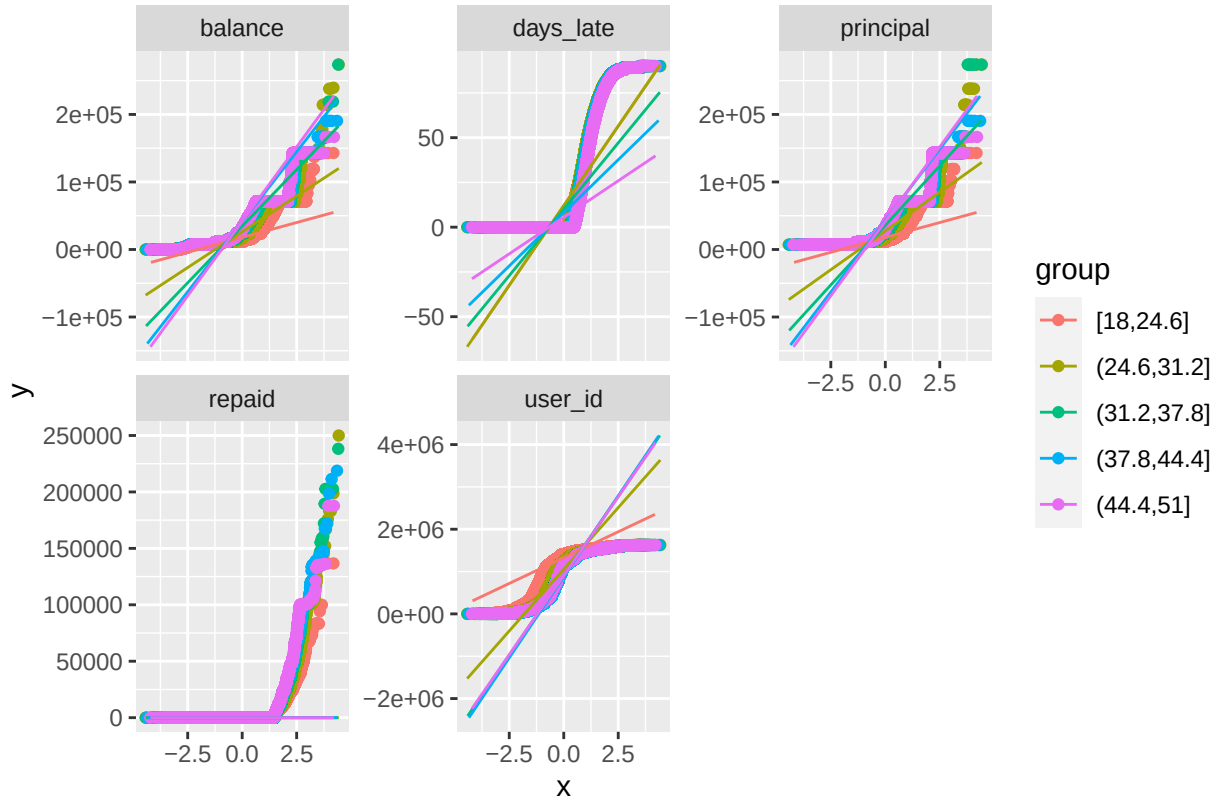


Age - customers between 25 and 40 Balance - balance owed is between 0 and 600,000. days late - between 0 and 7 days principal - loan amount collected is between 7,000 and 600,000 repaid - most repayment amount is less than 10,000

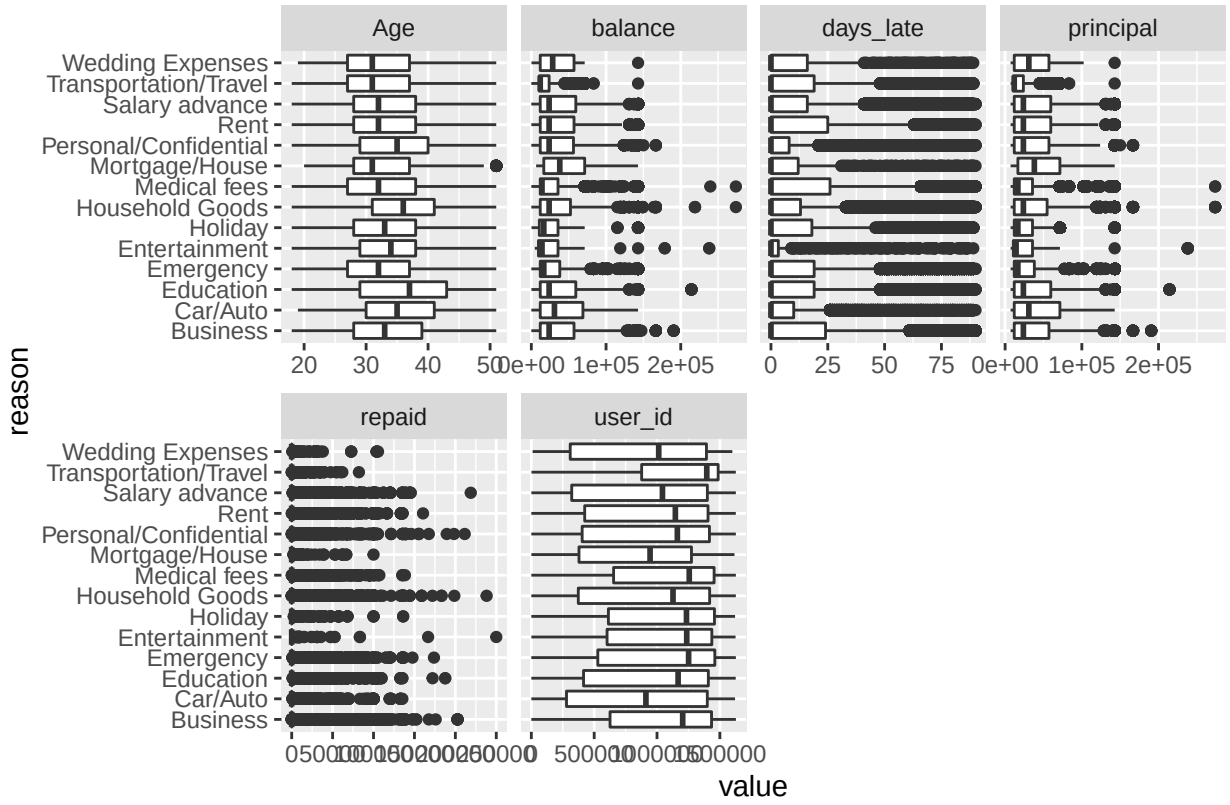
```
plot_qq(Cleandf)
```



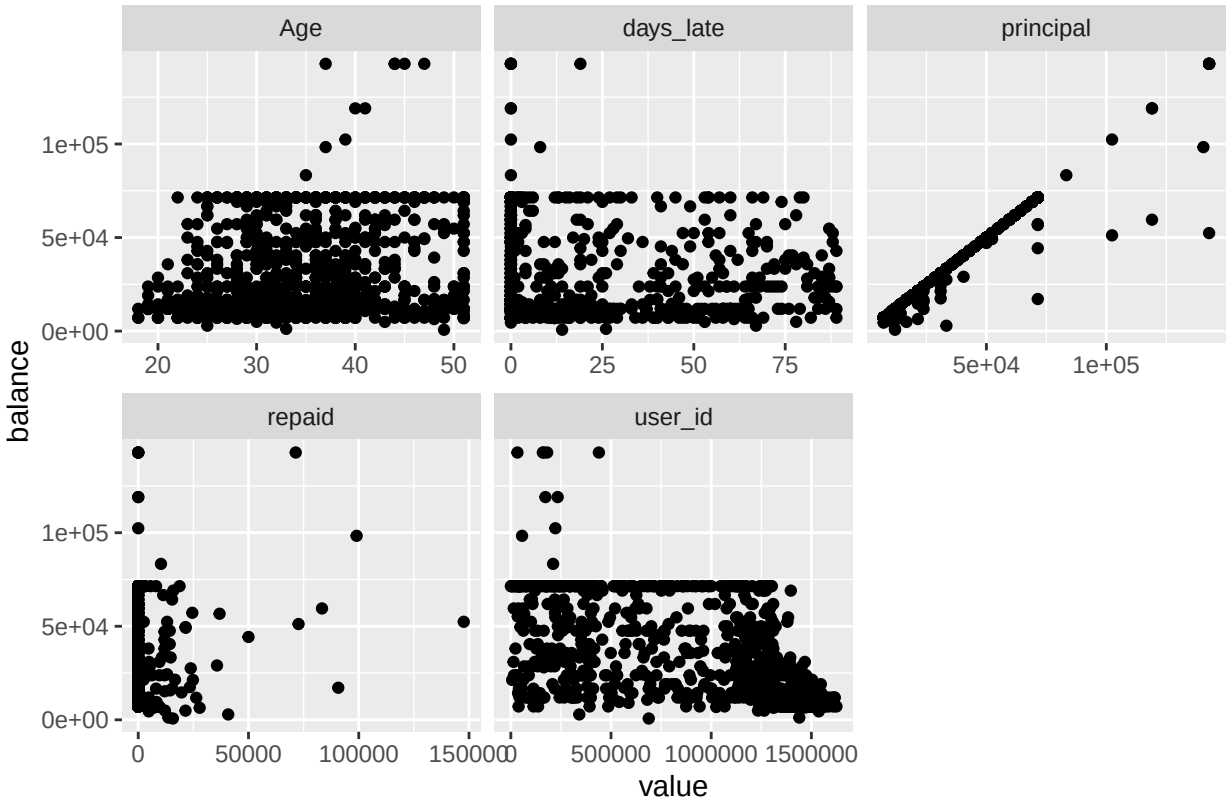

```
plot_qq(Cleandf, by = "Age")
```




```
plot_boxplot(Cleandf, by = "reason")
```




```
plot_scatterplot(split_columns(Cleandf)$continuous, by = "balance", sampled_rows = 1000L)
```



Save as csv file

```
write.csv(Cleandf, "CleanCS.csv")
```

#GROSS LOAN PORTFOLIO Needs to be grouped by user ID, loan ID. Then sum unique values in Balance

```
df7 <- Cleandf %>%
group_by(date, loan_id)
```

```
length(unique(df7$balance))
```

```
## [1] 3597
```

```
sum(unique(df7$balance))
```

```
## [1] 103659135
```

NOTES

1. Total GLP =
2. Appears there's a disconnect between the loan amount repaid and the balance left for some customers.

#Portfolio At Risk (PAR) ANALYSIS and EVOLUTION (7, 15, 30, 60)

Portfolio-at-risk (PAR) ratio : Portfolio at risk (X days) / Gross loan portfolio Evolution (Per week?) 15/3, 22/3, 29/3, 5/4, 12/4, 19/4, 26/4, 3/5 (8 weeks in total)

Task - sum by week Group by Date (week) and loan ID

###Wk 1 - 15/3

```
Wk1 <- Cleandf %>%
  filter(date == "2021/03/15") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

```
View(Wk1)
```

GLP of Week 1 - 1,375,404,576

```
sum(Wk1$balance)
```

```
## [1] 1375404576
```

```
length(unique(Cleandf$user_id))
```

```
## [1] 59988
```

EVOLUTION FOR WEEK 1

sum of balance when days late is 7 and above - 27.39%

```
Par7wk1 <- Wk1 %>%
  filter(days_late > 7)
```

```
sum(Par7wk1$balance)/1375404576
```

```
## [1] 0.273875
```

sum of balance when days late is 15 and above - 23.28%

```
Par15wk1 <- Wk1 %>%
  filter(days_late > 15)
```

```
sum(Par15wk1$balance)/1375404576
```

```
## [1] 0.2328037
```

sum of balance when days late is 30 and above 17.44%

```
Par30wk1 <- Wk1 %>%
  filter(days_late > 30)
```

```
sum(Par30wk1$balance)/1375404576
```

```
## [1] 0.1744588
```

sum of balance when days late is 60 and above - 7.86%

```
Par60wk1 <- Wk1 %>%
  filter(days_late > 60)
```

```
sum(Par60wk1$balance)/1375404576
```

```
## [1] 0.07856392
```

###Wk 2 - 22/3

```
Wk2 <- Cleandf %>%
  filter(date == "2021/03/22") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

GLP Wk2 - 1,405,305,146

```
View(Wk2)
sum(Wk2$balance)
```

```
## [1] 1405305146
```

EVOLUTION FOR WEEK 2

sum of balance when days late is 7 and above - 26.26%

```
Par7wk2 <- Wk2 %>%
  filter(days_late > 7)
```

```
sum(Par7wk2$balance)/1405305146
```

```
## [1] 0.2625645
```

sum of balance when days late is 15 and above - 23.16%

```
Par15wk2 <- Wk2 %>%
  filter(days_late > 15)
```

```
sum(Par15wk2$balance)/1405305146
```

```
## [1] 0.2316474
```

sum of balance when days late is 30 and above - 17.13%

```
Par30wk2 <- Wk2 %>%
  filter(days_late > 30)
```

```
sum(Par30wk2$balance)/1405305146
```

```
## [1] 0.1712799
```

sum of balance when days late is 60 and above - 8.19%

```
Par60wk2 <- Wk2 %>%
  filter(days_late > 60)
```

```
sum(Par60wk2$balance)/1405305146
```

```
## [1] 0.08185723
```

###Wk 3 - 29/3

```
Wk3 <- Cleandf %>%
  filter(date == "2021/03/29") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

GLP wk 3 = 1,411,598,292

```
View(Wk3)
sum(Wk3$balance)
```

```
## [1] 1411598292
```

WEEK 3 EVOLUTION

sum of balance when days late is 7 and above - 26.51%

```
Par7wk3 <- Wk3 %>%
  filter(days_late > 7)
```

```
sum(Par7wk3$balance)/1411598292
```

```
## [1] 0.2650545
```

sum of balance when days late is 15 and above - 23.08%

```
Par15wk3 <- Wk3 %>%
  filter(days_late > 15)
```

```
sum(Par15wk3$balance)/1411598292
```

```
## [1] 0.2307892
```

sum of balance when days late is 30 and above - 17.52%

```
Par30wk3 <- Wk3 %>%
  filter(days_late > 30)
```

```
sum(Par30wk3$balance)/1411598292
```

```
## [1] 0.1751651
```

sum of balance when days late is 60 and above - 8.46%

```
Par60wk3 <- Wk3 %>%
  filter(days_late > 60)
```

```
sum(Par60wk3$balance)/1411598292
```

```
## [1] 0.08464391
```

###Wk 4 - 5/4

```
Wk4 <- Cleandf %>%
  filter(date == "2021/04/05") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

GLP = 1,414,476,977

```
View(Wk4)
sum(Wk4$balance)
```

```
## [1] 1414476977
```

WEEK 4 EVOLUTION

sum of balance when days late is 7 and above - 26.40%

```
Par7wk4 <- Wk4 %>%
  filter(days_late > 7)
```

```
sum(Par7wk4$balance)/1414476977
```

```
## [1] 0.2639984
```

sum of balance when days late is 15 and above - 22.92%

```
Par15wk4 <- Wk4 %>%
  filter(days_late > 15)
```

```
sum(Par15wk4$balance)/1414476977
```

```
## [1] 0.2292069
```

sum of balance when days late is 30 and above - 17.87%

```
Par30wk4 <- Wk4 %>%
  filter(days_late > 30)
```

```
sum(Par30wk4$balance)/1414476977
```

```
## [1] 0.1787441
```

sum of balance when days late is 60 and above - 8.18%

```
Par60wk4 <- Wk4 %>%
  filter(days_late > 60)
```

```
sum(Par60wk4$balance)/1414476977
```

```
## [1] 0.08176224
```

###Wk 5 - 12/4

```
Wk5 <- Cleandf %>%
  filter(date == "2021/04/12") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

GLP wk 5 = 1,458,110,474

```
View(Wk5)
sum(Wk5$balance)
```

```
## [1] 1458110474
```

WEEK 5 EVOLUTION

sum of balance when days late is 7 and above - 27.42%

```
Par7wk5 <- Wk5 %>%
  filter(days_late > 7)
```

```
sum(Par7wk5$balance)/1458110474
```

```
## [1] 0.2742133
```

sum of balance when days late is 15 and above - 22.75%

```
Par15wk5 <- Wk5 %>%
  filter(days_late > 15)
```

```
sum(Par15wk5$balance)/1458110474
```

```
## [1] 0.2275141
```

sum of balance when days late is 30 and above - 17.63%

```
Par30wk5 <- Wk5 %>%
  filter(days_late > 30)
```

```
sum(Par30wk5$balance)/1458110474
```

```
## [1] 0.1762583
```

sum of balance when days late is 60 and above - 8.09%

```
Par60wk5 <- Wk5 %>%
  filter(days_late > 60)
```

```
sum(Par60wk5$balance)/1458110474
```

```
## [1] 0.08093415
```

###Wk 6 - 19/4

```
Wk6 <- Cleandf %>%
  filter(date == "2021/04/19") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

GLP wk 6 - 1,452,277,510

```
View(Wk6)
sum(Wk6$balance)
```

```
## [1] 1452277510
```

WEEK 6 EVOLUTION

sum of balance when days late is 7 and above - 27.53%

```
Par7wk6 <- Wk6 %>%
  filter(days_late > 7)
```

```
sum(Par7wk6$balance)/1452277510
```

```
## [1] 0.2752921
```

sum of balance when days late is 15 and above - 23.56%

```
Par15wk6 <- Wk6 %>%
  filter(days_late > 15)
```

```
sum(Par15wk6$balance)/1452277510
```

```
## [1] 0.2357595
```

sum of balance when days late is 30 and above - 17.05%

```
Par30wk6 <- Wk6 %>%
  filter(days_late > 30)
```

```
sum(Par30wk6$balance)/1452277510
```

```
## [1] 0.170562
```

sum of balance when days late is 60 and above - 7.61%

```
Par60wk6 <- Wk6 %>%
  filter(days_late > 60)
```

```
sum(Par60wk6$balance)/1452277510
```

```
## [1] 0.07613098
```

###Wk 7 - 26/4

```
Wk7 <- Cleandf %>%
  filter(date == "2021/04/26") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

GLP wk 7 - 1,461,959,963

```
View(Wk7)
sum(Wk7$balance)
```

```
## [1] 1461959963
```

WEEK 7 EVOLUTION

sum of balance when days late is 7 and above - 27.65%

```
Par7wk7 <- Wk7 %>%
  filter(days_late > 7)
```

```
sum(Par7wk7$balance)/1461959963
```

```
## [1] 0.2765478
```

sum of balance when days late is 15 and above - 23.78%

```
Par15wk7 <- Wk7 %>%
  filter(days_late > 15)
```

```
sum(Par15wk7$balance)/1461959963
```

```
## [1] 0.2377876
```

sum of balance when days late is 30 and above - 16.82%

```
Par30wk7 <- Wk7 %>%
  filter(days_late > 30)
```

```
sum(Par30wk7$balance)/1461959963
```

```
## [1] 0.1682005
```

sum of balance when days late is 60 and above - 7.45%

```
Par60wk7 <- Wk7 %>%
  filter(days_late > 60)
```

```
sum(Par60wk7$balance)/1461959963
```

```
## [1] 0.074472
```

###Wk 8 - 3/5

```
Wk8 <- Cleandf %>%
  filter(date == "2021/05/03") %>%
  select(date, user_id, loan_id, principal, balance, days_late)%>%
  group_by(date, user_id, loan_id)
```

GLP Wk 8 = 1,432,066,814

```
View(Wk8)
sum(Wk8$balance)
```

```
## [1] 1432066814
```

WEEK 8 EVOLUTION

sum of balance when days late is 7 and above - 28.37%

```
Par7wk8 <- Wk8 %>%
  filter(days_late > 7)
```

```
sum(Par7wk8$balance)/1432066814
```

```
## [1] 0.2836927
```

sum of balance when days late is 15 and above - 24.52%

```
Par15wk8 <- Wk8 %>%
  filter(days_late > 15)
```

```
sum(Par15wk8$balance)/1432066814
```

```
## [1] 0.2452345
```

sum of balance when days late is 30 and above - 18.26%

```
Par30wk8 <- Wk8 %>%
  filter(days_late > 30)
```

```
sum(Par30wk8$balance)/1432066814
```

```
## [1] 0.1826491
```

sum of balance when days late is 60 and above - 8.29%

```
Par60wk8 <- Wk8 %>%
  filter(days_late > 60)
```

```
sum(Par60wk8$balance)/1432066814
```

```
## [1] 0.08294334
```