

# Proposal

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2024-02-29

```
# load packages
library(tidyverse)
library(dplyr)
library(knitr)
library(broom)
library(ggplot2)
```

## Data Sets

- Describe the list of data sets you are thinking for the final project.

## Starbucks Customer Satisfactory Survey

### Introduction

This dataset, titled ‘Starbucks Customer Survey,’ is originally from Kaggle (<https://www.kaggle.com/datasets/mahirahmzh/starbucks-customer-retention-malaysia-survey/data>). It consists of survey responses from over 100 participants regarding their purchasing behavior at Starbucks in Malaysia. Incomes are shown in Malaysian Ringgit (RM). The dataset includes 33 variables, covering demographic information about the customers—such as gender, age range, employment status, and income range—as well as their current behavior in purchasing from Starbucks, including the products purchased and the amount of money spent.

```
# import data
starbucks_data <- read.csv("Starbucks satisfactory survey encode cleaned.csv")
```

### Variables Description

[to be added]

### Questions to Explore

- What are the factors influencing Loyalty Program Enrollment and how can we further increase the enrollment rate in the future?
- How can we increase customer’s time spent in the store and money spent in Starbucks’ products?
- What are some future in-store campaigns to increase customer loyalty and money spending?

## Data Exploration

Since the dataset is relatively small. We will run a preliminary regression to see if there are enough significant coefficients.

```
logit <- glm(membershipCard ~ ., family=binomial,data=starbucks_data)
tidy(logit) %>% kable(digits = 2)
```

term	estimate	std.error	statistic	p.value
(Intercept)	18.80	1455.40	0.01	0.99
Id	0.01	0.01	1.05	0.29
gender	0.04	0.56	0.07	0.94
age	0.20	0.46	0.44	0.66
status	-0.20	0.31	-0.63	0.53
income	-0.99	0.35	-2.80	0.01
visitNo	0.51	0.44	1.16	0.25
method	0.27	0.32	0.84	0.40
timeSpend	-0.10	0.37	-0.26	0.79
location	0.83	0.35	2.37	0.02
itemPurchaseCoffee	NA	NA	NA	NA
itemPurchaseCold	NA	NA	NA	NA
itemPurchasePastries	NA	NA	NA	NA
itemPurchaseJuices	NA	NA	NA	NA
itemPurchaseSandwiches	NA	NA	NA	NA
itemPurchaseOthers	NA	NA	NA	NA
spendPurchase	-0.28	0.44	-0.62	0.53
productRate	-0.43	0.36	-1.18	0.24
priceRate	0.56	0.33	1.71	0.09
promoRate	0.13	0.31	0.43	0.67
ambianceRate	-0.27	0.42	-0.64	0.52
wifiRate	-0.10	0.37	-0.27	0.78
serviceRate	-0.57	0.48	-1.18	0.24
chooseRate	0.08	0.30	0.27	0.79
promoMethodApp	NA	NA	NA	NA
promoMethodSoc	NA	NA	NA	NA
promoMethodEmail	NA	NA	NA	NA
promoMethodDeal	NA	NA	NA	NA
promoMethodFriend	NA	NA	NA	NA
promoMethodDisplay	NA	NA	NA	NA
promoMethodBillboard	NA	NA	NA	NA
promoMethodOthers	-18.61	1455.40	-0.01	0.99
loyal	1.82	0.89	2.05	0.04

```
## Start: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
## method + timeSpend + location + itemPurchaseCoffee + itemPurchaseCold +
## itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
## itemPurchaseOthers + spendPurchase + productRate + priceRate +
## promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
## promoMethodApp + promoMethodSoc + promoMethodEmail + promoMethodDeal +
## promoMethodFriend + promoMethodDisplay + promoMethodBillboard +
## promoMethodOthers + loyal
```

```

##
##
## Step: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##     method + timeSpend + location + itemPurchaseCoffee + itemPurchaseCold +
##     itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##     itemPurchaseOthers + spendPurchase + productRate + priceRate +
##     promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##     promoMethodApp + promoMethodSoc + promoMethodEmail + promoMethodDeal +
##     promoMethodFriend + promoMethodDisplay + promoMethodOthers +
##     loyal
##
##
## Step: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##     method + timeSpend + location + itemPurchaseCoffee + itemPurchaseCold +
##     itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##     itemPurchaseOthers + spendPurchase + productRate + priceRate +
##     promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##     promoMethodApp + promoMethodSoc + promoMethodEmail + promoMethodDeal +
##     promoMethodFriend + promoMethodOthers + loyal
##
##
## Step: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##     method + timeSpend + location + itemPurchaseCoffee + itemPurchaseCold +
##     itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##     itemPurchaseOthers + spendPurchase + productRate + priceRate +
##     promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##     promoMethodApp + promoMethodSoc + promoMethodEmail + promoMethodDeal +
##     promoMethodOthers + loyal
##
##
## Step: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##     method + timeSpend + location + itemPurchaseCoffee + itemPurchaseCold +
##     itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##     itemPurchaseOthers + spendPurchase + productRate + priceRate +
##     promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##     promoMethodApp + promoMethodSoc + promoMethodEmail + promoMethodOthers +
##     loyal
##
##
## Step: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##     method + timeSpend + location + itemPurchaseCoffee + itemPurchaseCold +
##     itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##     itemPurchaseOthers + spendPurchase + productRate + priceRate +
##     promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##     promoMethodApp + promoMethodSoc + promoMethodOthers + loyal
##
##
## Step: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +

```

```

##      method + timeSpend + location + itemPurchaseCoffee + itempurchaseCold +
##      itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##      itemPurchaseOthers + spendPurchase + productRate + priceRate +
##      promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##      promoMethodApp + promoMethodOthers + loyal
##
##
## Step:  AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##      method + timeSpend + location + itemPurchaseCoffee + itempurchaseCold +
##      itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##      itemPurchaseOthers + spendPurchase + productRate + priceRate +
##      promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##      promoMethodOthers + loyal
##
##
## Step:  AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##      method + timeSpend + location + itemPurchaseCoffee + itempurchaseCold +
##      itemPurchasePastries + itemPurchaseJuices + itemPurchaseSandwiches +
##      spendPurchase + productRate + priceRate + promoRate + ambianceRate +
##      wifiRate + serviceRate + chooseRate + promoMethodOthers +
##      loyal
##
##
## Step:  AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##      method + timeSpend + location + itemPurchaseCoffee + itempurchaseCold +
##      itemPurchasePastries + itemPurchaseJuices + spendPurchase +
##      productRate + priceRate + promoRate + ambianceRate + wifiRate +
##      serviceRate + chooseRate + promoMethodOthers + loyal
##
##
## Step:  AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##      method + timeSpend + location + itemPurchaseCoffee + itempurchaseCold +
##      itemPurchasePastries + spendPurchase + productRate + priceRate +
##      promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##      promoMethodOthers + loyal
##
##
## Step:  AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##      method + timeSpend + location + itemPurchaseCoffee + itempurchaseCold +
##      spendPurchase + productRate + priceRate + promoRate + ambianceRate +
##      wifiRate + serviceRate + chooseRate + promoMethodOthers +
##      loyal
##
##
## Step:  AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##      method + timeSpend + location + itemPurchaseCoffee + spendPurchase +
##      productRate + priceRate + promoRate + ambianceRate + wifiRate +
##      serviceRate + chooseRate + promoMethodOthers + loyal

```

```

##
##
## Step: AIC=143.73
## membershipCard ~ Id + gender + age + status + income + visitNo +
##     method + timeSpend + location + spendPurchase + productRate +
##     priceRate + promoRate + ambianceRate + wifiRate + serviceRate +
##     chooseRate + promoMethodOthers + loyal
##
##           Df Deviance    AIC
## - gender      1   103.74 141.74
## - timeSpend    1   103.80 141.80
## - chooseRate   1   103.81 141.81
## - wifiRate     1   103.81 141.81
## - promoRate    1   103.92 141.92
## - age          1   103.93 141.93
## - spendPurchase 1   104.12 142.12
## - status       1   104.13 142.13
## - ambianceRate 1   104.15 142.15
## - method       1   104.46 142.46
## - Id           1   104.85 142.85
## - productRate  1   105.15 143.15
## - visitNo      1   105.15 143.15
## - serviceRate  1   105.18 143.18
## <none>         103.73 143.73
## - priceRate    1   106.81 144.81
## - promoMethodOthers 1 108.12 146.12
## - loyal        1   108.33 146.33
## - location     1   109.95 147.95
## - income       1   113.44 151.44
##
## Step: AIC=141.74
## membershipCard ~ Id + age + status + income + visitNo + method +
##     timeSpend + location + spendPurchase + productRate + priceRate +
##     promoRate + ambianceRate + wifiRate + serviceRate + chooseRate +
##     promoMethodOthers + loyal
##
##           Df Deviance    AIC
## - chooseRate   1   103.81 139.81
## - timeSpend    1   103.81 139.81
## - wifiRate     1   103.82 139.82
## - promoRate    1   103.92 139.92
## - age          1   103.93 139.93
## - spendPurchase 1   104.12 140.12
## - status       1   104.13 140.13
## - ambianceRate 1   104.15 140.15
## - method       1   104.52 140.52
## - Id           1   104.86 140.86
## - productRate  1   105.16 141.16
## - serviceRate  1   105.18 141.18
## - visitNo      1   105.24 141.24
## <none>         103.74 141.74
## - priceRate    1   106.84 142.84
## - promoMethodOthers 1 108.14 144.14
## - loyal        1   108.43 144.43

```

```

## - location          1    109.99 145.99
## - income            1    113.84 149.84
##
## Step:  AIC=139.81
## membershipCard ~ Id + age + status + income + visitNo + method +
##      timeSpend + location + spendPurchase + productRate + priceRate +
##      promoRate + ambianceRate + wifiRate + serviceRate + promoMethodOthers +
##      loyal
##
##
##      Df Deviance    AIC
## - timeSpend      1    103.86 137.86
## - wifiRate       1    103.89 137.90
## - promoRate      1    103.97 137.97
## - age            1    104.00 138.00
## - spendPurchase  1    104.16 138.16
## - status         1    104.17 138.17
## - ambianceRate   1    104.21 138.21
## - method         1    104.52 138.52
## - Id             1    104.96 138.96
## - productRate    1    105.18 139.18
## - serviceRate    1    105.19 139.19
## - visitNo        1    105.27 139.27
## <none>           103.81 139.81
## - priceRate      1    107.01 141.01
## - promoMethodOthers 1    108.14 142.14
## - loyal          1    108.45 142.45
## - location       1    110.20 144.21
## - income         1    114.02 148.02
##
## Step:  AIC=137.86
## membershipCard ~ Id + age + status + income + visitNo + method +
##      location + spendPurchase + productRate + priceRate + promoRate +
##      ambianceRate + wifiRate + serviceRate + promoMethodOthers +
##      loyal
##
##
##      Df Deviance    AIC
## - wifiRate      1    103.94 135.94
## - promoRate     1    103.99 135.99
## - age           1    104.04 136.04
## - status        1    104.21 136.21
## - spendPurchase 1    104.24 136.24
## - ambianceRate  1    104.25 136.25
## - method        1    104.95 136.95
## - Id            1    104.97 136.97
## - serviceRate   1    105.20 137.20
## - productRate   1    105.38 137.38
## - visitNo       1    105.53 137.53
## <none>          103.86 137.86
## - priceRate     1    107.27 139.27
## - loyal         1    108.52 140.52
## - promoMethodOthers 1    108.56 140.56
## - location      1    110.40 142.40
## - income        1    114.44 146.44
##

```

```

## Step: AIC=135.94
## membershipCard ~ Id + age + status + income + visitNo + method +
##     location + spendPurchase + productRate + priceRate + promoRate +
##     ambienceRate + serviceRate + promoMethodOthers + loyal
##
##           Df Deviance    AIC
## - promoRate      1   104.06 134.06
## - age            1   104.17 134.17
## - status         1   104.25 134.25
## - spendPurchase  1   104.33 134.33
## - ambienceRate  1   104.42 134.42
## - Id            1   105.00 135.00
## - method        1   105.04 135.04
## - productRate    1   105.44 135.44
## - visitNo       1   105.59 135.59
## - serviceRate    1   105.82 135.82
## <none>          103.94 135.94
## - priceRate      1   107.28 137.28
## - promoMethodOthers 1   108.62 138.62
## - loyal          1   108.72 138.72
## - location       1   110.58 140.58
## - income         1   114.72 144.72
##
## Step: AIC=134.06
## membershipCard ~ Id + age + status + income + visitNo + method +
##     location + spendPurchase + productRate + priceRate + ambienceRate +
##     serviceRate + promoMethodOthers + loyal
##
##           Df Deviance    AIC
## - age            1   104.31 132.31
## - status         1   104.36 132.36
## - spendPurchase  1   104.47 132.47
## - ambienceRate  1   104.50 132.50
## - method        1   105.06 133.06
## - Id            1   105.17 133.18
## - productRate    1   105.67 133.67
## - visitNo       1   105.69 133.69
## - serviceRate    1   105.83 133.83
## <none>          104.06 134.06
## - priceRate      1   107.42 135.42
## - promoMethodOthers 1   108.71 136.71
## - loyal          1   108.81 136.81
## - location       1   110.62 138.62
## - income         1   115.03 143.03
##
## Step: AIC=132.3
## membershipCard ~ Id + status + income + visitNo + method + location +
##     spendPurchase + productRate + priceRate + ambienceRate +
##     serviceRate + promoMethodOthers + loyal
##
##           Df Deviance    AIC
## - status         1   104.52 130.52
## - spendPurchase  1   104.58 130.58
## - ambienceRate  1   104.69 130.69

```

```

## - method          1    105.36 131.36
## - Id              1    105.47 131.47
## - serviceRate     1    105.94 131.94
## - productRate     1    106.00 132.00
## - visitNo         1    106.03 132.03
## <none>            104.31 132.31
## - priceRate       1    107.56 133.56
## - loyal           1    108.94 134.94
## - promoMethodOthers 1    109.04 135.04
## - location        1    111.06 137.06
## - income          1    115.51 141.51
##
## Step:  AIC=130.52
## membershipCard ~ Id + income + visitNo + method + location +
##      spendPurchase + productRate + priceRate + ambianceRate +
##      serviceRate + promoMethodOthers + loyal
##
##              Df Deviance    AIC
## - spendPurchase    1    104.88 128.88
## - ambianceRate     1    104.98 128.98
## - method           1    105.43 129.43
## - Id               1    105.50 129.50
## - visitNo          1    106.12 130.12
## - productRate      1    106.22 130.22
## - serviceRate      1    106.29 130.29
## <none>             104.52 130.52
## - priceRate        1    108.12 132.12
## - promoMethodOthers 1    109.30 133.30
## - loyal            1    109.34 133.34
## - location         1    111.75 135.75
## - income           1    118.13 142.13
##
## Step:  AIC=128.88
## membershipCard ~ Id + income + visitNo + method + location +
##      productRate + priceRate + ambianceRate + serviceRate + promoMethodOthers +
##      loyal
##
##              Df Deviance    AIC
## - ambianceRate     1    105.15 127.15
## - method           1    105.77 127.77
## - Id               1    105.89 127.89
## - serviceRate      1    106.69 128.69
## - productRate      1    106.81 128.81
## <none>             104.88 128.88
## - visitNo          1    107.06 129.06
## - priceRate        1    108.20 130.21
## - promoMethodOthers 1    109.93 131.93
## - loyal            1    110.18 132.18
## - location         1    111.94 133.94
## - income           1    120.42 142.42
##
## Step:  AIC=127.15
## membershipCard ~ Id + income + visitNo + method + location +
##      productRate + priceRate + serviceRate + promoMethodOthers +

```



```

##      loyal
##
##              Df Deviance    AIC
## - method      1   106.08 126.08
## - Id           1   106.16 126.16
## <none>         1   105.15 127.15
## - visitNo      1   107.28 127.28
## - productRate  1   107.78 127.78
## - serviceRate  1   108.13 128.13
## - priceRate    1   108.35 128.35
## - promoMethodOthers 1  110.16 130.16
## - loyal        1   110.59 130.59
## - location     1   112.04 132.04
## - income       1   120.49 140.49
##
## Step:  AIC=126.08
## membershipCard ~ Id + income + visitNo + location + productRate +
##      priceRate + serviceRate + promoMethodOthers + loyal
##
##              Df Deviance    AIC
## - Id           1   107.19 125.19
## - visitNo      1   107.90 125.90
## <none>         1   106.08 126.08
## - serviceRate  1   108.56 126.56
## - priceRate    1   108.77 126.77
## - productRate  1   109.01 127.01
## - loyal        1   110.85 128.85
## - promoMethodOthers 1  111.42 129.43
## - location     1   112.53 130.53
## - income       1   123.25 141.25
##
## Step:  AIC=125.19
## membershipCard ~ income + visitNo + location + productRate +
##      priceRate + serviceRate + promoMethodOthers + loyal
##
##              Df Deviance    AIC
## - visitNo      1   108.72 124.72
## <none>         1   107.19 125.19
## - serviceRate  1   110.04 126.04
## - priceRate    1   110.89 126.89
## - productRate  1   111.13 127.13
## - promoMethodOthers 1  112.21 128.21
## - loyal        1   112.52 128.52
## - location     1   114.65 130.65
## - income       1   124.25 140.25
##
## Step:  AIC=124.72
## membershipCard ~ income + location + productRate + priceRate +
##      serviceRate + promoMethodOthers + loyal
##
##              Df Deviance    AIC
## <none>         1   108.72 124.72
## - serviceRate  1   111.40 125.40
## - priceRate    1   111.87 125.87

```

```
## - productRate      1    113.74 127.74
## - promoMethodOthers 1    114.19 128.19
## - loyal            1    114.86 128.86
## - location         1    115.22 129.22
## - income           1    128.32 142.32
```

```
logit2 <- glm(membershipCard ~ income + location + productRate + priceRate +
  serviceRate + promoMethodOthers + loyal, family=binomial, data=starbucks_data)
tidy(logit2) %>% kable(digits = 2)
```

term	estimate	std.error	statistic	p.value
(Intercept)	21.45	1455.40	0.01	0.99
income	-1.09	0.30	-3.63	0.00
location	0.75	0.31	2.45	0.01
productRate	-0.70	0.32	-2.17	0.03
priceRate	0.50	0.29	1.73	0.08
serviceRate	-0.56	0.35	-1.61	0.11
promoMethodOthers	-18.87	1455.40	-0.01	0.99
loyal	1.78	0.77	2.33	0.02