Case Study: Ramen

Nathacia Nathacia

2022-09-23

```
load("/Users/nathacia/Desktop/r wd/bsds/ramen.Rdata")

library(stringr)
library(dplyr)
```

Loading data and necessary packages

```
##
## 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(ggpubr)
```

```
## Loading required package: ggplot2
```

Case Study: Ramen dataset

The data contains reviews from Ramen Rater. It includes variables for Brand, Variety, Serving Style, Country of Origin, Number of Stars, and if it has ever won a place in the Top Ten Ramens of the Year.

The case study will follow 13 leading questions, each of which will be thoroughly explained and analyzed using various functions.

1. How many different brands are reviewed in the data set? Do you recognize any of them?

```
summary(ramen)
```

```
##       Brand                    Variety         Style             Country
##  Nissin  : 381   Beef              :   7   Pack   :1531   Japan      : 352
##  Nongshim:  98   Chicken           :   7   Bowl   : 481   USA        : 323
##  Maruchan:  76   Artificial Chicken:   6   Cup    : 450   South Korea: 309
##  Mama    :  71   Vegetable         :   6   Tray   : 108   Taiwan     : 224
##  Paldo   :  66   Yakisoba          :   6   Box    :   6   Thailand   : 191
##  Myojo   :  63   Miso Ramen        :   5          :   2   China      : 169
##  (Other) :1825   (Other)           :2543   (Other):   2   (Other)    :1012
```

```
##      Stars           Top.Ten       perc_salt
##  Min.   :0.000           :2543   Min.   : 3.691
##  1st Qu.:3.250   2012 #1 :   1   1st Qu.:18.372
##  Median :3.750   2012 #10:   1   Median :19.340
##  Mean   :3.655   2012 #2 :   1   Mean   :18.951
##  3rd Qu.:4.250   2012 #3 :   1   3rd Qu.:20.198
##  Max.   :5.000   2012 #4 :   1   Max.   :22.870
##  NA's   :3       (Other) :  32
```

```
head(ramen)
```

```
##            Brand                                                    Variety
## 1      New Touch                                  T's Restaurant Tantanmen
## 2       Just Way Noodles Spicy Hot Sesame Spicy Hot Sesame Guan-miao Noodles
## 3         Nissin                               Cup Noodles Chicken Vegetable
## 4        Wei Lih                               GGE Ramen Snack Tomato Flavor
## 5 Ching's Secret                                           Singapore Curry
## 6  Samyang Foods                                  Kimchi song Song Ramen
##   Style     Country Stars Top.Ten perc_salt
## 1   Cup       Japan  3.75          19.54183
## 2  Pack      Taiwan  1.00          13.02732
## 3   Cup         USA  2.25          17.54386
## 4  Pack      Taiwan  2.75          18.89882
## 5  Pack       India  3.75          20.72071
## 6  Pack South Korea  4.75          19.99373
```

```
#unique(ramen$Brand)
length(unique(ramen$Brand))
```

```
## [1] 355
```

There are 355 different brands in the dataset. I recognize several brands including Knorr, Nissin, Nongshim, Paldo, MAMA, Mie Sedaap, and Indomie.

2. What years do we have "top ten" data from?

```
unique(substr(ramen$Top.Ten, 1, 4))
```

```
## [1] ""     "2016" "2015" "2013" "2014" "2012"
```

We have "top ten" data from the years 2012-2016.

3. Which ramen brands are from the United States?

```
unique(ramen$Country)
```

```
##  [1] Japan         Taiwan        USA           India         South Korea
##  [6] Singapore     Thailand      Hong Kong     Vietnam       Ghana
## [11] Malaysia      Indonesia     China         Nigeria       Germany
## [16] Hungary       Mexico        Fiji          Australia     Pakistan
## [21] Bangladesh    Canada        Nepal         Brazil        UK
## [26] Myanmar       Netherlands   United States Cambodia      Finland
## [31] Sarawak       Philippines   Sweden        Colombia      Estonia
## [36] Holland       Poland        Dubai
## 38 Levels: Australia Bangladesh Brazil Cambodia Canada China Colombia ... Vietnam
```

```
from.us <- ramen$Brand[which(ramen$Country == "USA" | ramen$Country == "United States")]

unique(ramen$Brand[from.us])
```

```
##  [1] Maggi            Nissin           Happy Cook       Uni-President
##  [5] Samyang Foods    KOKA             Sichuan Guangyou Ikeda Shoku
##  [9] Myojo            Tokyo Noodle     Sichuan Baijia   Paldo
## [13] Yamachan         Pran             Ajinatori        Wai Wai
## [17] Knorr            Kiki Noodle      Shirakiku        New Touch
## [21] Kamfen           Xiao Ban Mian    Wang
## 355 Levels: 1 To 3 Noodles 7 Select 7 Select/Nissin A-One ... Zow Zow
```

4. Has any brand of ramen won the #1 slot in the Top Ten Ramens list more than once? Which brand(s) is/are these?

```
ones <- which(substr(ramen$Top.Ten, 6,7) == "#1")
tens <- which(substr(ramen$Top.Ten, 6,8) == "#10")

ramen$Brand[setdiff(ones, tens)]
```

```
## [1] Prima Taste MyKuali     MyKuali     Prima Taste Indomie
## 355 Levels: 1 To 3 Noodles 7 Select 7 Select/Nissin A-One ... Zow Zow
```

5. Which brand has the highest average star rating? If there is a tie, report multiple brands.

```
averages <- aggregate(ramen$Stars, by = list(ramen$Brand), FUN = mean)
averages$Group.1[which.max(averages$x)]
```

```
## [1] ChoripDong
## 355 Levels: 1 To 3 Noodles 7 Select 7 Select/Nissin A-One ... Zow Zow
```

6. Is the way a ramen is packaged related to which country it is from?

```
table_stylecountry <- table(ramen$Style, ramen$Country)
chisq.test(table_stylecountry)
```

```
## Warning in chisq.test(table_stylecountry): Chi-squared approximation may be
## incorrect
```

```
##
##  Pearson's Chi-squared test
##
## data:  table_stylecountry
## X-squared = 704.92, df = 259, p-value < 2.2e-16
```

The X-squared value of 704.92 is the test statistic, which measures the difference between the observed frequencies in the contingency table and the expected frequencies under the assumption of independence between the rows and columns of the table. A larger test statistic indicates a stronger deviation from independence and stronger evidence against the null hypothesis of independence. The df value of 259 is the degrees of freedom for the test, which is calculated as the product of the number of levels of each variable minus 1. In this case, it indicates the number of degrees of freedom for the chi-squared distribution that was used to calculate the p-value. The p-value of less than 2.2e-16 (essentially 0) indicates strong evidence against the null hypothesis of independence, and suggests that there is a significant association between the two variables represented in the contingency table. Therefore, based on this output, we can reject the null hypothesis of independence and conclude that there is a statistically significant association between the rows

and columns of the table_stylecountry table. This is quite predictable as all countries seem to have more of the 'pack' style of ramen. This is simply due to the fact that pack style ramen is the most popular style option among consumers.

7. What is the average, maximum, and minimum rating for ramens from the US? What about for ramens from Singapore? Based on your findings, which country do you expect to land in the Top Ten more often? Check your prediction.

```
max(ramen$Stars[which(ramen$Country == "USA" | ramen$Country == "United States")])
```

```
## [1] 5
```

```
min(ramen$Stars[which(ramen$Country == "USA" | ramen$Country == "United States")])
```

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

```
mean(ramen$Stars[which(ramen$Country == "USA" | ramen$Country == "United States")])
```

```
## [1] 3.457948
```

```
max(ramen$Stars[which(ramen$Country == "Singapore")])
```

```
## [1] 5
```

```
min(ramen$Stars[which(ramen$Country == "Singapore")])
```

```
## [1] 2
```

```
mean(ramen$Stars[which(ramen$Country == "Singapore")])
```

```
## [1] 4.126147
```

Based on my findings, I would expect Singapore to land in the Top 10 more often. This is because Singapore's lowest ramen rating is 2 whereas the United States has a lowest ramen rating of 0. Furthermore, Singapore has a higher average ramen rating, with Singapore having an average of 4.13 and the US having an average of 3.46.

```
usatopten <- which(substr(ramen$Top.Ten, 6,6) == "#" & ramen$Country == "USA")
unitedstatestopten <- which(substr(ramen$Top.Ten, 6,6) == "#" & ramen$Country == "United States")
ramen$Brand[usatopten]
```

```
## [1] Nongshim
## 355 Levels: 1 To 3 Noodles 7 Select 7 Select/Nissin A-One ... Zow Zow
```

```
sgtopten <- which(substr(ramen$Top.Ten, 6,6) == "#" & ramen$Country == "Singapore")
ramen$Brand[sgtopten]
```

```
## [1] Prima Taste Prima       Prima Taste Prima Taste Prima Taste Prima Taste
## [7] Koka
## 355 Levels: 1 To 3 Noodles 7 Select 7 Select/Nissin A-One ... Zow Zow
```

My predictions are correct. US has been placed in the top ten ramen only once whereas Singapore has been placed 7 times.

8. Which country makes the most ramen? Which country makes the best ramen? How did you define "best"? Why? Was the country that makes the best ramen also the country that makes the most ramen?

```
table(ramen$Country)
```

```
##
##     Australia    Bangladesh        Brazil      Cambodia        Canada
##            22             7             5             5            41
##         China      Colombia         Dubai       Estonia          Fiji
##           169             6             3             2             4
##       Finland       Germany         Ghana       Holland     Hong Kong
##             3            27             2             4           137
##       Hungary         India     Indonesia         Japan      Malaysia
##             9            31           126           352           156
##        Mexico       Myanmar         Nepal   Netherlands       Nigeria
##            25            14            14            15             1
##      Pakistan   Philippines        Poland       Sarawak     Singapore
##             9            47             4             3           109
##   South Korea        Sweden        Taiwan      Thailand            UK
##           309             3           224           191            69
## United States           USA       Vietnam
##             1           323           108
```

```
table(ramen$Country[which(substr(ramen$Top.Ten, 6,6) == "#")])
```

```
##
##     Australia    Bangladesh        Brazil      Cambodia        Canada
##             0             0             0             0             0
##         China      Colombia         Dubai       Estonia          Fiji
##             1             0             0             0             0
##       Finland       Germany         Ghana       Holland     Hong Kong
##             0             0             0             0             1
##       Hungary         India     Indonesia         Japan      Malaysia
##             0             0             4             6             6
##        Mexico       Myanmar         Nepal   Netherlands       Nigeria
##             0             1             0             0             0
##      Pakistan   Philippines        Poland       Sarawak     Singapore
##             0             0             0             0             7
##   South Korea        Sweden        Taiwan      Thailand            UK
##             5             0             2             3             0
## United States           USA       Vietnam
##             0             1             0
```

Japan makes the most ramen (352). The country that makes the best ramen is Singapore. My definition of the best ramen is determined by the number of times a ramen from a particular country is placed on the Top Ten list throughout the years. No, the country with the most number of ramens (Japan) is not the same as the country with the best ramen. Singapore has placed on the top ten 7 times and Japan is a close runner up with 6 placements.

9. How many ramens are considered spicy as part of their variety? Are spicy ramens typically rated higher than non-spicy ramens?

```
library(stringr)

numberofspicy <- sum(str_detect(ramen$Variety, 'Spicy | spicy | Chilli | Hot | Pedas | Cabe | Sambal'))
print(numberofspicy)
```

```
## [1] 320
```

```
print((numberofspicy/2580)*100)
```

```
## [1] 12.4031
```

```
spicyvariant <- which(str_detect(ramen$Variety, 'Spicy | spicy | Chilli | Hot | Pedas | Cabe | Sambal'))
mean(ramen$Stars[spicyvariant])
```

```
## [1] 3.716016
```

```
nonspicyvariant <- ramen[!grepl('Spicy | spicy | Chilli | Hot | Pedas | Cabe | Sambal', ramen$Variety),]
nonspicyvariant <- na.omit(nonspicyvariant)
mean(nonspicyvariant$Stars)
```

```
## [1] 3.645979
```

320 ramens, or 12.4% of all the ramen in the dataset, are considered to be spicy as part of their variety. I have chosen to include the words "Chili" as well as "Hot" to make these predictions more accurate. The spicy ramens are rated slightly higher than non-spicy ramens. Spicy ramens have an average rating of 3.72 whereas non-spicy ramen have an average rating of 3.65

10. Based on this data set, what effect does saltiness have on ramen ratings?

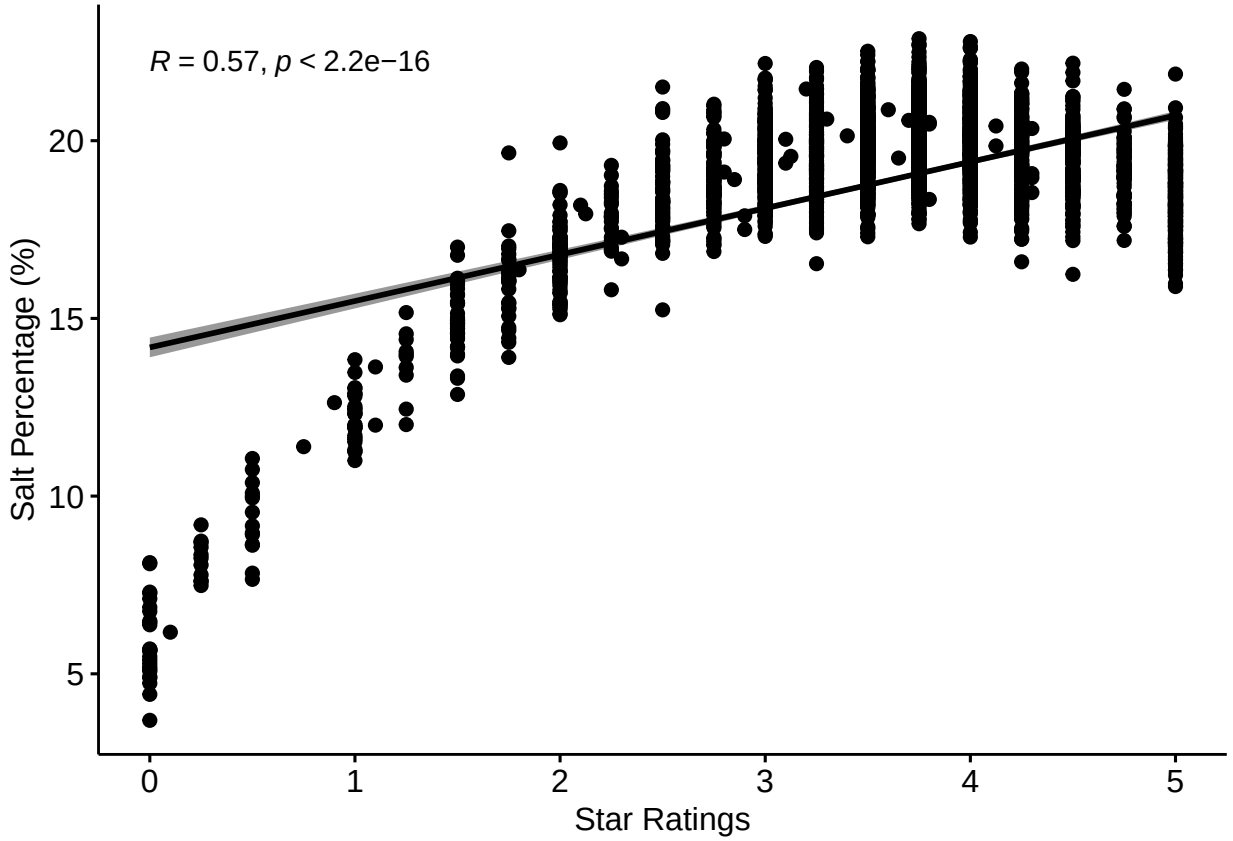
```
library("ggpubr")
ggscatter(ramen, x = "Stars", y = "perc_salt",
          add = "reg.line", conf.int = TRUE,
          cor.coef = TRUE, cor.method = "pearson",
          xlab = "Star Ratings", ylab = "Salt Percentage (%)")
```

```
## `geom_smooth()` using formula 'y ~ x'
```

```
## Warning: Removed 3 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 3 rows containing non-finite values (stat_cor).
```

```
## Warning: Removed 3 rows containing missing values (geom_point).
```



From the graph, we can see that there is a general upwards trend, indicating that ramen with higher salt percentages have higher ratings. However, we can also observe that the ramen with the highest rating (5) have a wide range of salt percentages, ranging from approximately 15% to 20%.

11. Are there certain styles, countries, brands, or flavors of ramen that tend to use more or less salt?

```
summary(ramen)
```

```
##       Brand                    Variety         Style            Country
##  Nissin  : 381   Beef              :   7   Pack   :1531   Japan      : 352
##  Nongshim:  98   Chicken           :   7   Bowl   : 481   USA        : 323
##  Maruchan:  76   Artificial Chicken:   6   Cup    : 450   South Korea: 309
##  Mama    :  71   Vegetable         :   6   Tray   : 108   Taiwan     : 224
##  Paldo   :  66   Yakisoba          :   6   Box    :   6   Thailand   : 191
##  Myojo   :  63   Miso Ramen        :   5          :   2   China      : 169
##  (Other) :1825   (Other)           :2543   (Other):   2   (Other)    :1012
##      Stars           Top.Ten       perc_salt
##  Min.   :0.000           :2543   Min.   : 3.691
##  1st Qu.:3.250   2012 #1 :   1   1st Qu.:18.372
##  Median :3.750   2012 #10:   1   Median :19.340
##  Mean   :3.655   2012 #2 :   1   Mean   :18.951
##  3rd Qu.:4.250   2012 #3 :   1   3rd Qu.:20.198
##  Max.   :5.000   2012 #4 :   1   Max.   :22.870
##  NA's   :3       (Other) :  32
```

```
beeftest <- which(str_detect(ramen$Variety, 'Beef | beef'))
summary(ramen$perc_salt[beeftest])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   3.691  18.607  19.582  19.036  20.342  22.790
```

```
chickentest <- which(str_detect(ramen$Variety, 'Chicken | chicken'))
summary(ramen$perc_salt[chickentest])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   5.073  18.324  19.395  18.855  20.265  22.870
```

```
porktest <- which(str_detect(ramen$Variety, 'Pork | pork | Tonkotsu'))
summary(ramen$perc_salt[porktest])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   6.485  18.344  19.446  19.028  20.513  22.237
```

```
souptest <- which(str_detect(ramen$Variety, 'Soup | soup | Kuah'))
summary(ramen$perc_salt[souptest])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   5.073  18.360  19.442  18.762  20.192  22.246
```

```
veggietest <- which(str_detect(ramen$Variety, 'Veggie | Veg | Vegetable'))
summary(ramen$perc_salt[veggietest])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   8.097  18.256  19.275  18.893  20.530  22.286
```

We can see that, on average, ramen with pork and beef flavors have the most salt composition, with salt percentages being 19.03% and 19.04% respectively.

```
brands_highsalt<- ramen$Brand[which(ramen$perc_salt>=20.198)]
brands_highsalt_df <- data.frame(brands_highsalt)
dplyr::count(brands_highsalt_df, brands_highsalt, sort=TRUE)
```

```
##               brands_highsalt   n
## 1                      Nissin 102
## 2                    Maruchan  21
## 3                    Nongshim  21
## 4                       Myojo  20
## 5                Samyang Foods  20
## 6                        Mama  18
## 7                      Ottogi  14
## 8                       Paldo  12
## 9                   Lucky Me!  11
## 10                    Indomie   9
## 11               Vina Acecook   9
## 12           Asian Thai Foods   8
## 13                        JML   7
## 14                      Maggi   7
## 15                Master Kong   7
## 16              Saigon Ve Wong   7
## 17            Sapporo Ichiban   7
## 18                    Ve Wong   7
## 19                       KOKA   6
## 20                      Vifon   6
## 21                    Wai Wai   6
## 22                      Wu-Mu   6
## 23                Wugudaochang   6
```

```
## 24           A-Sha Dry Noodle   5
## 25                       Fuku   5
## 26               Golden Wheat   5
## 27                     Kamfen   5
## 28                       Koka   5
## 29                       MAMA   5
## 30                    Samyang   5
## 31                    Sau Tao   5
## 32                    Wei Lih   5
## 33                   Acecook    4
## 34                Annie Chun's   4
## 35                  Batchelors   4
## 36                      Ibumie   4
## 37                     Ko-Lee    4
## 38                   Pulmuone    4
## 39             Takamori Kosan    4
## 40                 Tasty Bite    4
## 41                        ABC    3
## 42                    Amianda    3
## 43                    Chencun    3
## 44                      Chewy    3
## 45                     Cintan    3
## 46                       Doll   3
## 47                  Dragonfly    3
## 48               Dream Kitchen   3
## 49                 Great Value   3
## 50                     Hao Way   3
## 51                       Mamee   3
## 52                       Pama    3
## 53                    Payless    3
## 54                  Pot Noodle   3
## 55               Rhee Bros Assi   3
## 56               Sichuan Baijia   3
## 57                 Thai Kitchen   3
## 58                        Unif   3
## 59                Unif / Tung-I   3
## 60                        Unox   3
## 61                     Yum Yum   3
## 62                   Asia Gold   2
## 63           Baixiang Noodles    2
## 64                    Bonasia    2
## 65              Ching's Secret   2
## 66              Chuan Wei Wang   2
## 67                    Daikoku    2
## 68                    Deshome    2
## 69                       E-mi    2
## 70                  Four Seas    2
## 71                       GaGa    2
## 72                   Goku-Uma    2
## 73                       iMee    2
## 74                     Itomen    2
## 75                     Jingqi    2
## 76              Kabuto Noodles   2
## 77                 Kang Shi Fu   2
```

```
## 78                    Knorr   2
## 79                  Kuriki   2
## 80                Love Cook   2
## 81               Mama Pat's   2
## 82                  Marutai   2
## 83                Mee Jang   2
## 84                  Menraku   2
## 85                Mi Sedaap   2
## 86         Mr. Lee's Noodles   2
## 87               Mr. Noodles   2
## 88                    Ohsung   2
## 89                Pop Bihun   2
## 90                     Pran   2
## 91               Prima Taste   2
## 92             Sakura Noodle   2
## 93             Sakurai Foods   2
## 94                    Sarimi   2
## 95               Six Fortune   2
## 96                    Souper   2
## 97                    Suimin   2
## 98                Sun Noodle   2
## 99                Thai Choice   2
## 100                   Trident   2
## 101                     Vit's   2
## 102                      Wang   2
## 103            Xiao Ban Mian   2
## 104           1 To 3 Noodles   1
## 105                 7 Select   1
## 106                       A1   1
## 107                    Adabi   1
## 108                Ajinatori   1
## 109                     Aroi   1
## 110                    Azami   1
## 111                    Bamee   1
## 112                Binh Tay   1
## 113       Chaudhary's Wai Wai   1
## 114             Chering Chang   1
## 115              Curry Prince   1
## 116                  Eat & Go   1
## 117                Fantastic   1
## 118              Fashion Food   1
## 119             Fashion Foods   1
## 120                       FMF   1
## 121                 Fujiwara   1
## 122                    Gefen   1
## 123                 Goku Uma   1
## 124               Golden Mie   1
## 125                 Haioreum   1
## 126         Han's South Korea   1
## 127                Happy Cook   1
## 128              Happy Family   1
## 129                   Hi-Myon   1
## 130              HoMyeonDang   1
## 131                 Hua Feng   1
```

```
## 132                  IbuRamen   1
## 133               Ikeda Shoku   1
## 134                      J.J.   1
## 135                       JFC   1
## 136                   Kin-Dee   1
## 137                      Koyo   1
## 138                 La Fonte   1
## 139               Lee Fah Mee   1
## 140 Lishan Food Manufacturing   1
## 141               Little Cook   1
## 142                    Maitri   1
## 143                   Miliket   1
## 144          Mom's Dry Noodle   1
## 145                     Morre   1
## 146            Nakaya Shouten   1
## 147                 New Touch   1
## 148                 Nyor Nyar   1
## 149                 Ogasawara   1
## 150                    Omachi   1
## 151                    Oyatsu   1
## 152                      Papa   1
## 153                    Pirkka   1
## 154                  Premiere   1
## 155            President Rice   1
## 156                         Q   1
## 157                 Quickchow   1
## 158                     Ruski   1
## 159                       S&S   1
## 160                   Sakurai   1
## 161                     Sanpo   1
## 162                   Sawadee   1
## 163                    Sempio   1
## 164                      Shan   1
## 165                  Shirakiku   1
## 166          Sichuan Guangyou   1
## 167                Snapdragon   1
## 168                Springlife   1
## 169                    Sunlee   1
## 170                   SuperMi   1
## 171                    Ten-In   1
## 172             Thai Pavilion   1
## 173                Thai Smile   1
## 174         Thien Houng Foods   1
## 175              Tokyo Noodle   1
## 176                 Tradition   1
## 177                      TRDP   1
## 178             Tseng Noodles   1
## 179                       TTL   1
## 180                    Tung-I   1
## 181             Uni-President   1
## 182                    United   1
## 183                 Wei Chuan   1
## 184                   Wei Wei   1
## 185            Western Family   1
```

```
## 186                    Wu Mu   1
## 187                  Yamadai   1
## 188                 Yamamori   1
## 189                  Zow Zow   1
```

We can also see that the brand Nissin has the most ramen with a salt percentage falling above the 3rd quartile. Nissin has 102 ramen with this high salt percentage, whereas the runner ups, Maruchan and Nongshim, both have only 21 ramen that falls in this category.

```
brands_lowsalt<- ramen$Brand[which(ramen$perc_salt<=16)]
brands_lowsalt_df <- data.frame(brands_lowsalt)
#dplyr::count(brands_lowsalt_df, brands_lowsalt, sort=TRUE)
```

Baija, Mr. Noodles, and Ottogi are some of the brands that make ramen with a salt percentage of 16% and below.

```
style_highsalt <- ramen$Style[which(ramen$perc_salt>=20.198)]
table(style_highsalt)
```

```
## style_highsalt
##       Bar Bowl  Box  Can  Cup Pack Tray
##    1    0  120    1    0  112  384   29
```

```
table(ramen$Style)
```

```
##
##       Bar Bowl  Box  Can  Cup Pack Tray
##    2    1  481    6    1  450 1531  108
```

We can see that 24.9% of the bowl style, 24.9% of the cup style, 25.1% of the pack style and 26.9% of the tray style ramen have a salt composition above the 3rd quartile. They are roughly the same, and this is most likely attributed to the fact that each style of ramen has a large variety of flavors and ramen, and about the same percentage of all the ramen of each style has a high salt percentage.

12. Say that you have been hired by a brand new ramen start up. They are trying to better understand the ramen market and have asked you to break down ramen into 5 collections of "similar" ramens. How do you go about it? Discuss your findings.

I would split the ramen by flavor: 1. Beef, 2. Chicken, 3. Pork, 4. Seafood, 5. Veggies.

```
beefcollection <- which(str_detect(ramen$Variety, 'Beef | beef'))

chickencollection <- which(str_detect(ramen$Variety, 'Chicken | chicken | Ayam | Tori'))

porkcollection <- which(str_detect(ramen$Variety, 'Pork | pork | Bacon | Tonkotsu'))

seafoodcollection <- which(str_detect(ramen$Variety, 'Seafood | seafood | Shrimp | Prawn | Fish'))

veggiecollection <- which(str_detect(ramen$Variety, 'Veggie | Veg | Vegetable'))

summary(ramen$Stars[beefcollection])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.000   3.250   3.750   3.491   4.000   5.000
```

```
summary(ramen$Stars[chickencollection])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.000   3.000   3.500   3.434   4.000   5.000
```

```
summary(ramen$Stars[porkcollection])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.000   3.500   4.000   3.812   4.750   5.000
```

```
summary(ramen$Stars[seafoodcollection])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.500   3.250   3.750   3.835   4.250   5.000
```

```
summary(ramen$Stars[veggiecollection])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.000   3.000   3.750   3.539   4.000   5.000
```

Based on this, we can see that the ramen variant that has the highest average rating is seafood and pork, with an average star rating of 3.84 and 3.81 respectively.

13. The ramen startup wants to make the next Top Ten Ramen winner. What recommendations do you have for them based on this data set? Support your assertions with statistics and graphs.

```
toptenplacements <- which(substr(ramen$Top.Ten, 6,6) == "#")
ramen$Brand[toptenplacements]
```

```
##  [1] MAMA             Prima Taste      Prima            Prima Taste
##  [5] Tseng Noodles    Wugudaochang     A-Sha Dry Noodle MyKuali
##  [9] CarJEN           Maruchan         Mamee            MyKuali
## [13] Mama             Mama             Mamee            Sapporo Ichiban
## [17] Nongshim         Mama             Prima Taste      Samyang Foods
## [21] Paldo            MyKuali          Prima Taste      Prima Taste
## [25] Nongshim         Paldo            Indomie          Koka
## [29] Nongshim         Mi Sedaap        Nissin           Myojo
## [33] Doll             Indomie          Indomie          Myojo
## [37] Sapporo Ichiban
## 355 Levels: 1 To 3 Noodles 7 Select 7 Select/Nissin A-One ... Zow Zow
```

```
ramen$Variety[toptenplacements]
```

```
##  [1] Instant Noodles Coconut Milk Flavour
##  [2] Singapore Laksa Wholegrain La Mian
##  [3] Juzz's Mee Creamy Chicken Flavour
##  [4] Singapore Curry Wholegrain La Mian
##  [5] Scallion With Sichuan Pepper  Flavor
##  [6] Tomato Beef Brisket Flavor Purple Potato Noodle
##  [7] Veggie Noodle Tomato Noodle With Vine Ripened Tomato Sauce
##  [8] Penang Hokkien Prawn Noodle (New Improved Taste)
##  [9] Nyonya Curry Laksa
## [10] Gotsumori Sauce Yakisoba
## [11] Chef Gold Recipe Mi Kari Seribu Rasa
## [12] Penang Red Tom Yum Goong Noodle
## [13] Instant Noodles Shrimp Creamy Tom Yum Flavour Jumbo Pack
## [14] Oriental Style Instant Noodles Green Curry Flavour Jumbo Pack
## [15] Chef Curry Laksa Flavour
## [16] Otafuku Okonomi Sauce Yakisoba
## [17] Soon Veggie Noodle Soup
```

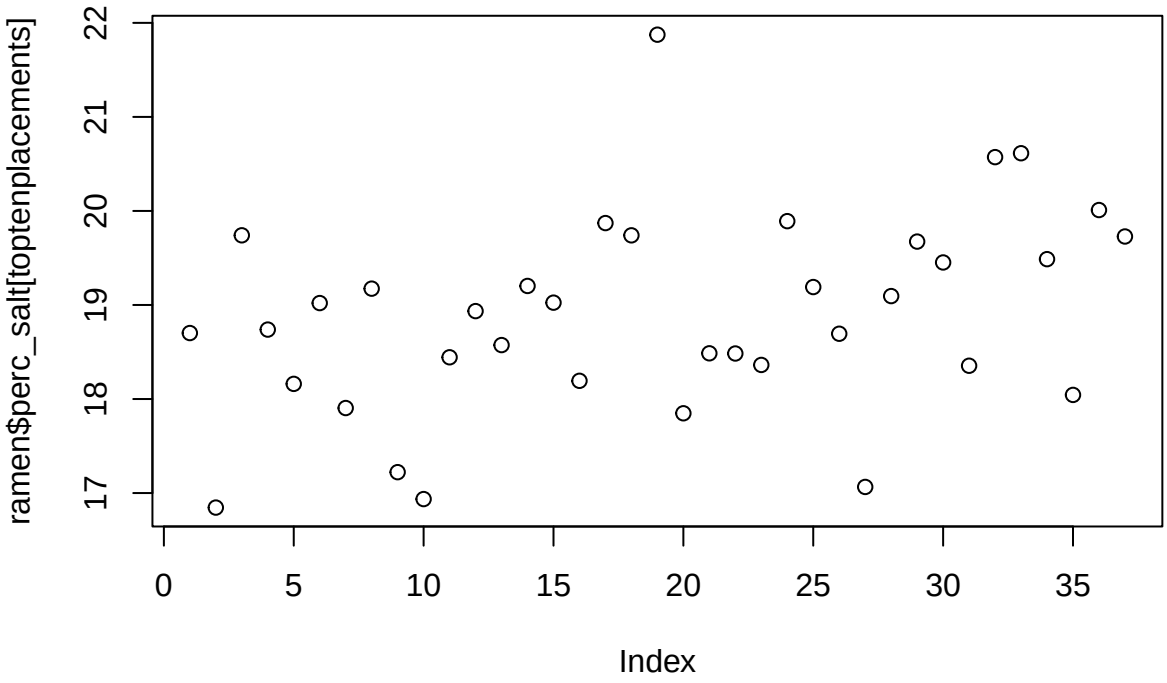
```
## [18] Instant Noodles Yentafo Tom Yum Mohfai Flavour
## [19] Singapore Chilli Crab La Mian
## [20] Maesaengyitangmyun Baked Noodle
## [21] Cheese Noodle
## [22] Penang White Curry Noodle
## [23] Singapore Laksa La Mian
## [24] Singapore Curry La Mian
## [25] Jinjja Jinjja Flamin' Hot & Nutty
## [26] Kokomen Spicy Chicken
## [27] Mi Goreng Rendang (Import)
## [28] Spicy Black Pepper
## [29] Shin Ramyun Black
## [30] Kari Spesial
## [31] Yakisoba Noodles Karashi
## [32] Hyoubanya No Chukasoba Oriental
## [33] Artificial Chicken
## [34] Special Fried Curly Noodle
## [35] Mi Goreng Jumbo Barbecue Chicken
## [36] Ippeichan Yakisoba
## [37] Chow Mein
## 2413 Levels: "A" Series Artificial Chicken ...    (Samyang Ramyun) (South Korean Version)
```

```
table(ramen$Country[toptenplacements])
```

```
##
##     Australia    Bangladesh        Brazil      Cambodia        Canada
##             0             0             0             0             0
##         China      Colombia         Dubai       Estonia          Fiji
##             1             0             0             0             0
##       Finland       Germany         Ghana       Holland     Hong Kong
##             0             0             0             0             1
##       Hungary         India     Indonesia         Japan      Malaysia
##             0             0             4             6             6
##        Mexico       Myanmar         Nepal   Netherlands       Nigeria
##             0             1             0             0             0
##      Pakistan   Philippines        Poland       Sarawak     Singapore
##             0             0             0             0             7
##   South Korea        Sweden        Taiwan      Thailand            UK
##             5             0             2             3             0
## United States           USA       Vietnam
##             0             1             0
```

Singapore has the most top ten placements of 7 times, closely followed by Japan and Malaysia with 6, and Indonesia with 4. Geographically speaking, all of the ramen that has placed in the top ten are from Asian countries aside from 1 from the USA.

```
plot(ramen$perc_salt[toptenplacements])
```




```
mean(ramen$perc_salt[toptenplacements])
```

```
## [1] 18.90144
```

```
summary(ramen$perc_salt[toptenplacements])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   16.85   18.35   18.93   18.90   19.67   21.87
```

I would recommend that the salt percentage of the ramen stay around the mean of 18.90. Or at least preferably within the interquartile range of 18.35%-19.67%.

```
table(ramen$Style[toptenplacements])
```

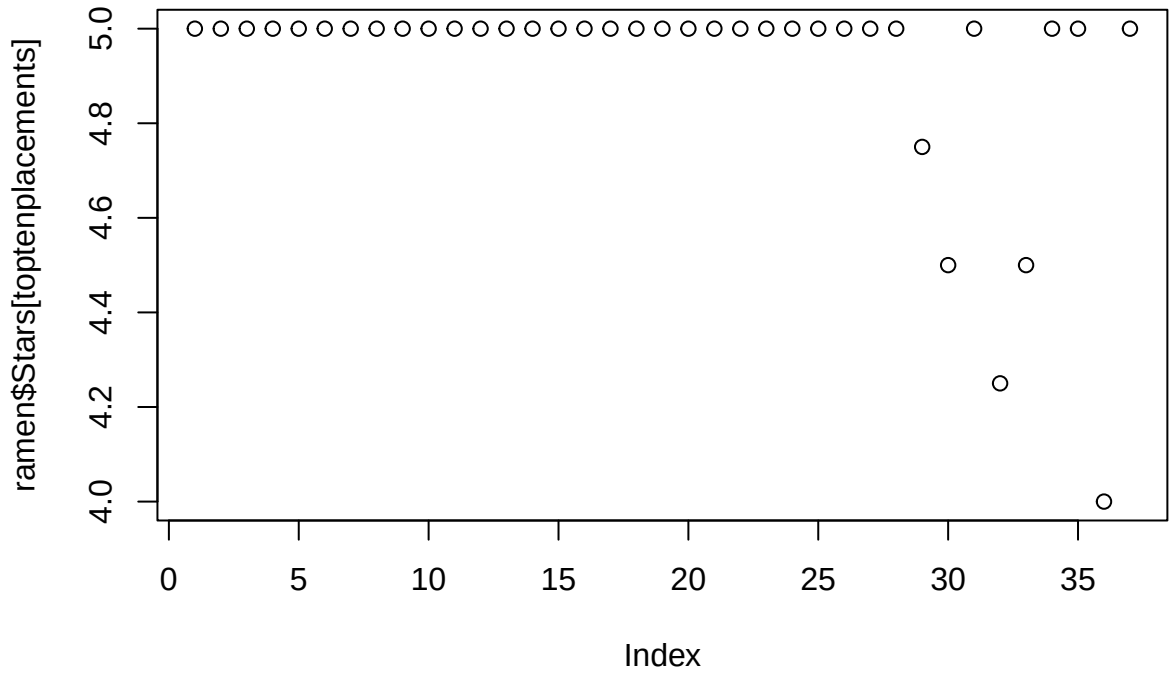
```
##
##       Bar Bowl  Box  Can  Cup Pack Tray
##    0    0    0    0    0    0   33    4
```

Furthermore, I would recommend that they make a ramen with a pack style, as 33 of the 37 ramens that have been placed on the top ten are pack style ramens.

```
summary(ramen$Stars[toptenplacements])
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   4.000   5.000   5.000   4.919   5.000   5.000
```

```
plot(ramen$Stars[toptenplacements])
```



Most of the ramen in the top ten range between 4 and 5. More specifically, the median falls at 5, meaning that almost all of the ramen that have been placed in the top 10 have a star rating of 5.00. Thus, in order to create the next Top Ten Ramen winner, the ramen startup should make a ramen that can receive a 5.00 rating.

```
ramen$Variety[toptenplacements]
```

```
##  [1] Instant Noodles Coconut Milk Flavour
##  [2] Singapore Laksa Wholegrain La Mian
##  [3] Juzz's Mee Creamy Chicken Flavour
##  [4] Singapore Curry Wholegrain La Mian
##  [5] Scallion With Sichuan Pepper  Flavor
##  [6] Tomato Beef Brisket Flavor Purple Potato Noodle
##  [7] Veggie Noodle Tomato Noodle With Vine Ripened Tomato Sauce
##  [8] Penang Hokkien Prawn Noodle (New Improved Taste)
##  [9] Nyonya Curry Laksa
## [10] Gotsumori Sauce Yakisoba
## [11] Chef Gold Recipe Mi Kari Seribu Rasa
## [12] Penang Red Tom Yum Goong Noodle
## [13] Instant Noodles Shrimp Creamy Tom Yum Flavour Jumbo Pack
## [14] Oriental Style Instant Noodles Green Curry Flavour Jumbo Pack
## [15] Chef Curry Laksa Flavour
## [16] Otafuku Okonomi Sauce Yakisoba
## [17] Soon Veggie Noodle Soup
## [18] Instant Noodles Yentafo Tom Yum Mohfai Flavour
## [19] Singapore Chilli Crab La Mian
## [20] Maesaengyitangmyun Baked Noodle
## [21] Cheese Noodle
## [22] Penang White Curry Noodle
## [23] Singapore Laksa La Mian
## [24] Singapore Curry La Mian
## [25] Jinjja Jinjja Flamin' Hot & Nutty
## [26] Kokomen Spicy Chicken
## [27] Mi Goreng Rendang (Import)
```

```
## [28] Spicy Black Pepper
## [29] Shin Ramyun Black
## [30] Kari Spesial
## [31] Yakisoba Noodles Karashi
## [32] Hyoubanya No Chukasoba Oriental
## [33] Artificial Chicken
## [34] Special Fried Curly Noodle
## [35] Mi Goreng Jumbo Barbecue Chicken
## [36] Ippeichan Yakisoba
## [37] Chow Mein
## 2413 Levels: "A" Series Artificial Chicken ...    (Samyang Ramyun) (South Korean Version)
```

As mentioned before, all but 1 of the ramen on the top 10 are from Asian countries (Singapore, Malaysia, Japan, South Korea, Indonesia, Myanmar, Taiwan, China, and Thailand). Thus, it is no surprise that the variety of these ramen all compose of various Asian flavors. For instance, laksa and curry flavors are very popular, and these flavors originate from Southeast Asian cuisines such as Malaysia and Singapore. Additionally, spicy tom yum flavored ramen are also popular, with flavors from Thailand. The mi goreng variety also found its way to the top ten, originating from Indonesia. I think that the ramen startup will have a good chance of creating a Top Ten Ramen winner if they used flavors from such Asian cuisines, as it is evident that they are most likely to win top ten positions.