

Case Study: Ramen

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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)
```

```
## [1] New Touch      Just Way
## [3] Nissin          Wei Lih
## [5] Ching's Secret  Samyang Foods
## [7] Acecook         Ikeda Shoku
## [9] Ripe'n'Dry      KOKA
## [11] Tao Kae Noi     Yamachan
## [13] Nongshim        TRDP
## [15] Binh Tay        Paldo
## [17] Jackpot Teriyaki Yum-Mie
## [19] MyKuali         Ottogi
## [21] Sichuan Guangyou Lipton
## [23] Lele            Fujiwara
## [25] Uni-President   Maruchan
## [27] Prima           Sokensha
## [29] Takamori        Guava Story
## [31] Samurai Ramen   Ogasawara
## [33] Pringles        Mom's Dry Noodle
## [35] Maggi           Indomie
## [37] Happy Cook      The Ramen Rater Select
## [39] TTL             E-Zee
## [41] Kiki Noodle     Tokyo Noodle
## [43] GGE             Myojo
## [45] Sau Tao         Wang
## [47] Daifuku         Master Kong
## [49] World O' Noodle Kang Shi Fu
## [51] Mum Ngon        Fashion Food
## [53] Dream Kitchen   Ajinatori
```

## [55]	Dr. McDougall's	Ve Wong
## [57]	Super Bihun	Xiuhe
## [59]	Little Cook	Shirakiku
## [61]	Mama Pat's	Goku-Uma
## [63]	Sichuan Baijia	Liang Cheng Mai
## [65]	Gefen	Hua Feng
## [67]	Pulmuone	Liu Quan
## [69]	Daikoku	Chuan Wei Wang
## [71]	Wai Wai	Kamfen
## [73]	Marutai	Vifon
## [75]	1 To 3 Noodles	Fantastic
## [77]	Knorr	Sempio
## [79]	Patanjali	Qin Zong
## [81]	Pran	Sapporo Ichiban
## [83]	MAMA	Xiao Ban Mian
## [85]	Suimin	Cintan
## [87]	JML	Unif Tung-I
## [89]	Tablemark	Farmer's Heart
## [91]	Fuku	Singa-Me
## [93]	Love Cook	Great Value
## [95]	Asian Thai Foods	Nagatanien
## [97]	Nyor Nyar	Tseng Noodles
## [99]	A-Sha Dry Noodle	Morre
## [101]	Roland	Mr. Lee's Noodles
## [103]	Choumama	President Rice
## [105]	Happy Family	Menraku
## [107]	La Moderna	Jingqi
## [109]	Thien Houng Foods	Doll
## [111]	Four Seas	CarJEN
## [113]	7 Select	Oni Hot Pot
## [115]	Weh Lih	Itomen
## [117]	Sanpo	Mi Sedaap
## [119]	Tokushima Seifun	Mamee
## [121]	Zow Zow	Koyo
## [123]	ORee Garden	A1
## [125]	Migawon	Chaudhary's Wai Wai
## [127]	Urban Noodle	Trident
## [129]	Conimex	Prima Taste
## [131]	MyOri	Itsuki
## [133]	Kabuto Noodles	IbuRamen
## [135]	Koh Thai	Bamee
## [137]	Ibumie	Unox
## [139]	Fortune	Bonasia
## [141]	Mie Sedaap	iMee
## [143]	Thai Smile	Asia Gold
## [145]	Pirkka	Higashimaru
## [147]	Kuriki	Vedan
## [149]	Yum Yum	Mama
## [151]	Baijia	Daraz
## [153]	Pama	Seven & I
## [155]	Forest Noodles	Vit's
## [157]	Ten-In	Sugakiya Foods
## [159]	Hao Way	Nakaya Shouten
## [161]	Thai Chef	Crystal Noodle

## [163]	Azami	Super
## [165]	Torishi	Western Family
## [167]	Chering Chang	Ishimaru
## [169]	Authentically Asian	Aroi
## [171]	Koka	Wu-Mu
## [173]	Yamadai	Vina Acecook
## [175]	Baixiang Noodles	Salam Mie
## [177]	Lee Fah Mee	Sakurai Foods
## [179]	The Kitchen Food	Premiere
## [181]	7 Select/Nissin	Wugudaochang
## [183]	Emart	Lishan Food Manufacturing
## [185]	Ah Lai	Tropicana Slim
## [187]	A-One	Deshome
## [189]	Paldo Vina	Chencun
## [191]	United	ChoripDong
## [193]	Shan	Ruski
## [195]	No Name	New Way
## [197]	Lucky Me!	Campbell's
## [199]	One Dish Asia	Long Jun Hang
## [201]	Unif-100	Hankow
## [203]	The Bridge	Mitoku
## [205]	Unzen	Uncle Sun
## [207]	Mi E-Zee	E-mi
## [209]	J.J.	Curry Prince
## [211]	Econsave	Oyatsu
## [213]	Kin-Dee	Ko-Lee
## [215]	ICA	Nanyang Chef
## [217]	Thai Pavilion	Miliket
## [219]	Katoz	Men-Sunaoshi
## [221]	Chewy	Adabi
## [223]	Osaka Ramen	Sainsbury's
## [225]	Pamana	Annie Chun's
## [227]	La Fonte	Thai Choice
## [229]	Tesco	Pop Bihun
## [231]	Snapdragon	Saji
## [233]	Miracle Noodle	Tiger Tiger
## [235]	Takamori Kosan	Papa
## [237]	Sawadee	Golden Wheat
## [239]	Lotus Foods	Plats Du Chef
## [241]	Batchelors	Sakura Noodle
## [243]	Unif	Hi-Myon
## [245]	Healtimie	Thai Kitchen
## [247]	Mr. Noodles	Good Tto Leu Foods
## [249]	GaGa	Kimura
## [251]	Tokachimen Koubou	ABC
## [253]	Eat & Go	President
## [255]	SuperMi	Kumamoto
## [257]	HoMyeonDang	Nan Jie Cun
## [259]	China Best	Sanrio
## [261]	Peyang	Golden Wonder
## [263]	Komforte Chockolates	Nagao Noodle
## [265]	Maitri	GS25
## [267]	Baltix	Amianda
## [269]	Tasty Bite	Star Anise Foods

```
## [271] Tradition Amino
## [273] Pot Noodle Sun Noodle
## [275] S&S Springlife
## [277] Right Foods Sunlee
## [279] Goku Uma Daddy
## [281] Han's South Korea Sarimi
## [283] FMF Long Kow
## [285] Unif / Tung-I Song Hak
## [287] Fuji Mengyo Dragonfly
## [289] CJ CheilJedang Dongwon
## [291] Seven-Eleven Souper
## [293] Kim's Bowl Ohsung
## [295] Gau Do Golden Mie
## [297] GreeNoodle Kailo
## [299] Fashion Foods Hosoonyi
## [301] Payless Yamamoto
## [303] Saigon Ve Wong Wu Mu
## [305] Mee Jang JFC
## [307] Samyang Mug Shot
## [309] Lishan Cap Atoom Bulan
## [311] Sura Wei Chuan
## [313] Yamamori Mr. Udon
## [315] Omachi Wei Wei
## [317] Six Fortune Haioreum
## [319] Sunlight Noah Foods
## [321] O Sung Foodmon
## [323] Sahmyook Nan Hsing
## [325] Mexi-Ramen Hsin Tung Yang
## [327] Sao Tao iNoodle
## [329] Quickchow Chikara
## [331] Q Noodle Time
## [333] Gomex US Canning
## [335] Rhee Bros Assi Bon Go Jang
## [337] Tayho Sunny Maid
## [339] Royal Umbrella Tiger
## [341] Fu Chang Chinese Noodle Company Sanyo Foods
## [343] Rocket Brand Boss
## [345] Chorip Dong Higashi
## [347] Sakurai Global Inspiration
## [349] Teriyaki Time Hua Feng Noodle Expert
## [351] Kim Ve Wong Smack
## [353] Sutah Tung-I
## [355] Westbrae
## 355 Levels: 1 To 3 Noodles 7 Select 7 Select/Nissin A-One ... Zow Zow
```

```
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
```

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

```
## [1] Prima Taste Prima      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 | Chillli | Hot | Pedas | Cabe | Sambal'))
print(numberofspicy)

## [1] 320

print((numberofspicy/2580)*100)

## [1] 12.4031

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

## [1] 3.716016

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

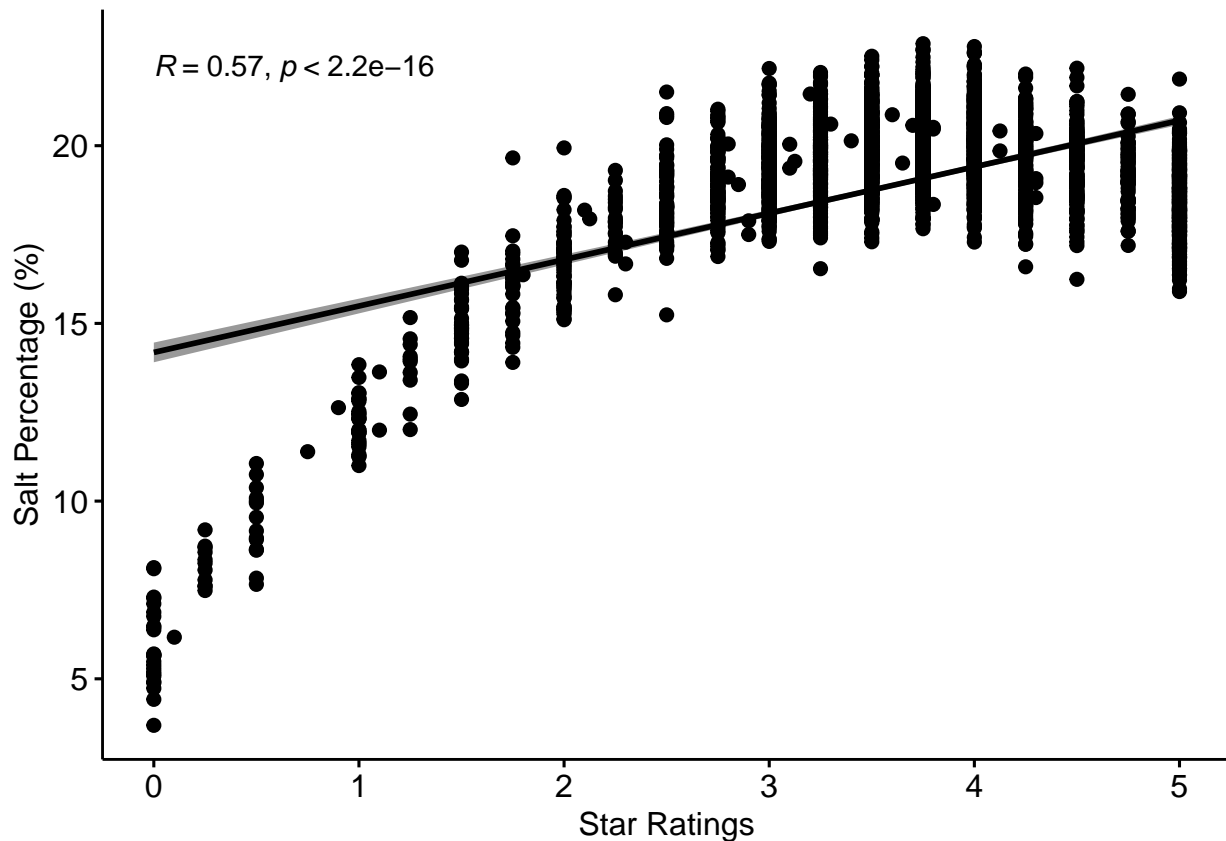
## [1] 3.645979
```

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
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## 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 Houg 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)
```

```
##      brands_lowsalt n
## 1      Baijia      7
## 2      Mr. Noodles  6
## 3      Ottogi      5
## 4      Vifon       5
## 5      Ve Wong     4
## 6      Acecook     3
## 7      Batchelors  3
## 8      Fashion Foods 3
## 9      GreeNoodle  3
## 10     Koyo        3
## 11     Lucky Me!   3
## 12     Mama        3
## 13     Nissin      3
## 14     Wai Wai     3
## 15     Western Family 3
## 16     Azami       2
## 17     Campbell's  2
## 18     Chewy       2
## 19     Conimex     2
## 20     Koh Thai    2
## 21     Little Cook  2
## 22     Long Kow    2
## 23     Maggi       2
## 24     Myojo       2
## 25     Paldo       2
## 26     Pot Noodle  2
## 27     Roland      2
## 28     Samyang Foods 2
## 29     Sichuan Guangyou 2
## 30     Tesco        2
## 31     Uni-President 2
## 32     Vedan       2
## 33     A-One       1
## 34     A1          1
## 35     Annie Chun's 1
## 36     Asian Thai Foods 1
## 37     Authentically Asian 1
## 38     China Best  1
## 39     Crystal Noodle 1
## 40     Deshome     1
## 41     Doll        1
```

## 42	Dr. McDougall's	1
## 43	Fantastic	1
## 44	Fortune	1
## 45	Guava Story	1
## 46	Hsin Tung Yang	1
## 47	Hua Feng Noodle Expert	1
## 48	IbuRamen	1
## 49	Indomie	1
## 50	Itsuki	1
## 51	JML	1
## 52	Just Way	1
## 53	Kim Ve Wong	1
## 54	Knorr	1
## 55	Ko-Lee	1
## 56	Liang Cheng Mai	1
## 57	Lipton	1
## 58	MAMA	1
## 59	Mamee	1
## 60	Maruchan	1
## 61	Master Kong	1
## 62	Mie Sedaap	1
## 63	Mitoku	1
## 64	Mr. Lee's Noodles	1
## 65	MyKuali	1
## 66	Nan Hsing	1
## 67	Nan Jie Cun	1
## 68	Nongshim	1
## 69	Noodle Time	1
## 70	One Dish Asia	1
## 71	Paldo Vina	1
## 72	Ripe'n'Dry	1
## 73	Saigon Ve Wong	1
## 74	Sainsbury's	1
## 75	Sapporo Ichiban	1
## 76	Sau Tao	1
## 77	Sawadee	1
## 78	Sichuan Baijia	1
## 79	Singa-Me	1
## 80	Sunlee	1
## 81	Tayho	1
## 82	Ten-In	1
## 83	Thai Pavilion	1
## 84	Thai Smile	1
## 85	Tiger	1
## 86	Unif / Tung-I	1
## 87	Unif Tung-I	1
## 88	Unzen	1
## 89	Urban Noodle	1
## 90	US Canning	1
## 91	Wang	1
## 92	Weh Lih	1
## 93	Wei Lih	1
## 94	Westbrae	1
## 95	Wu Mu	1

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]
```

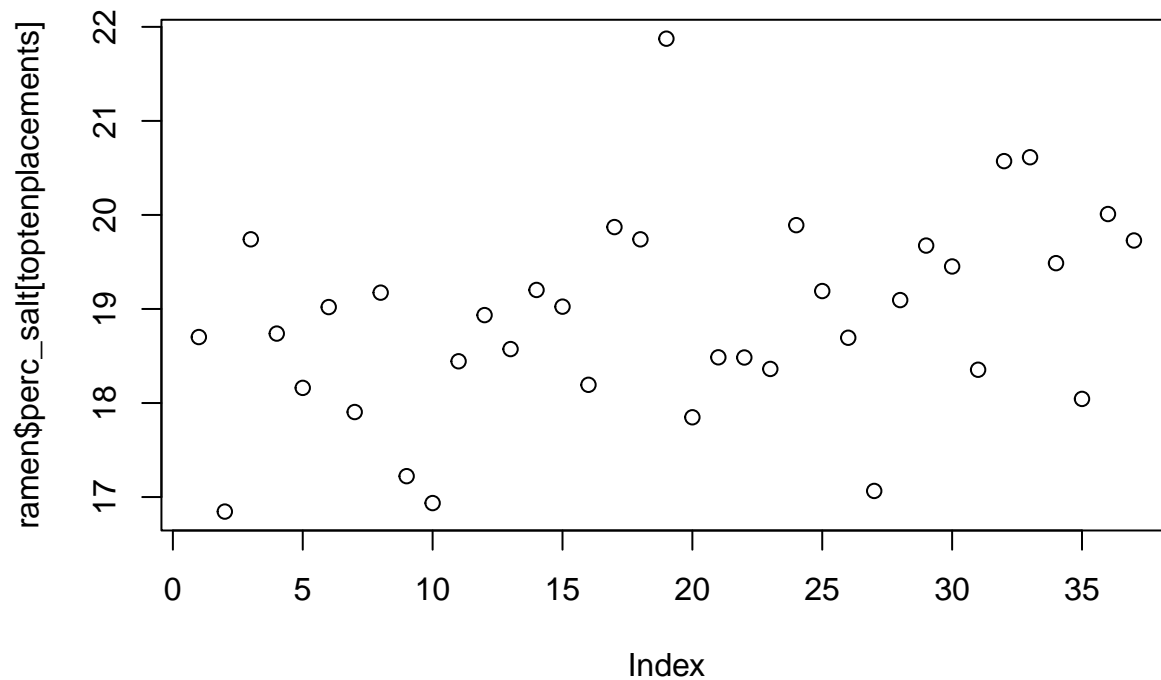
```
## [1] Instant Noodles Coconut Milk Flavour
## [2] Singapore Laksa Wholegrain La Mian
## [3] Juzz's Mee Creamy Chicken Flavour
## [4] Singapore Curry Wholegrain La Mian
## [5] Scallion With Sichuan Pepper Flavor
## [6] Tomato Beef Brisket Flavor Purple Potato Noodle
## [7] Veggie Noodle Tomato Noodle 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])
```

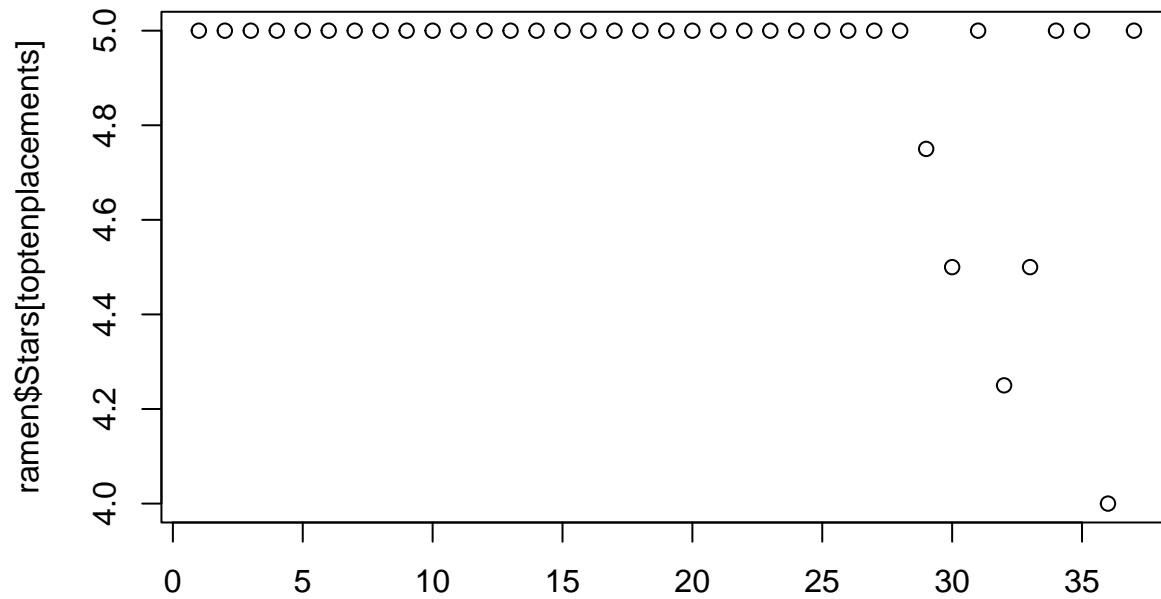
```
##
##      Bar Bowl  Box  Can  Cup Pack Tray
##      0    0    0    0    0   33   4
```

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])
```



Index

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.