



I'm loving it

PCA on the Mcdonald's Calory data - Woojoeng Kim_Math department





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Explore Data_summary

```
mc <- read.csv("/Users/woojeongkim/Desktop/23Spring/S670/menu.csv")
#https://www.kaggle.com/datasets/mcdonalds/nutrition-facts?resource=download ← Reference
head(mc)
```

```
summary(mc)

##      Category          Item      Serving.Size      Calories
##  Length:260    Length:260    Length:260      Min.   :  0.0
##  Class :character  Class :character  Class :character  1st Qu.: 210.0
##  Mode  :character  Mode  :character  Mode  :character  Median  : 340.0
##                                         Mean   : 368.3
##                                         3rd Qu.: 500.0
##                                         Max.   :1880.0
## 
##  Calories.from.Fat  Total.Fat      Total.Fat....Daily.Value. Saturated.Fat
##  Min.   :  0.0  Min.   : 0.000  Min.   :  0.000  Min.   : 0.000
##  1st Qu.: 20.0  1st Qu.: 2.375  1st Qu.:  3.75   1st Qu.: 1.000
##  Median :100.0  Median :11.000  Median : 17.00   Median : 5.000
##  Mean   :127.1  Mean   :14.165  Mean   : 21.82   Mean   : 6.008
##  3rd Qu.:200.0  3rd Qu.:22.250  3rd Qu.: 35.00   3rd Qu.:10.000
##  Max.   :1060.0  Max.   :118.000  Max.   :182.00   Max.   :20.000
## 
##  Saturated.Fat....Daily.Value.  Trans.Fat      Cholesterol
##  Min.   :  0.0000  Min.   :0.0000  Min.   :  0.00
##  1st Qu.: 4.7500  1st Qu.:0.0000  1st Qu.:  5.00
##  Median :24.0000  Median :0.0000  Median : 35.00
##  Mean   :29.9700  Mean   :0.2038  Mean   : 54.94
##  3rd Qu.:48.0000  3rd Qu.:0.0000  3rd Qu.: 65.00
##  Max.   :102.0000  Max.   :2.5000  Max.   :575.00
## 
##  Cholesterol....Daily.Value.  Sodium      Sodium....Daily.Value.
##  Min.   :  0.00  Min.   :  0.0  Min.   :  0.00
##  1st Qu.: 2.00  1st Qu.:107.5  1st Qu.:  4.75
##  Median :11.00  Median :190.0  Median :  8.00
##  Mean   :18.39  Mean   :495.8  Mean   : 20.68
##  3rd Qu.:21.25  3rd Qu.:865.0  3rd Qu.: 36.25
##  Max.   :192.00  Max.   :3600.0  Max.   :150.00
```

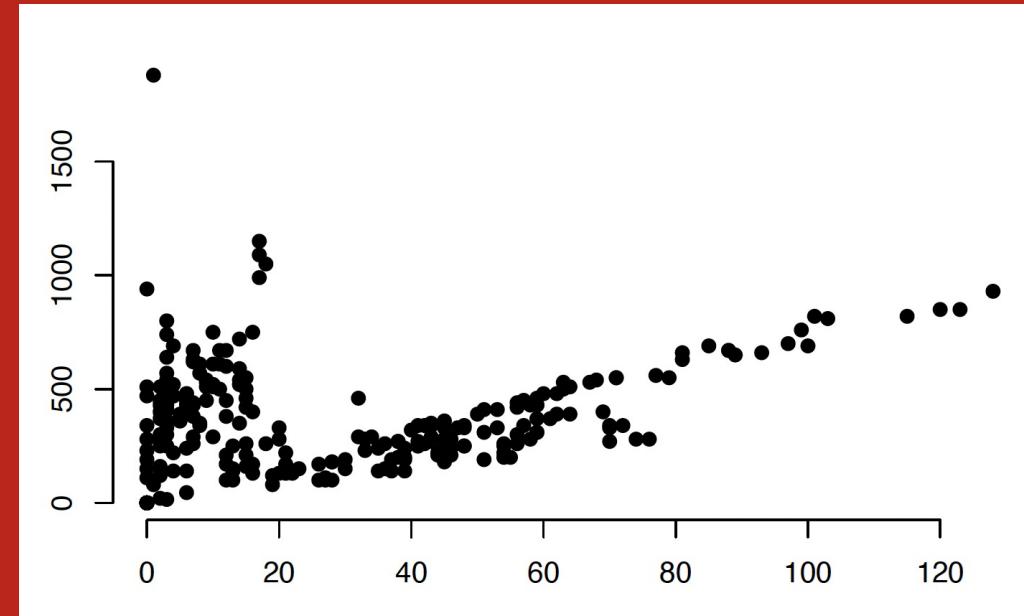
```
##      Carbohydrates      Carbohydrates....Daily.Value. Dietary.Fiber
##  Min.   :  0.00  Min.   :  0.00  Min.   :0.000
##  1st Qu.:30.00  1st Qu.:10.00  1st Qu.:0.000
##  Median :44.00  Median :15.00  Median :1.000
##  Mean   :47.35  Mean   :15.78  Mean   :1.631
##  3rd Qu.:60.00  3rd Qu.:20.00  3rd Qu.:3.000
##  Max.   :141.00  Max.   :47.00  Max.   :7.000
## 
##  Dietary.Fiber....Daily.Value.      Sugars      Protein
##  Min.   :  0.000  Min.   :  0.00  Min.   :  0.00
##  1st Qu.: 0.000  1st Qu.:  5.75  1st Qu.: 4.00
##  Median : 5.000  Median :17.50  Median :12.00
##  Mean   : 6.531  Mean   :29.42  Mean   :13.34
##  3rd Qu.:10.000  3rd Qu.:48.00  3rd Qu.:19.00
##  Max.   :28.000  Max.   :128.00  Max.   :87.00
```





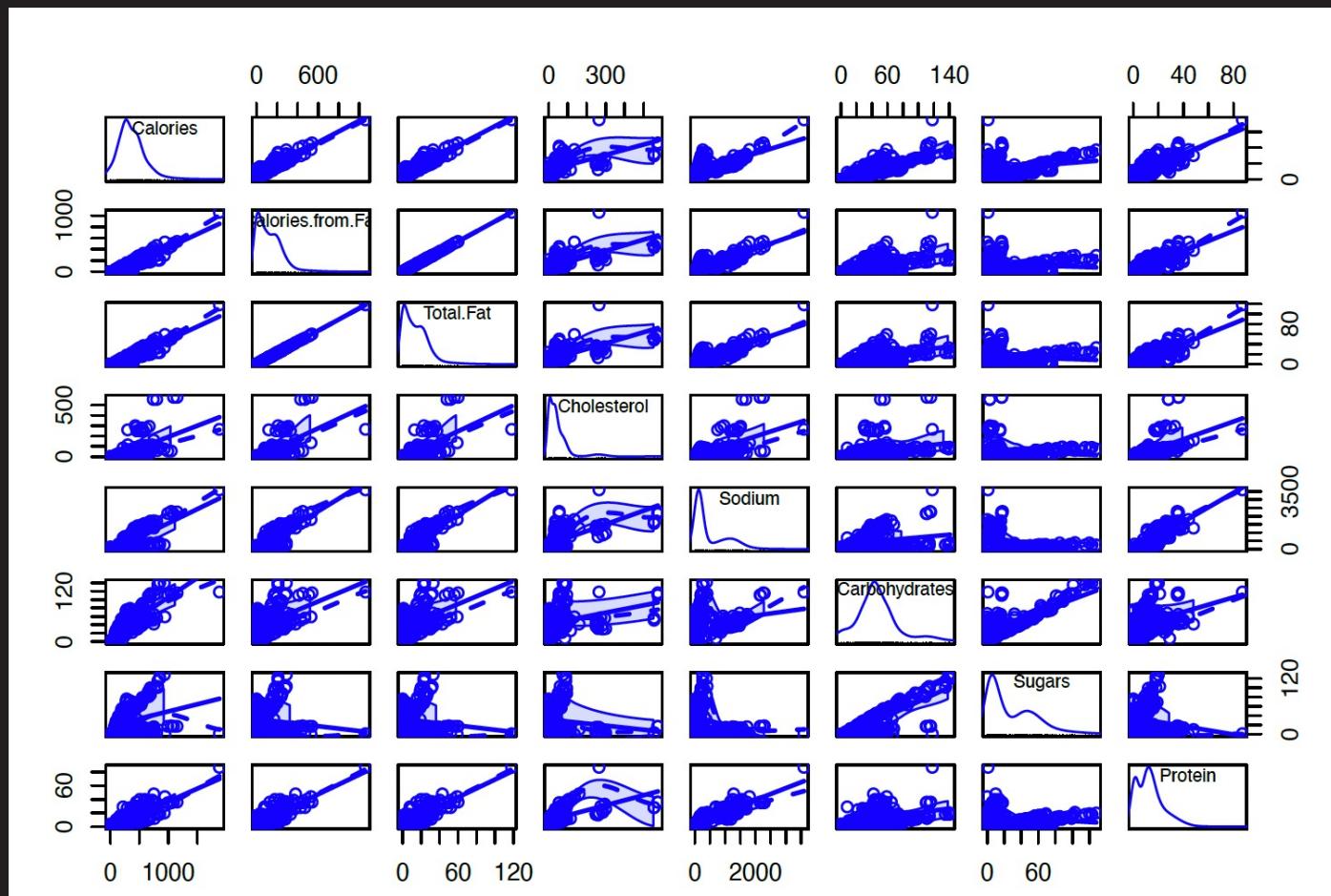
Explore Data_Scatterplot

```
library(ggplot2)
bp <- ggplot(mc, aes(x=mc$Sugars, y=mc$Calories))
plot(mc$Sugars, mc$Calories, main = "Main title",
     xlab = "X axis title", ylab = "Y axis title",
     pch = 19, frame = FALSE)+geom_point(aes(color = Category)) +theme(legend.position = "top")
```

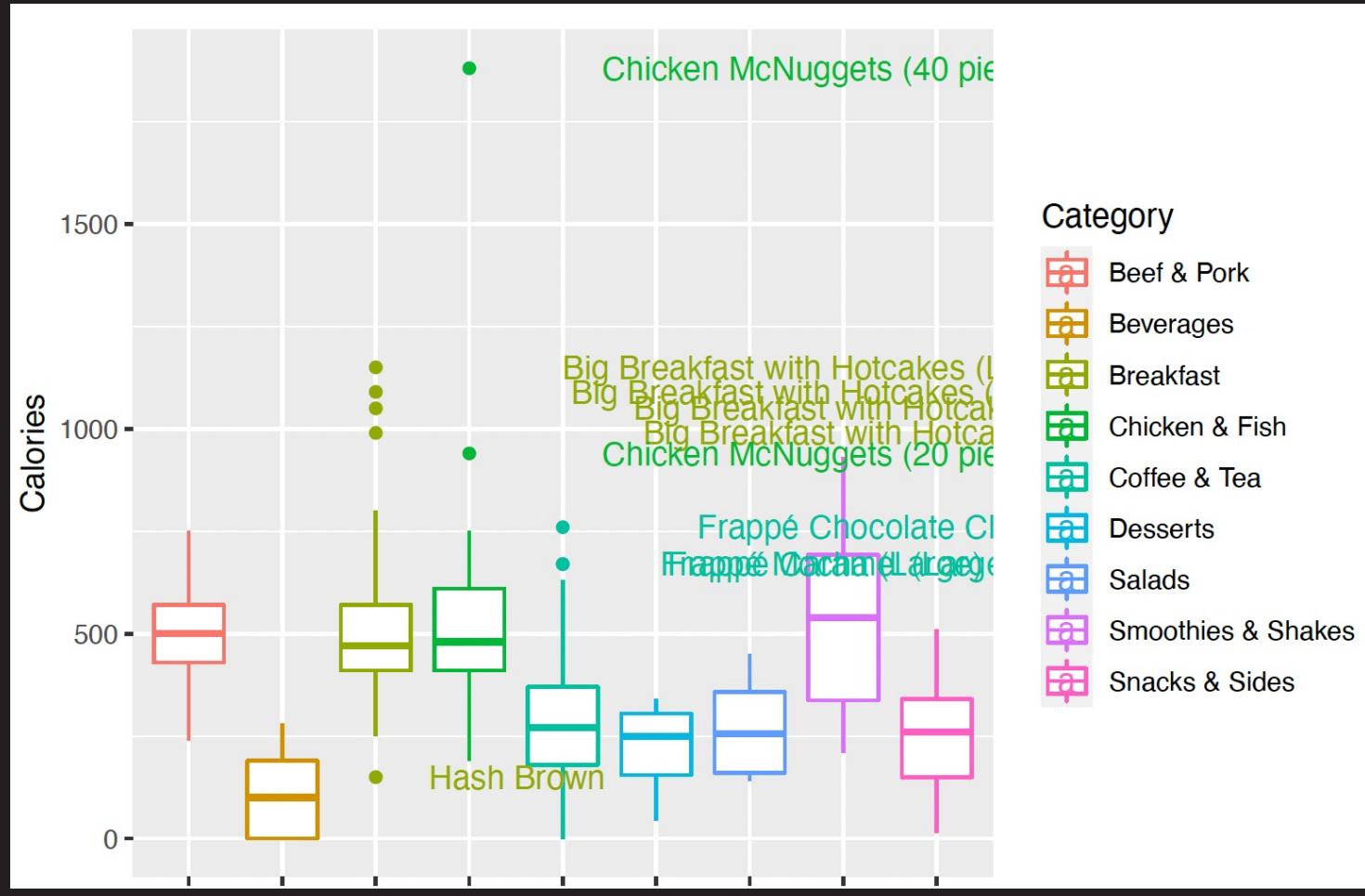


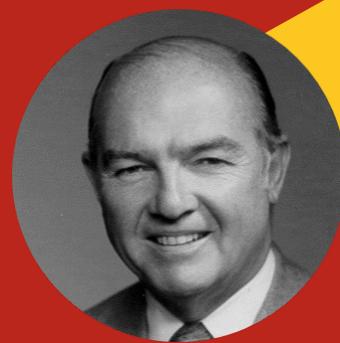


Explore Data_scatterplotMatrix



Explore Data_Boxplot

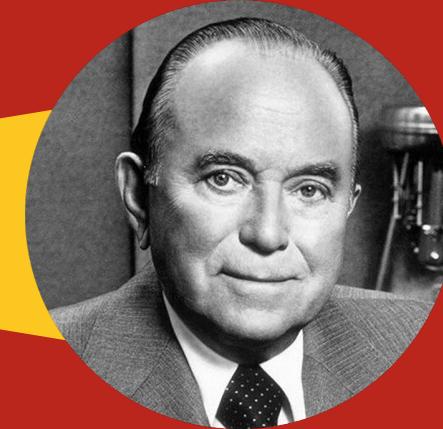




PCA Form Biplot



*The i-th principal component can be **taken as a direction orthogonal** to the first $i-1$ principal components that maximizes the variance of the projected data.

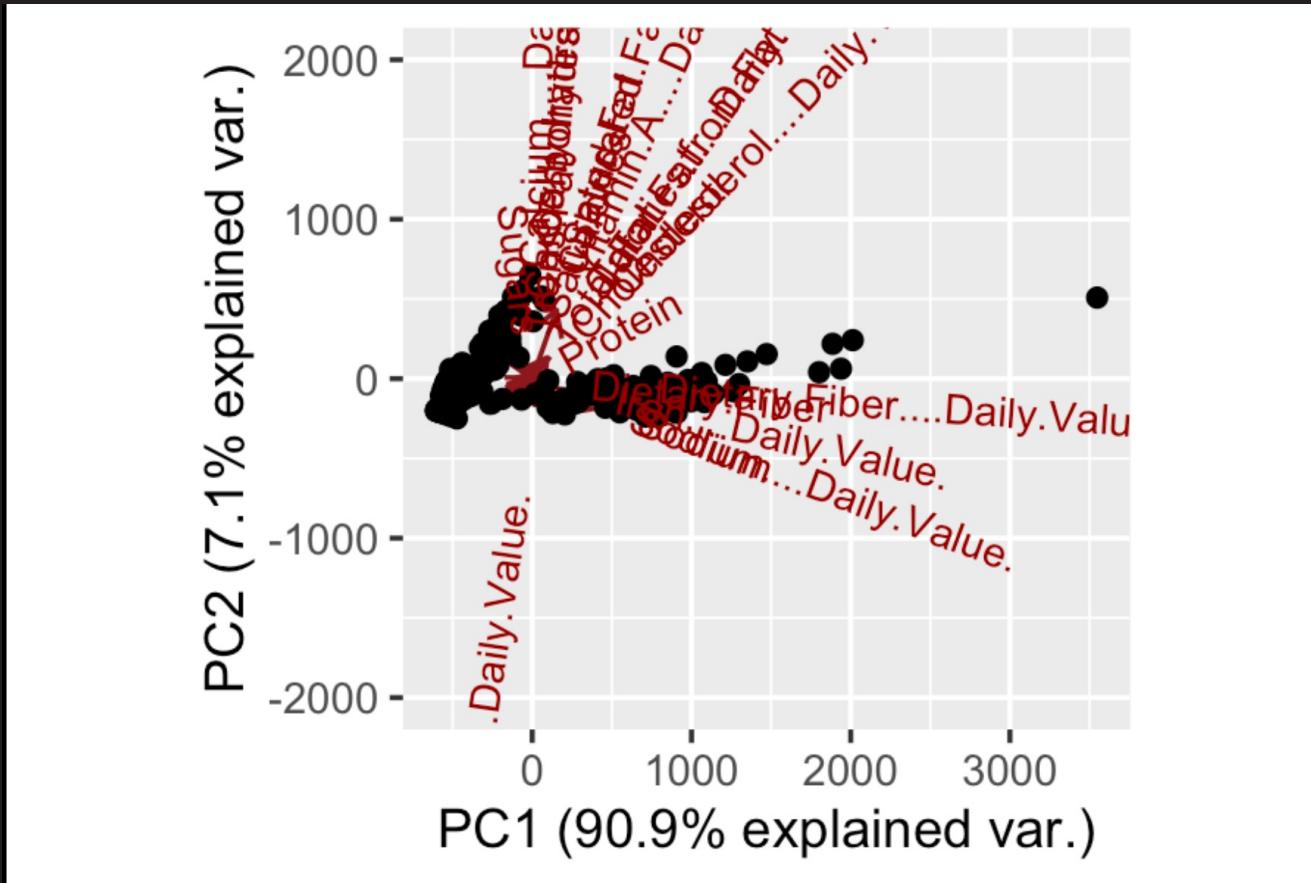


PCA correlation-based Biplot

*The first principal component can equivalently be defined as a direction that **maximizes the variance** of the projected data.

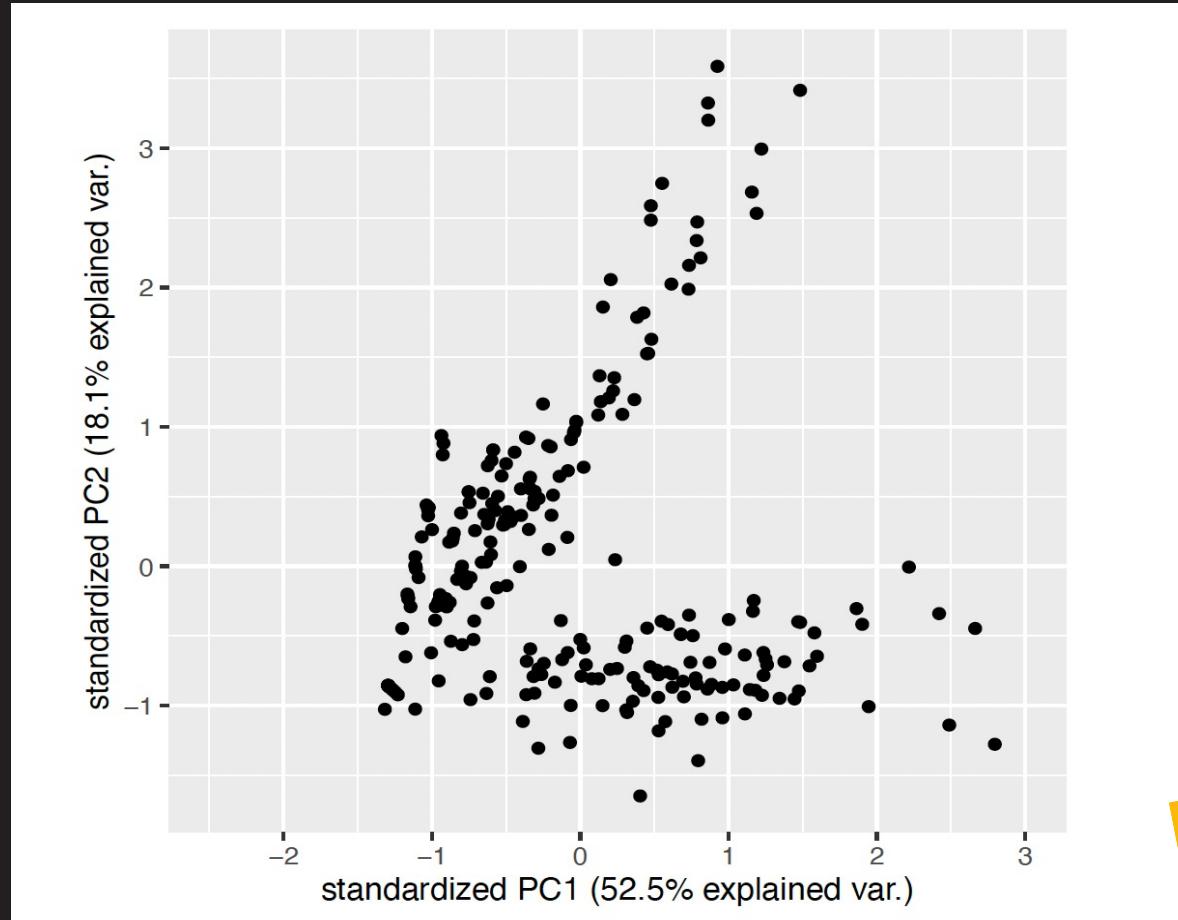


Explore Data_PCA Form Biplot



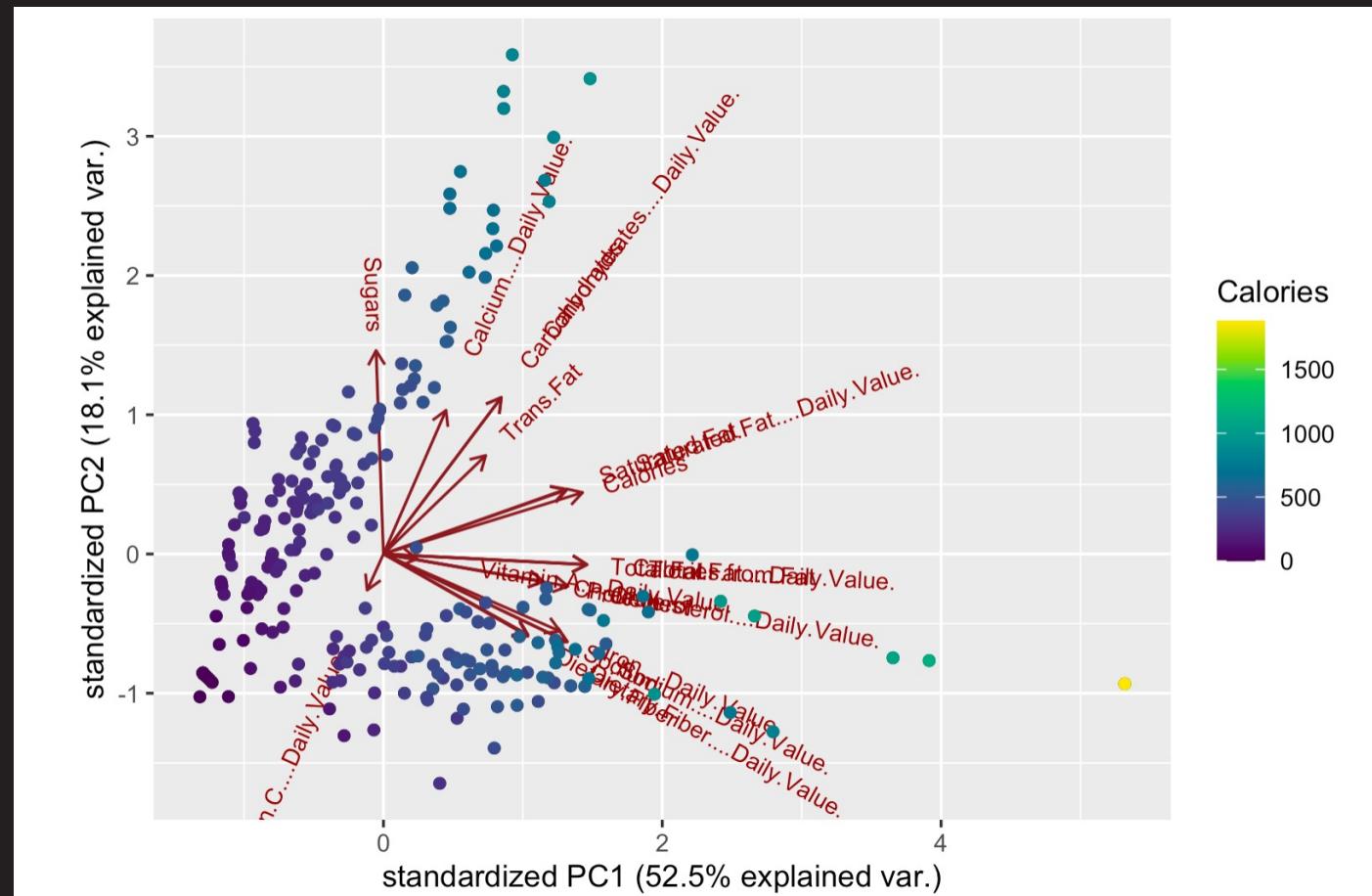


Explore Data_PCA covariance Biplot



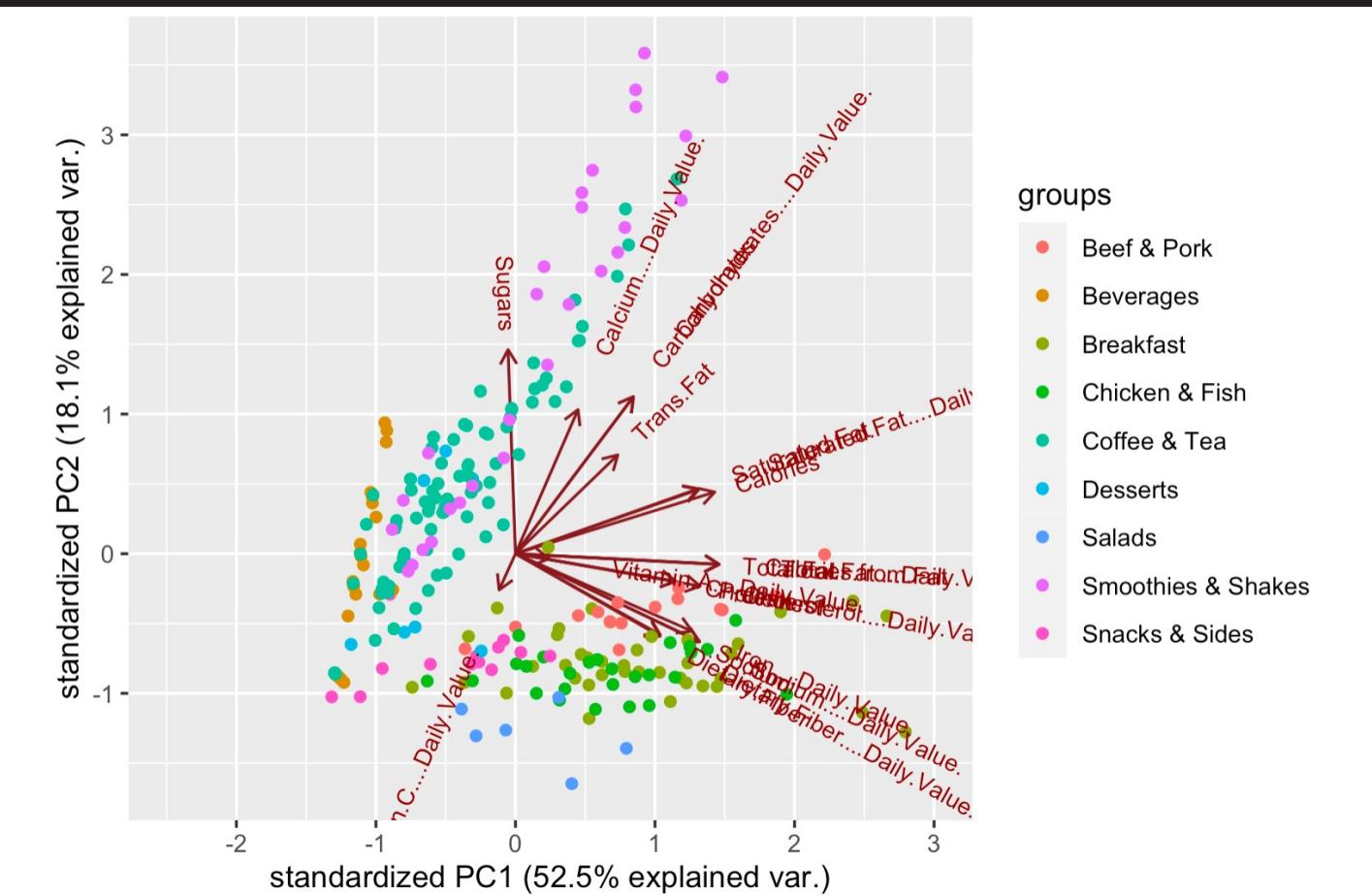


Explore Data_PCA correlation-based Biplot





Explore Data_PCA correlation-based Biplot



Compare the PCA biplots



Kimchi Mac
_PCA Form Biplot



McLobster
_PCA Covariance Biplot

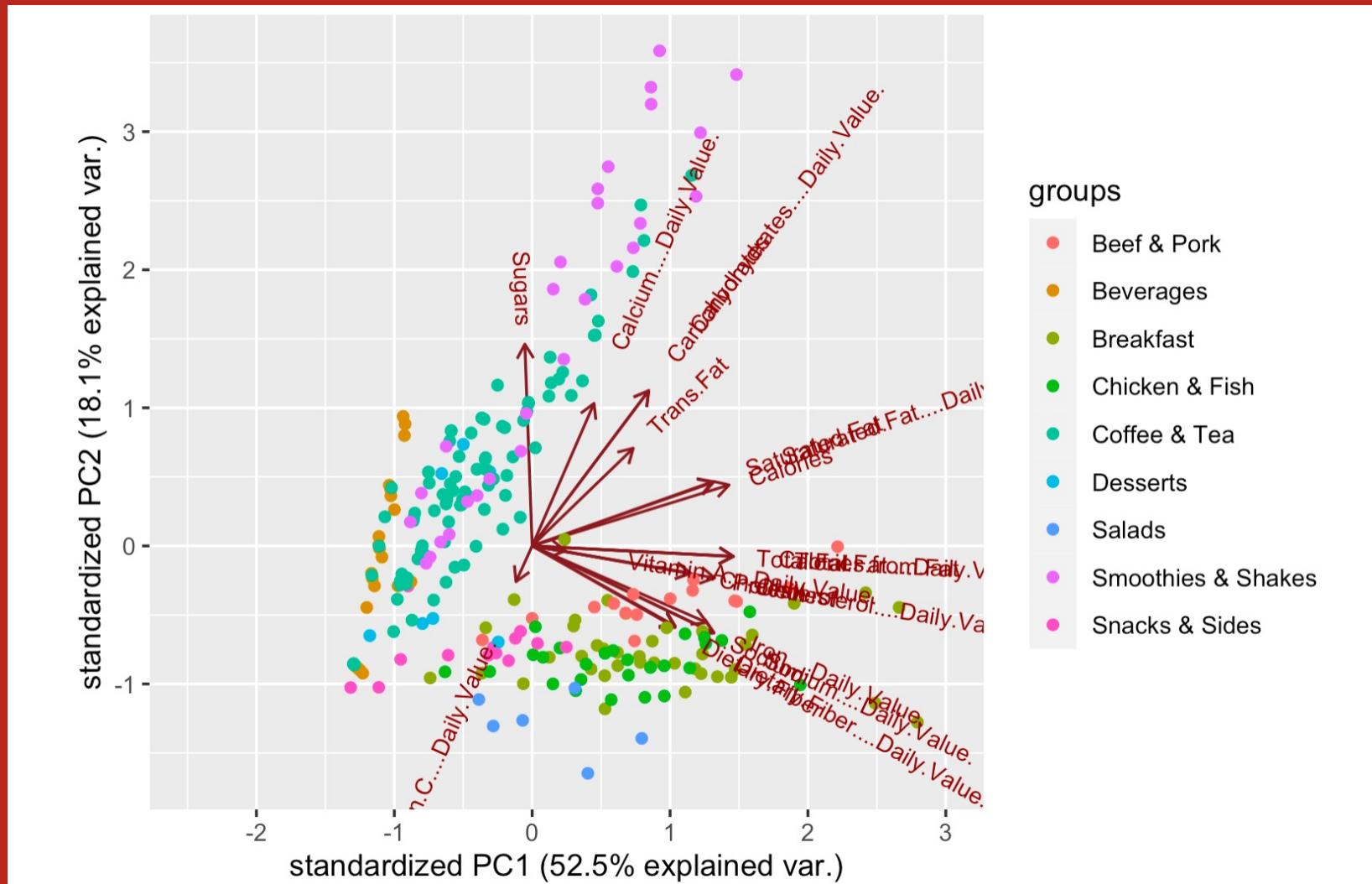


Maharaja Mac
_PCA correlation-based Biplot

Compare the PCA biplots and Result



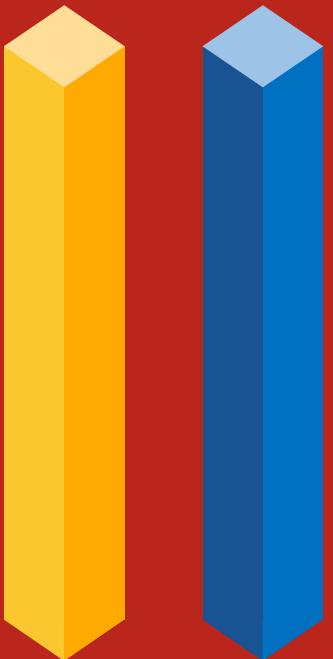
The McDonald's logo, featuring the golden arches and the word "McDonald's" in its signature font.



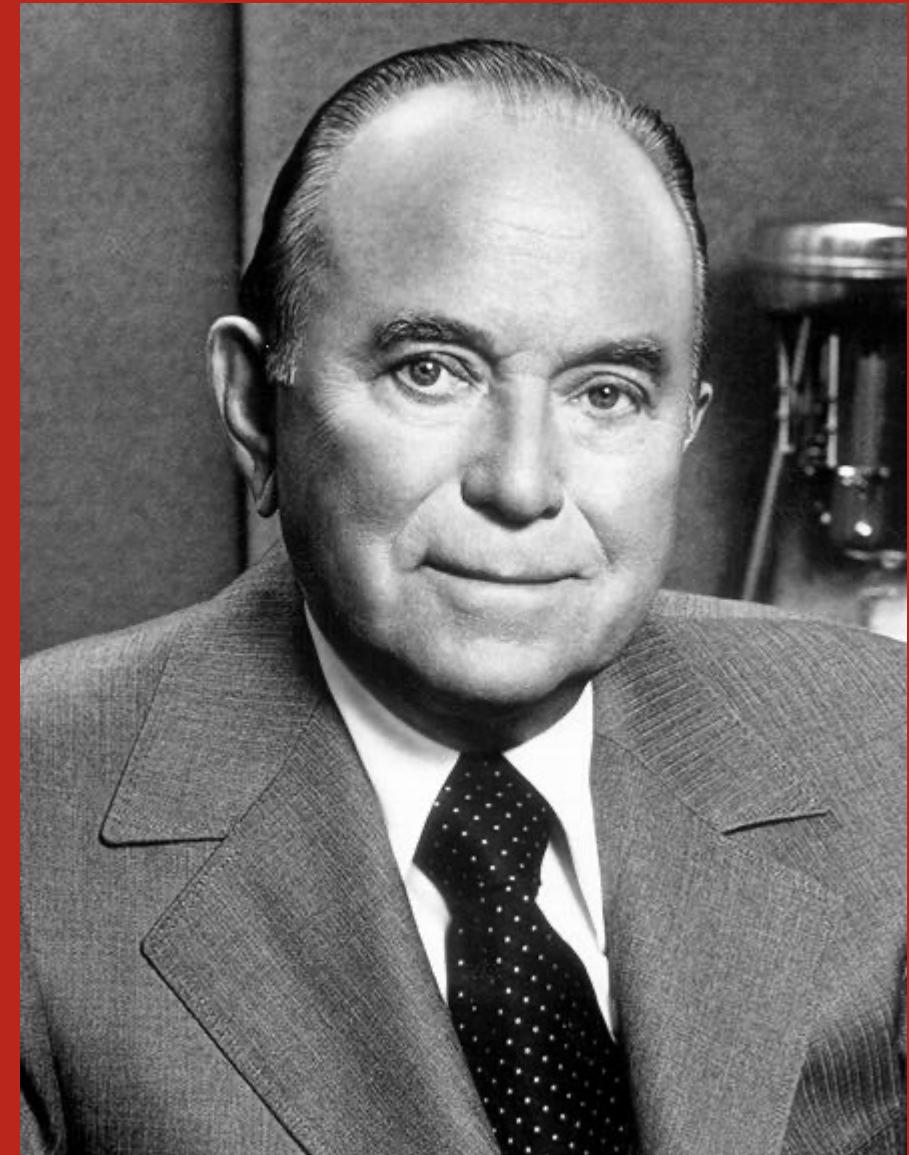




3M in America



맥도날드



Compare the PCA biplots



Kimchi Mac

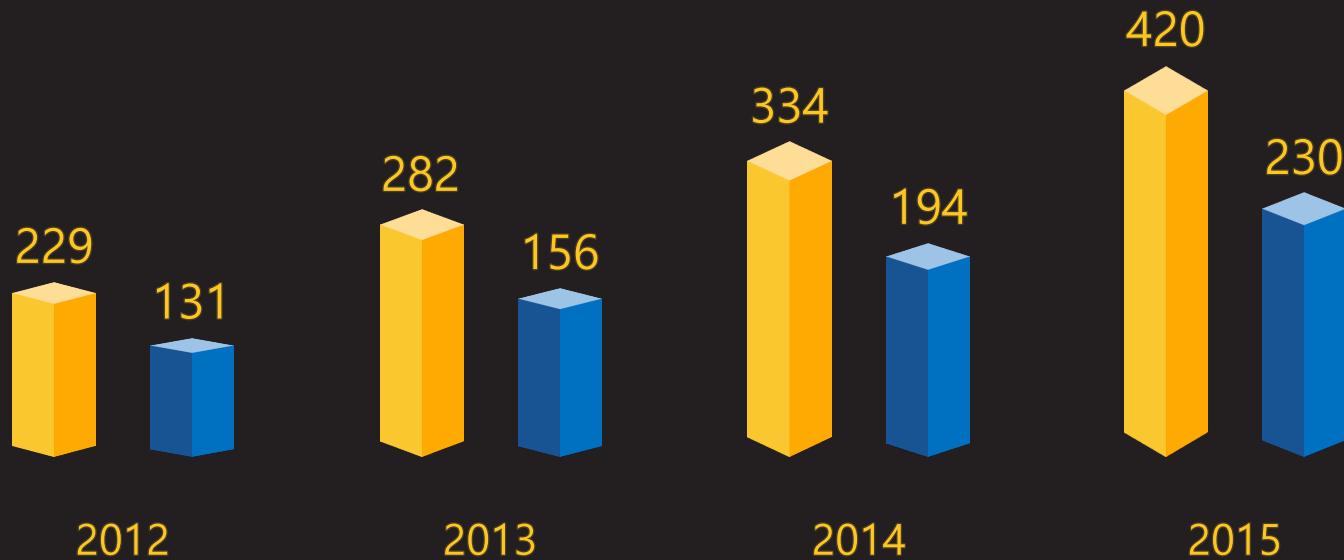


McLobster



Maharaja Mac

맥도날드 , 버거킹 매장 수 비교



출처 : 공정거래위원회