

ASSINGMENTS 5

2024-04-08

#Loading the required packages and reading the cereals file.

```
library(factoextra)
```

```
## Warning: package 'factoextra' was built under R version 4.3.3
```

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

```
## Warning: package 'ggplot2' was built under R version 4.3.3
```

```
## Welcome! Want to learn more? See two factoextra-related books at https://goo.gl/ve3WBa
```

```
library(dendextend)
```

```
## Warning: package 'dendextend' was built under R version 4.3.3
```

```
##
```

```
## -----
```

```
## Welcome to dendextend version 1.17.1
```

```
## Type citation('dendextend') for how to cite the package.
```

```
##
```

```
## Type browseVignettes(package = 'dendextend') for the package vignette.
```

```
## The github page is: https://github.com/talgalili/dendextend/
```

```
##
```

```
## Suggestions and bug-reports can be submitted at: https://github.com/talgalili/dendextend/issues
```

```
## You may ask questions at stackoverflow, use the r and dendextend tags:
```

```
## https://stackoverflow.com/questions/tagged/dendextend
```

```
##
```

```
## To suppress this message use: suppressPackageStartupMessages(library(dendextend))
```

```
## -----
```

```
##
```

```
## Attaching package: 'dendextend'
```

```
## The following object is masked from 'package:stats':
```

```
##
```

```
## cutree
```

```
library(cluster)
```

```
## Warning: package 'cluster' was built under R version 4.3.3
```

```
library(tidyverse)
```

```
## Warning: package 'dplyr' was built under R version 4.3.2
```

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr      1.1.4      v readr      2.1.4
## v forcats    1.0.0      v stringr   1.5.0
## v lubridate  1.9.2      v tibble    3.2.1
## v purrr      1.0.2      v tidyr     1.3.0
```

```
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
cereals <- read_csv("C:/Users/vhume/Desktop/FML/Assingments 5/Cereals.csv")
```

```
## Rows: 77 Columns: 16
## -- Column specification -----
## Delimiter: ","
## chr (3): name, mfr, type
## dbl (13): calories, protein, fat, sodium, fiber, carbo, sugars, potass, vita...
##
## i Use 'spec()' to retrieve the full column specification for this data.
## i Specify the column types or set 'show_col_types = FALSE' to quiet this message.
```

```
View(cereals)
numericaldata = data.frame(cereals[,4:16])
spec(cereals)
```

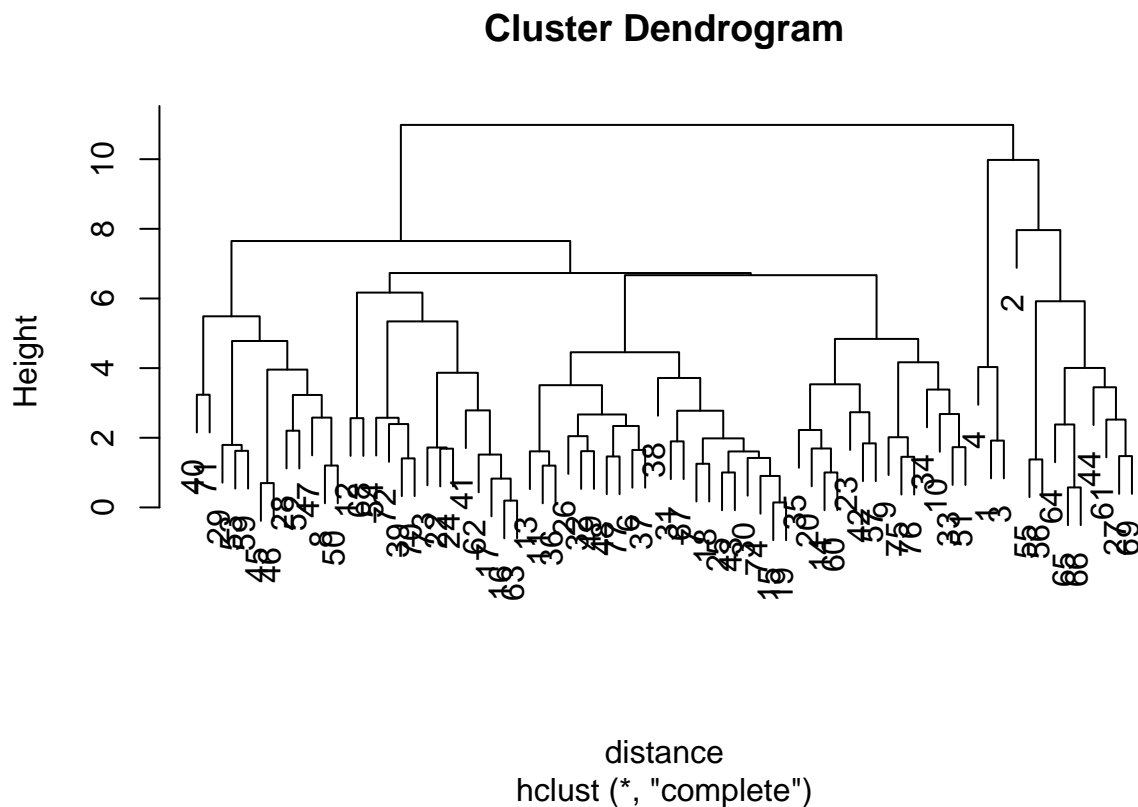
```
## cols(
##   name = col_character(),
##   mfr = col_character(),
##   type = col_character(),
##   calories = col_double(),
##   protein = col_double(),
##   fat = col_double(),
##   sodium = col_double(),
##   fiber = col_double(),
##   carbo = col_double(),
##   sugars = col_double(),
##   potass = col_double(),
##   vitamins = col_double(),
##   shelf = col_double(),
##   weight = col_double(),
##   cups = col_double(),
##   rating = col_double()
## )
```

```
#Data preprocessing - Normalize the measurements to ensure that variables with different scales do not d
missing = na.omit(numericaldata)
```

```
#normalizing and scaling the data
normalise = scale(missing)
```

```
#measuring the distance using the euclidian distance and computing the dissimilarity matrix
distance = dist(normalise, method = "euclidian")
```

```
#Hierarchical clustering is a method of cluster analysis which seeks to build a hierarchy of clusters.p
hierarchial_clustering = hclust(distance,method = "complete")
plot(hierarchial_clustering)
```



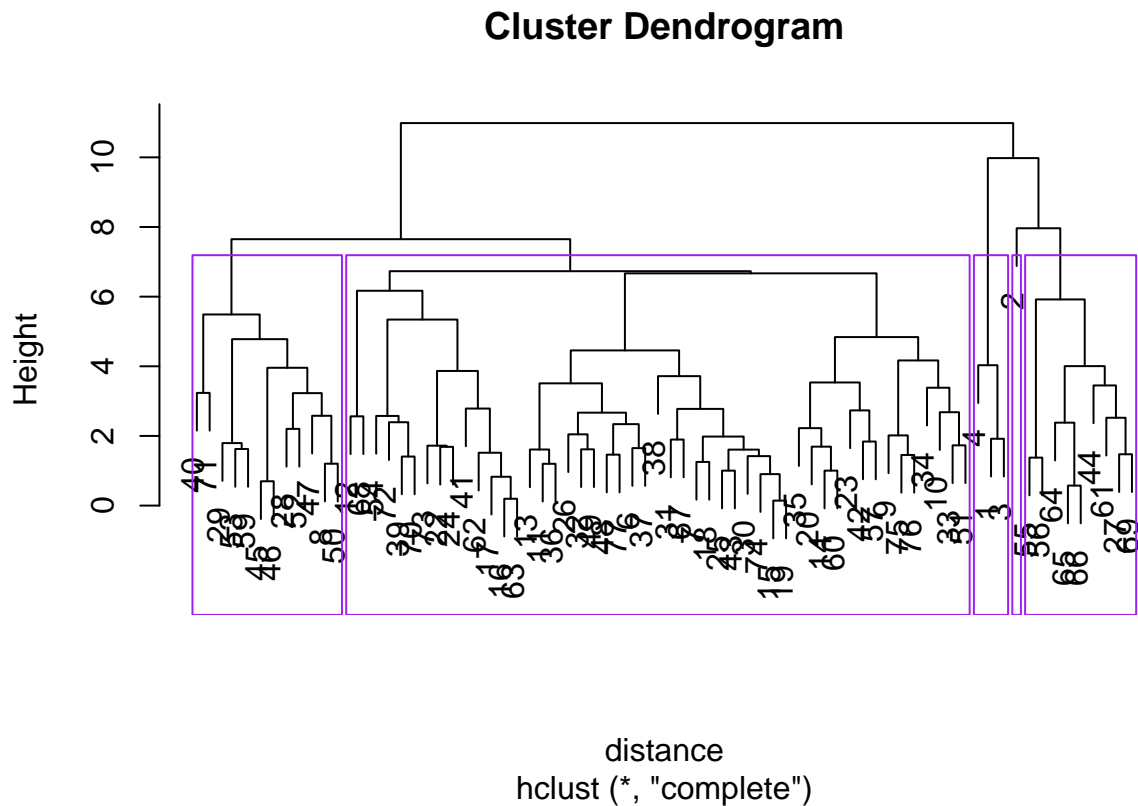
```
#rounding off the decimals
round(hierarchial_clustering$height, 5)
```

```
## [1] 0.14315 0.19616 0.57455 0.69797 0.82806 0.90354 1.00349 1.00405
## [9] 1.20088 1.20325 1.25377 1.37772 1.40832 1.42074 1.45357 1.46326
## [17] 1.47393 1.51732 1.60758 1.61061 1.61576 1.62451 1.65040 1.68700
## [25] 1.69233 1.72023 1.73046 1.79488 1.83892 1.89651 1.91874 1.98210
## [33] 2.01539 2.04628 2.20301 2.22359 2.33886 2.38139 2.39401 2.52225
## [41] 2.56304 2.57436 2.57921 2.66832 2.68196 2.73397 2.77641 2.78680
## [49] 3.22925 3.23622 3.38498 3.45069 3.51004 3.53516 3.71686 3.86639
## [57] 3.95737 4.00466 4.03105 4.16760 4.45568 4.77888 4.83870 5.34168
```

```
## [65] 5.48793 5.91994 6.16858 6.66865 6.73123 7.64963 7.96381 9.97867
## [73] 10.98389
```

#Look at the dendrogram plot and observe where the blue rectangles are drawn. Each rectangle correspond

```
plot(hierarchical_clustering)
rect.hclust(hierarchical_clustering,k = 5, border = "purple")
```



#Agglomerative hierarchical clustering, facilitated by the agnes function in R's cluster package, entails

```
# Data matrix, data frame, or dissimilarity matrix
# Metric for calculating dissimilarities: "euclidean" or "manhattan"
# Standardize measurements if TRUE
# Clustering method: "average", "single", "complete", "ward"
```

```
#performing clustering using AGNES
HCsingle = agnes(normalise, method = "single")
HCcomplete = agnes(normalise, method = "complete")
HCaverage = agnes(normalise, method = "average")
HCward = agnes(normalise, method = "ward")
```

```
#performing clustering using AGNES
HCsingle = agnes(normalise, method = "single")
HCcomplete = agnes(normalise, method = "complete")
```

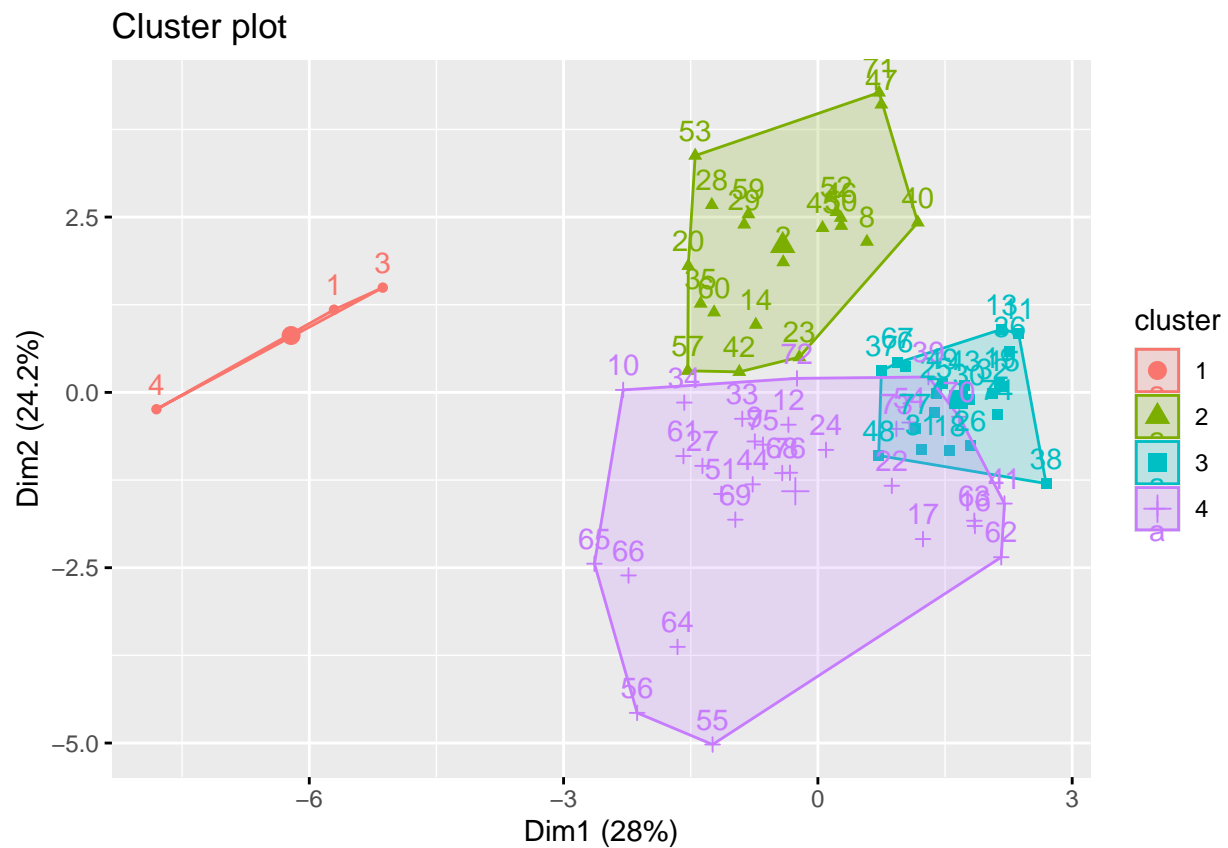
```
HCaverage = agnes(normalise, method = "average")
HCward = agnes(normalise, method = "ward")
```

```
#using the ward method for hierarchical clustering and Ward's method minimizes the variance within each
HC1 <- hclust(distance, method = "ward.D2" )
subgrp <- cutree(HC1, k = 4)
table(subgrp)
```

```
## subgrp
## 1 2 3 4
## 3 20 21 30
```

```
cereals <- as.data.frame(cbind(normalise,subgrp))
```

```
#It is used for visualizing clustering results obtained from various clustering algorithms. visualising
fviz_cluster(list(data = normalise, cluster = subgrp))
```



```
#choosing the healthy cereal cluster
data <- cereals
data_omit <- na.omit(data)
Clust <- cbind(data_omit, subgrp)
Clust[Clust$subgrp==1,]
```

```
## calories protein fat sodium fiber carbo sugars
```

```
## 1 -1.865915 1.381748 0.0000000 -0.3910227 3.228667 -2.500140 -0.2542051
## 3 -1.865915 1.381748 0.0000000 1.1795987 2.816023 -1.986222 -0.4836096
## 4 -2.873782 1.381748 -0.9932203 -0.2702057 4.879247 -1.729263 -1.6306324
##      potass      vitamins      shelf      weight      cups      rating subgrp subgrp
## 1 2.560523 -0.1818422 0.9419715 -0.2008324 -2.085658 1.854904      1      1
## 3 3.124867 -0.1818422 0.9419715 -0.2008324 -2.085658 1.215196      1      1
## 4 3.265954 -0.1818422 0.9419715 -0.2008324 -1.364449 3.657844      1      1
```

```
Clust[Clust$subgrp==2,]
```

```
##      calories      protein      fat      sodium      fiber      carbo
## 2  0.6537514  0.4522084  3.9728810 -1.78041856 -0.07249167 -1.72926320
## 8  1.1576848  0.4522084  0.9932203  0.57551356 -0.07249167  0.84032469
## 14 0.1498180  0.4522084  0.9932203 -0.27020566 -0.07249167 -0.44446926
## 20 0.1498180  0.4522084  1.9864405 -0.27020566  0.75279812 -1.21534562
## 23 -0.3541153 -0.4773310  0.0000000 -0.27020566 -0.07249167 -0.95838683
## 28 0.6537514  0.4522084  0.9932203 -0.02857160  1.16544301 -0.70142805
## 29 0.6537514  0.4522084 -0.9932203  0.93796466  1.16544301 -0.18751047
## 35 0.6537514  0.4522084  1.9864405 -1.05551637  0.34015322 -0.44446926
## 40 1.6616182  0.4522084  0.0000000  0.09224544 -0.07249167  1.35424227
## 42 -0.3541153  1.3817478  0.9932203 -0.14938863 -0.07249167 -0.70142805
## 45 2.1655516  1.3817478  1.9864405 -0.81388230  0.34015322  0.32640711
## 46 2.1655516  1.3817478  1.9864405 -0.14938863  0.34015322  0.32640711
## 47 2.6694849  0.4522084  0.9932203 -0.14938863  0.34015322  0.58336590
## 50 1.6616182  0.4522084  0.9932203  0.69633060  0.34015322  1.61120105
## 52 1.1576848  0.4522084  0.9932203  0.09224544 -0.27881412 -0.31598986
## 53 0.6537514  0.4522084  0.0000000  0.45469653  1.57808790 -0.95838683
## 57 -0.3541153  1.3817478  0.0000000 -0.33061417 -0.07249167 -0.18751047
## 59 0.6537514  0.4522084  0.0000000  0.57551356  1.16544301 -0.18751047
## 60 -0.3541153  0.4522084  0.9932203 -0.27020566  0.13383078 -1.08686623
## 71 1.6616182  0.4522084  0.0000000  0.33387950  0.75279812  0.06944832
##      sugars      potass      vitamins      shelf      weight      cups
## 2  0.20460407  0.51477378 -1.3032024  0.9419715 -0.2008324  0.7567534
## 8  0.20460407  0.02097226 -0.1818422  0.9419715  1.9501886 -0.3038480
## 14 -0.02480049  0.09151534 -0.1818422  0.9419715 -0.2008324 -1.3644493
## 20 -0.02480049  0.86748914 -0.1818422  0.9419715 -0.2008324 -1.3644493
## 23 0.66341318  0.30314456 -0.1818422  0.9419715 -0.2008324 -0.3038480
## 28 0.66341318  1.43183372 -0.1818422  0.9419715  1.4287290 -0.6432404
## 29 1.12222230  1.29074758 -0.1818422  0.9419715  1.9501886 -0.6432404
## 35 -0.71301417  0.02097226 -0.1818422  0.9419715 -0.2008324 -2.0856582
## 40 0.43400862 -0.04957081  3.1822385  0.9419715  1.7546413 -0.3038480
## 42 -0.25420505 -0.04957081 -0.1818422 -0.2598542 -0.2008324 -0.6432404
## 45 0.89281774  1.00857529 -0.1818422  0.9419715 -0.2008324  0.7567534
## 46 0.89281774  1.00857529 -0.1818422  0.9419715 -0.2008324  0.7567534
## 47 1.35162686  0.86748914 -0.1818422  0.9419715  3.0582904 -0.6432404
## 50 -0.02480049  0.44423070 -0.1818422  0.9419715  1.9501886 -0.6432404
## 52 0.66341318  0.30314456 -0.1818422  0.9419715  1.4287290 -1.3644493
## 53 1.58103142  2.27835060 -0.1818422  0.9419715  1.9501886 -0.6432404
## 57 -0.25420505  0.16205841 -0.1818422  0.9419715 -0.2008324 -1.3644493
## 59 1.12222230  1.99617831 -0.1818422 -0.2598542  1.9501886 -0.3038480
## 60 0.20460407  0.58531685 -0.1818422  0.9419715 -0.2008324 -1.3644493
## 71 1.58103142  1.85509216  3.1822385  0.9419715  3.0582904  0.7567534
##      rating subgrp subgrp
## 2 -0.59771126      2      2
```

```
## 8 -0.38002951      2      2
## 14 -0.14048876      2      2
## 20 -0.13702824      2      2
## 23 -0.44147911      2      2
## 28 -0.10366038      2      2
## 29 -0.09664548      2      2
## 35  0.24511896      2      2
## 40 -0.42043579      2      2
## 42  0.21065609      2      2
## 45 -0.37302488      2      2
## 46 -0.58658904      2      2
## 47 -0.85924775      2      2
## 50 -0.11967375      2      2
## 52 -0.84945049      2      2
## 53 -0.32287913      2      2
## 57  0.50878106      2      2
## 59 -0.22179377      2      2
## 60 -0.19014120      2      2
## 71 -0.98185009      2      2
```

```
Clust[Clust$subgrp==3,]
```

```
##      calories  protein      fat      sodium      fiber      carbo
## 6  0.1498180 -0.4773310  0.9932203  0.2130625 -0.27881412 -1.08686623
## 7  0.1498180 -0.4773310 -0.9932203 -0.4514312 -0.48513656 -0.95838683
## 11 0.6537514 -1.4068705  0.9932203  0.6963306 -0.89778146 -0.70142805
## 13 0.6537514 -1.4068705  1.9864405  0.5755136 -0.89778146 -0.44446926
## 15 0.1498180 -1.4068705  0.0000000  0.2130625 -0.89778146 -0.70142805
## 18 0.1498180 -1.4068705 -0.9932203 -0.8742908 -0.48513656 -0.44446926
## 19 0.1498180 -1.4068705  0.0000000  0.2130625 -0.89778146 -0.70142805
## 25 0.1498180 -0.4773310  0.0000000 -0.4514312 -0.48513656 -0.95838683
## 26 0.1498180 -1.4068705 -0.9932203  0.4546965 -0.48513656 -0.18751047
## 30 0.1498180 -1.4068705  0.0000000 -0.3306142 -0.89778146 -0.44446926
## 31 -0.3541153 -0.4773310 -0.9932203 -1.4179675 -0.89778146 -0.95838683
## 32 0.1498180 -1.4068705  0.0000000  1.4212328 -0.89778146  0.06944832
## 36 0.6537514 -1.4068705  0.9932203  0.6963306 -0.48513656 -0.70142805
## 37 0.1498180  0.4522084  0.0000000  1.0587817 -0.27881412 -0.82990744
## 38 0.1498180 -1.4068705 -0.9932203  0.2130625 -0.89778146 -0.18751047
## 43 0.1498180 -0.4773310  0.0000000  0.2130625 -0.89778146 -0.70142805
## 48 -0.3541153 -0.4773310  0.0000000  0.6963306 -0.07249167  0.06944832
## 49 0.6537514 -0.4773310  0.0000000  0.3338795 -0.89778146  0.06944832
## 67 0.1498180 -0.4773310  0.0000000 -1.1159249 -0.48513656 -1.47230441
## 74 0.1498180 -1.4068705  0.0000000 -0.2702057 -0.89778146 -0.44446926
## 77 0.1498180 -0.4773310  0.0000000  0.4546965 -0.48513656  0.32640711
##      sugars  potass  vitamins      shelf      weight      cups      rating
## 6  0.6634132 -0.4022862 -0.1818422 -1.4616799 -0.2008324 -0.3038480 -0.9165248
## 7  1.5810314 -0.9666308 -0.1818422 -0.2598542 -0.2008324  0.7567534 -0.6553998
## 11 1.1222223 -0.8960877 -0.1818422 -0.2598542 -0.2008324 -0.3038480 -1.7336066
## 13 0.4340086 -0.7550015 -0.1818422 -0.2598542 -0.2008324 -0.3038480 -1.6067177
## 15 1.3516269 -0.6139154 -0.1818422 -0.2598542 -0.2008324  0.7567534 -1.3991551
## 18 1.1222223 -1.1077169 -0.1818422 -0.2598542 -0.2008324  0.7567534 -0.4695120
## 19 1.3516269 -0.4728292 -0.1818422 -0.2598542 -0.2008324  0.7567534 -1.4233777
## 25 1.3516269 -0.9666308 -0.1818422 -0.2598542 -0.2008324  0.7567534 -0.7242706
## 26 0.8928177 -1.0371738 -0.1818422 -1.4616799 -0.2008324 -0.3038480 -0.7792531
```

```

## 30  1.1222223 -1.0371738 -0.1818422 -0.2598542 -0.2008324 -0.3038480 -1.0222542
## 31  1.8104360 -0.8255446 -0.1818422 -1.4616799 -0.2008324  0.2476647 -0.5073029
## 32  0.4340086 -0.7550015 -0.1818422 -0.2598542 -0.2008324 -0.3038480 -1.3230814
## 36  0.8928177 -0.7550015 -0.1818422 -0.2598542 -0.2008324  0.7567534 -1.4608034
## 37  0.6634132 -0.1201139 -0.1818422 -1.4616799 -0.2008324 -0.3038480 -0.8051733
## 38  0.8928177 -0.8960877 -0.1818422 -1.4616799 -0.2008324  2.1567472 -0.9711880
## 43  1.1222223 -0.6139154 -0.1818422 -0.2598542 -0.2008324  0.7567534 -1.1142648
## 48 -0.2542051 -0.1201139 -0.1818422 -1.4616799 -0.2008324  0.7567534 -0.1614556
## 49  0.4340086 -0.8255446 -0.1818422 -0.2598542 -0.2008324 -0.6432404 -0.8869714
## 67  1.8104360 -0.8255446 -0.1818422 -0.2598542 -0.2008324 -0.3038480 -0.7939263
## 74  1.1222223 -1.0371738 -0.1818422 -0.2598542 -0.2008324  0.7567534 -1.0416692
## 77  0.2046041 -0.5433723 -0.1818422 -1.4616799 -0.2008324 -0.3038480 -0.4406694
##      subgrp subgrp
## 6         3      3
## 7         3      3
## 11        3      3
## 13        3      3
## 15        3      3
## 18        3      3
## 19        3      3
## 25        3      3
## 26        3      3
## 30        3      3
## 31        3      3
## 32        3      3
## 36        3      3
## 37        3      3
## 38        3      3
## 43        3      3
## 48        3      3
## 49        3      3
## 67        3      3
## 74        3      3
## 77        3      3

```

```
Clust[Clust$subgrp==4,]
```

```

##      calories  protein      fat      sodium      fiber      carbo
## 9 -0.8580487 -0.4773310  0.0000000  0.45469653  0.75279812  0.06944832
## 10 -0.8580487  0.4522084 -0.9932203  0.57551356  1.16544301 -0.44446926
## 12  0.1498180  3.2408266  0.9932203  1.54204982 -0.07249167  0.58336590
## 16  0.1498180 -0.4773310 -0.9932203  1.42123279 -0.89778146  1.86815984
## 17 -0.3541153 -0.4773310 -0.9932203  1.54204982 -0.48513656  1.61120105
## 22  0.1498180 -0.4773310 -0.9932203  0.69633060 -0.48513656  1.61120105
## 24 -0.3541153 -0.4773310 -0.9932203  0.33387950 -0.48513656  0.84032469
## 27 -0.3541153  0.4522084 -0.9932203 -1.96164410  0.34015322 -0.18751047
## 33 -0.3541153  0.4522084  0.0000000 -0.27020566  0.34015322  0.06944832
## 34  0.1498180  0.4522084 -0.9932203  0.09224544  0.34015322  0.58336590
## 39  0.1498180 -0.4773310  0.0000000  0.09224544 -0.48513656  0.58336590
## 41  0.1498180 -0.4773310  0.0000000  1.17959872 -0.89778146  1.61120105
## 44 -0.3541153  1.3817478  0.0000000 -1.96164410 -0.89778146  0.32640711
## 51 -0.8580487  0.4522084 -0.9932203  0.09224544  0.34015322  0.84032469
## 54 -0.3541153  0.4522084 -0.9932203  1.90450091 -0.48513656  1.35424227
## 55 -2.8737823 -1.4068705 -0.9932203 -1.96164410 -0.89778146 -0.44446926

```



```

## 56 -2.8737823 -0.4773310 -0.9932203 -1.96164410 -0.48513656 -1.21534562
## 61 -0.8580487 -0.4773310 -0.9932203 -1.96164410 -0.07249167 0.06944832
## 62 0.1498180 -1.4068705 -0.9932203 0.93796466 -0.89778146 2.12511863
## 63 0.1498180 -0.4773310 -0.9932203 1.54204982 -0.89778146 1.86815984
## 64 -1.3619821 -0.4773310 -0.9932203 -1.96164410 0.34015322 0.32640711
## 65 -0.8580487 0.4522084 -0.9932203 -1.96164410 0.75279812 1.09728348
## 66 -0.8580487 0.4522084 -0.9932203 -1.96164410 0.34015322 1.35424227
## 68 0.1498180 3.2408266 -0.9932203 0.81714763 -0.48513656 0.32640711
## 69 -0.8580487 -0.4773310 -0.9932203 -1.78041856 0.34015322 0.06944832
## 70 0.1498180 -0.4773310 0.0000000 0.45469653 -0.89778146 1.61120105
## 72 -0.3541153 0.4522084 0.0000000 0.45469653 0.34015322 0.32640711
## 73 0.1498180 -0.4773310 0.0000000 1.05878169 -0.89778146 1.61120105
## 75 -0.3541153 0.4522084 0.0000000 0.81714763 0.34015322 0.58336590
## 76 -0.3541153 0.4522084 0.0000000 0.45469653 0.34015322 0.58336590
##          sugars      potass  vitamins    shelf    weight      cups
## 9  -0.25420505 0.37368763 -0.1818422 -1.4616799 -0.2008324 -0.64324039
## 10 -0.48360961 1.29074758 -0.1818422 0.9419715 -0.2008324 -0.64324039
## 12 -1.40122785 0.09151534 -0.1818422 -1.4616799 -0.2008324 1.81735475
## 16 -0.94241873 -1.03717383 -0.1818422 -1.4616799 -0.2008324 0.75675340
## 17 -1.17182329 -0.89608768 -0.1818422 -1.4616799 -0.2008324 0.75675340
## 22 -0.94241873 -0.96663076 -0.1818422 0.9419715 -0.2008324 0.75675340
## 24 -0.48360961 -0.26120003 -0.1818422 0.9419715 -0.2008324 -0.30384795
## 27 -0.02480049 0.02097226 -0.1818422 -0.2598542 -0.2008324 -0.09172768
## 33 -0.48360961 -0.19065695 -0.1818422 0.9419715 -0.2008324 0.24766475
## 34 -0.94241873 -0.12011388 -0.1818422 0.9419715 -0.2008324 -2.42505066
## 39 -0.25420505 -0.54337232 3.1822385 0.9419715 -0.2008324 0.75675340
## 41 -0.94241873 -0.82554461 -0.1818422 -0.2598542 -0.2008324 2.87795610
## 44 -0.94241873 -0.04957081 -0.1818422 -0.2598542 -0.2008324 0.75675340
## 51 -1.17182329 -0.12011388 -0.1818422 0.9419715 -0.2008324 0.75675340
## 54 -0.94241873 -0.75500154 3.1822385 0.9419715 -0.2008324 0.75675340
## 55 -1.63063240 -1.17825998 -1.3032024 0.9419715 -3.4599552 0.75675340
## 56 -1.63063240 -0.68445846 -1.3032024 0.9419715 -3.4599552 0.75675340
## 61 -0.25420505 0.16205841 -0.1818422 0.9419715 -0.2008324 -1.36444931
## 62 -1.17182329 -0.96663076 -0.1818422 -1.4616799 -0.2008324 1.30826610
## 63 -0.94241873 -0.89608768 -0.1818422 -1.4616799 -0.2008324 0.75675340
## 64 -1.63063240 -0.04957081 -1.3032024 -1.4616799 -1.3089342 0.75675340
## 65 -1.63063240 0.58531685 -1.3032024 -1.4616799 -0.2008324 -0.64324039
## 66 -1.63063240 0.30314456 -1.3032024 -1.4616799 -0.2008324 -0.64324039
## 68 -0.94241873 -0.61391539 -0.1818422 -1.4616799 -0.2008324 0.75675340
## 69 -0.48360961 -0.12011388 -0.1818422 -0.2598542 -0.2008324 0.75675340
## 70 -0.94241873 -0.89608768 3.1822385 0.9419715 -0.2008324 0.75675340
## 72 -0.94241873 0.16205841 3.1822385 0.9419715 -0.2008324 0.75675340
## 73 -0.94241873 -0.54337232 -0.1818422 0.9419715 -0.2008324 -0.30384795
## 75 -0.94241873 0.23260148 -0.1818422 -1.4616799 -0.2008324 -0.64324039
## 76 -0.94241873 0.16205841 -0.1818422 -1.4616799 -0.2008324 0.75675340
##          rating subgrp subgrp
## 9  0.48087533      4      4
## 10 0.77969576      4      4
## 12 0.59807496      4      4
## 16 -0.06603869      4      4
## 17 0.24879639      4      4
## 22 0.32235640      4      4
## 24 0.13959735      4      4
## 27 1.13821301      4      4

```

```
## 33 0.69155685      4      4
## 34 0.78377123      4      4
## 39 -0.41671824     4      4
## 41 -0.22308231     4      4
## 44 0.88922515      4      4
## 51 1.23068291      4      4
## 54 -0.06186866     4      4
## 55 1.31001152      4      4
## 56 1.47030646      4      4
## 61 0.92358705      4      4
## 62 -0.02656845     4      4
## 63 -0.12909114     4      4
## 64 1.84299757      4      4
## 65 2.28743193      4      4
## 66 2.16834997      4      4
## 68 0.76669214      4      4
## 69 1.21081332      4      4
## 70 -0.25168258     4      4
## 72 0.30548275      4      4
## 73 -0.23269772     4      4
## 75 0.52841741      4      4
## 76 0.65701831      4      4
```

```
#here we calculate the mean rating in order determine the healthy cluster cereals
mean(Clust[Clust$subgrp==1,"rating"])
```

```
## [1] 2.242648
```

```
mean(Clust[Clust$subgrp==2,"rating"])
```

```
## [1] -0.2928786
```

```
mean(Clust[Clust$subgrp==3,"rating"])
```

```
## [1] -0.9636465
```

```
mean(Clust[Clust$subgrp==4,"rating"])
```

```
## [1] 0.6455402
```