Assignment 5

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```
#loading all the required libraries

library(factoextra)
```

```
## Warning: package 'factoextra' was built under R version 4.2.2
```

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

```
## Warning: package 'ggplot2' was built under R version 4.2.2
```

```
## 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 4.2.2
```

```
##
## ---------------------
## Welcome to dendextend version 1.16.0
## 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)
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.2.2
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
```

```
## v tibble  3.1.8      v dplyr   1.0.10
## v tidyr   1.2.1      v stringr 1.4.1
## v readr   2.1.3      v forcats 0.5.2
## v purrr   0.3.5
```

```
## Warning: package 'readr' was built under R version 4.2.2
```

```
## Warning: package 'purrr' was built under R version 4.2.2
```

```
## Warning: package 'dplyr' was built under R version 4.2.2
```

```
## Warning: package 'forcats' was built under R version 4.2.2
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
#importing the data
cer= read_csv("C://Users//heere//Downloads//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(cer)
numericaldata = data.frame(cer[,4:16])
spec(cer)
```

```
## 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(),
```

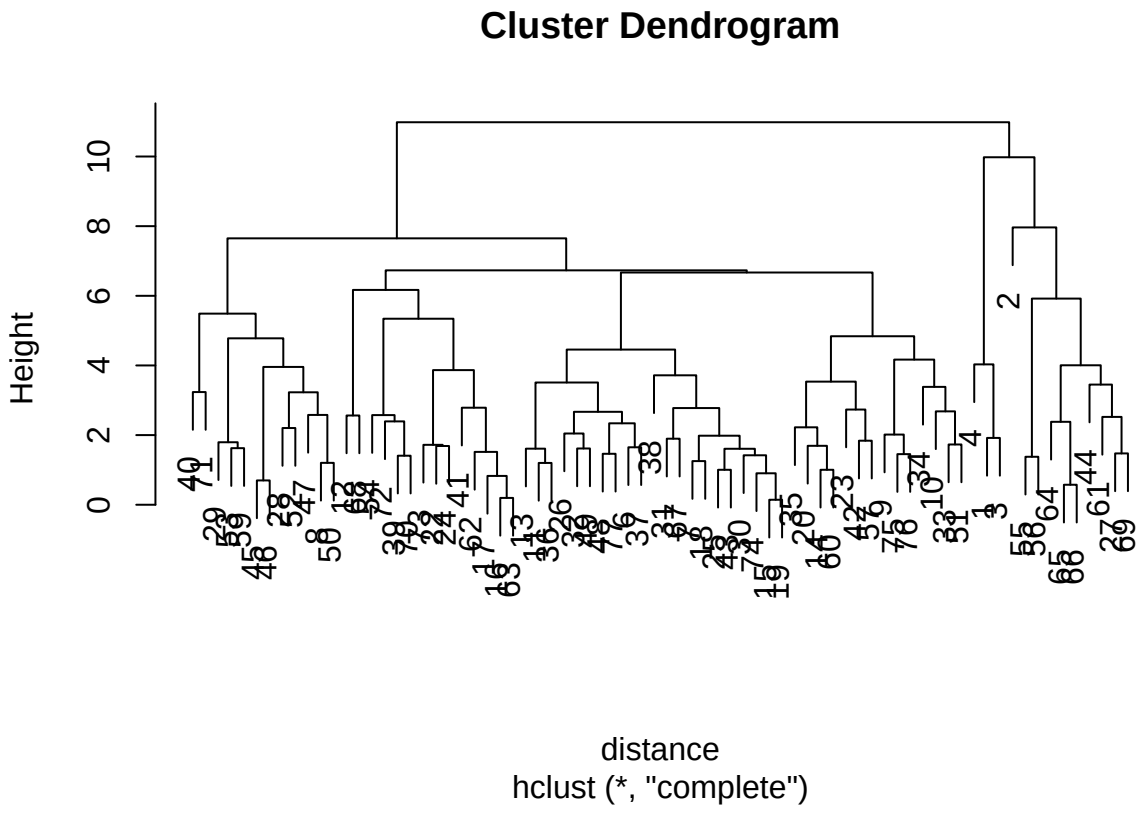
```
##   sugars = col_double(),
##   potass = col_double(),
##   vitamins = col_double(),
##   shelf = col_double(),
##   weight = col_double(),
##   cups = col_double(),
##   rating = col_double()
## )
```

```
#data prepocessing - removing all cereals with missing values
omitmissing = na.omit(numericaldata)
```

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

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

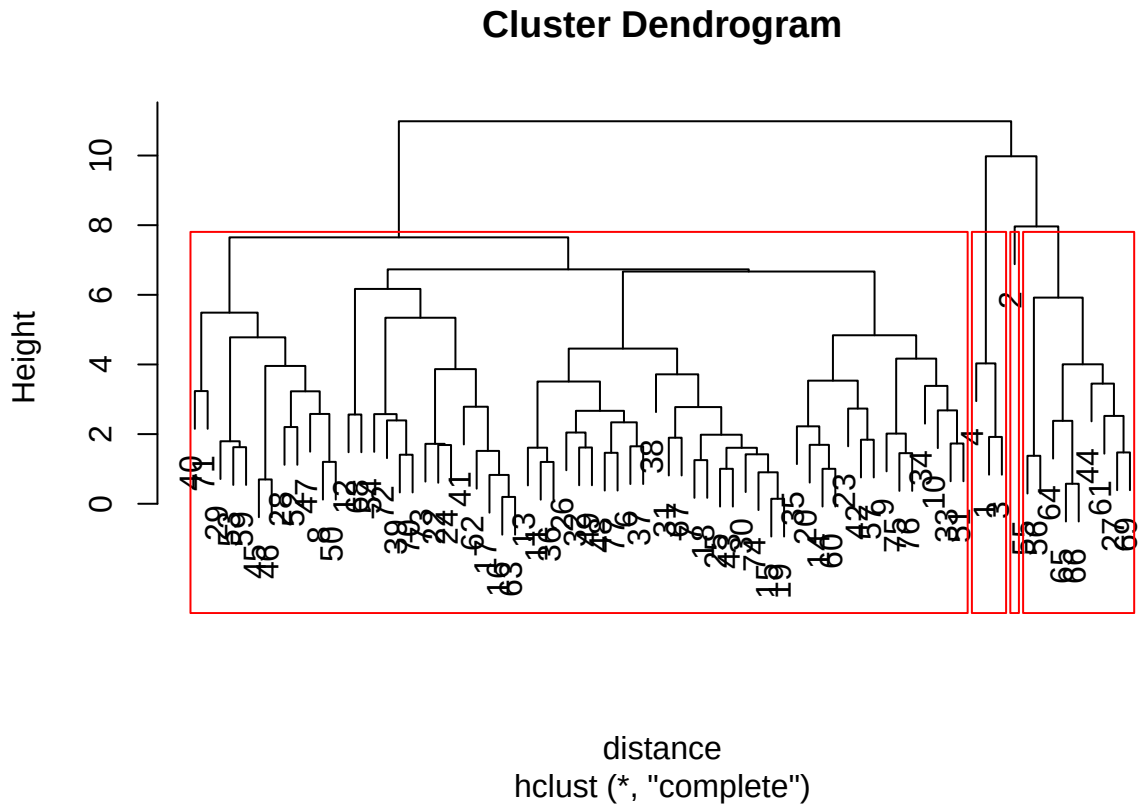
```
#performing hierarchial clustering using complete linkage and representing in plot
hierarchial_clustering = hclust(distance,method = "complete")
plot(hierarchial_clustering)
```




```
#rounding off the decimals
round(hierarchial_clustering$height, 4)
```

```
##  [1]  0.1432  0.1962  0.5745  0.6980  0.8281  0.9035  1.0035  1.0041  1.2009
## [10]  1.2033  1.2538  1.3777  1.4083  1.4207  1.4536  1.4633  1.4739  1.5173
## [19]  1.6076  1.6106  1.6158  1.6245  1.6504  1.6870  1.6923  1.7202  1.7305
## [28]  1.7949  1.8389  1.8965  1.9187  1.9821  2.0154  2.0463  2.2030  2.2236
## [37]  2.3389  2.3814  2.3940  2.5223  2.5630  2.5744  2.5792  2.6683  2.6820
## [46]  2.7340  2.7764  2.7868  3.2293  3.2362  3.3850  3.4507  3.5100  3.5352
## [55]  3.7169  3.8664  3.9574  4.0047  4.0311  4.1676  4.4557  4.7789  4.8387
## [64]  5.3417  5.4879  5.9199  6.1686  6.6687  6.7312  7.6496  7.9638  9.9787
## [73] 10.9839
```

```
#determining the optimla clusters and highlighting with colours
plot(hierarchial_clustering)
rect.hclust(hierarchial_clustering,k = 4, border = "red")
```




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

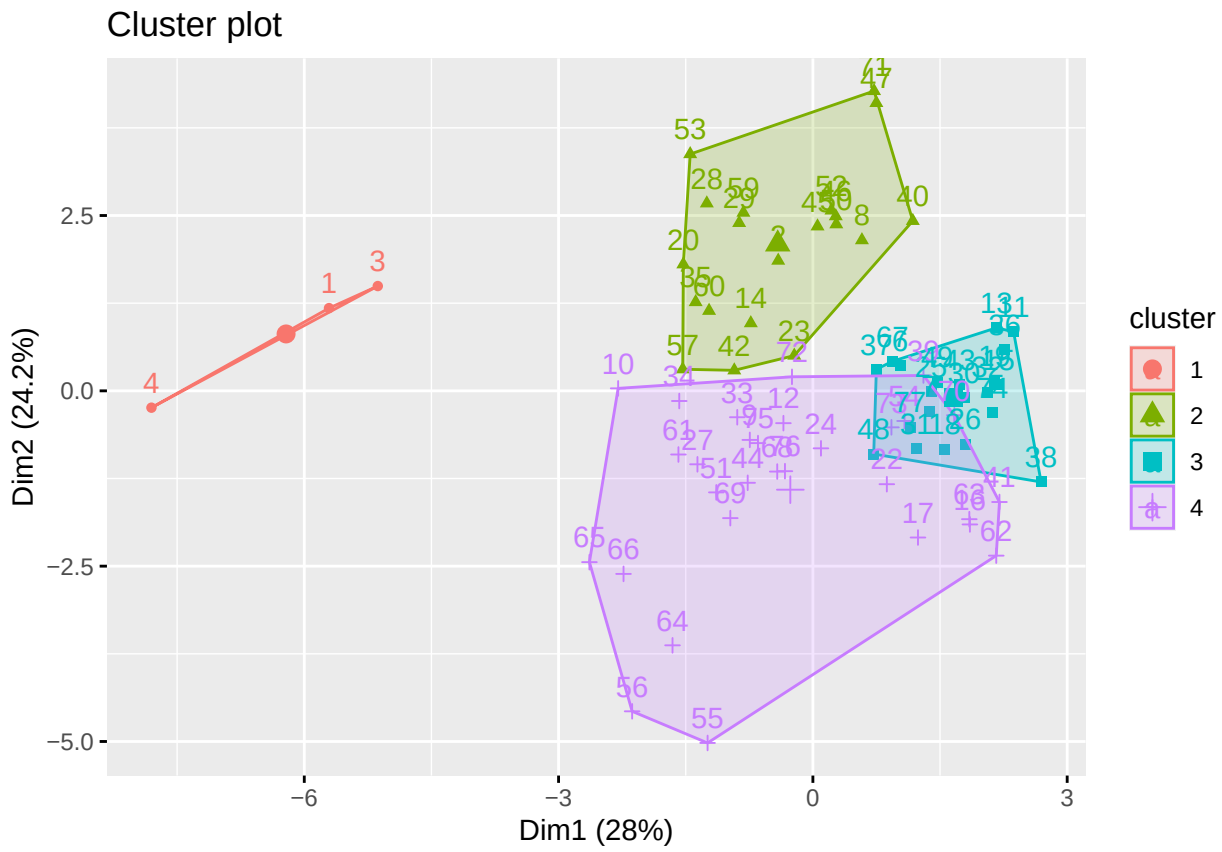
```
#performing clustering using AGNES
HCsingle = agnes(normalise, method = "single")
HCcomplete = agnes(normalise, method = "complete")
HCaverage = agnes(normalise, method = "average")
HCward = agnes(normalise, method = "ward")
```

```
#using the ward method for hierarchial clustering
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))
```

```
#visualising the results on scatterplot
fviz_cluster(list(data = normalise, cluster = subgrp))
```




```
#choosing the healthy cereal cluster
newdata <- cereals
newdata_omit <- na.omit(newdata)
Clust <- cbind(newdata_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
```

```
#From the above results it is clearly evident that mean rating is highest for subgroup 1.so, it is reco

#yes, we need to noemalize the data.
```