Importing libraries

```
library(stats)
library(dplyr)
```

```
##
## 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(ggplot2)
library(ggfortify)
library(cluster)
library(readr)
library(factoextra)
```

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

Load the dataset

```
data1 <- read.csv("Customersdata.csv")
```

Data Preprocessing

```
# Sub-setting of only numerical type of data columns from the data set
data <- data1 %>% select(Channel, Region, Age, Fresh, Milk, Grocery, Frozen, Detergents_Paper,
                         Delicatessen, Annual.Income..k..)
```

Preprocessed dataset

```
# Printing of the top 3 rows of preprocessed dataset
head(data, n=3)
```

```
##   Channel Region Age Fresh Milk Grocery Frozen Detergents_Paper Delicatessen
## 1       2      3  19 12669 9656    7561    214             2674         1338
## 2       2      3  21  7057 9810    9568   1762             3293         1776
## 3       2      3  20  6353 8808    7684   2405             3516         7844
##   Annual.Income..k..
## 1                 15
## 2                 15
## 3                 16
```

Setting seed

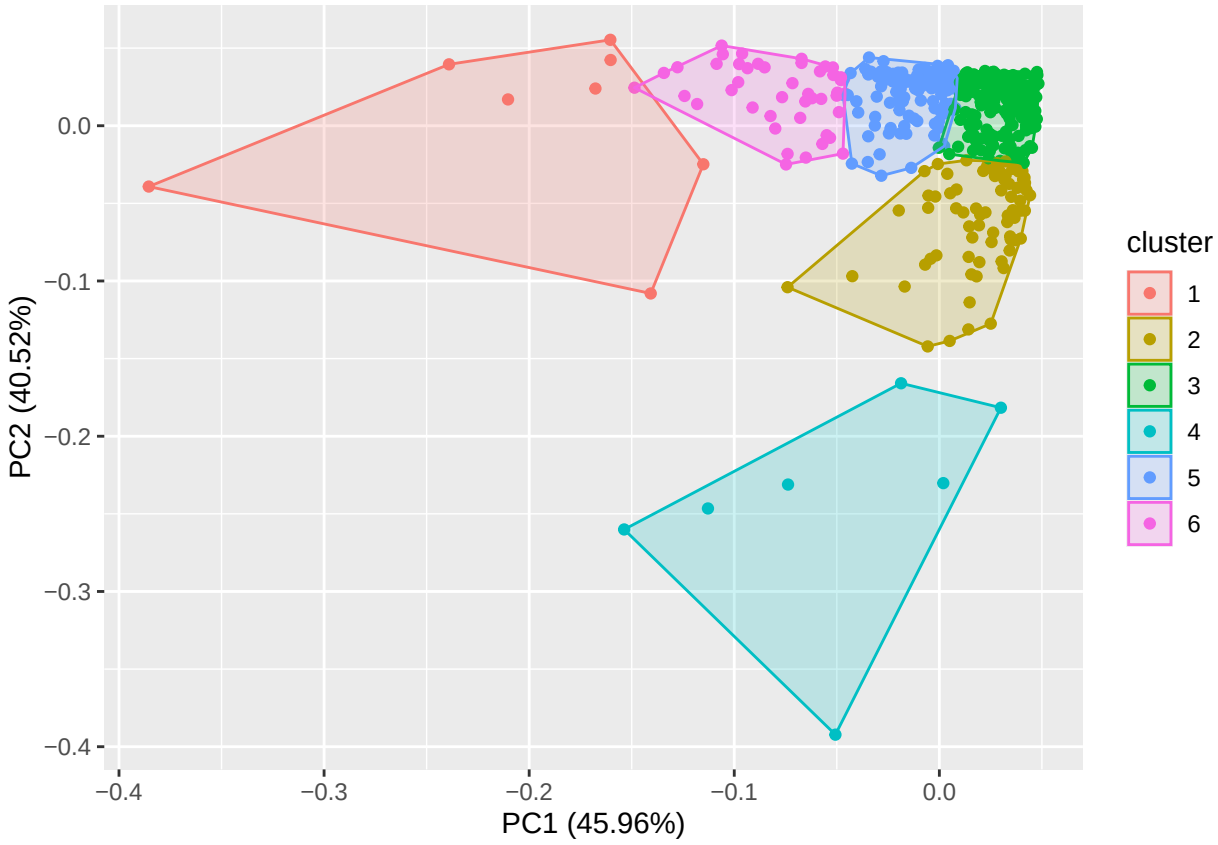
```
set.seed(1)# Setting seed 1 as a random number
```

Implementing of K Means Clustering Algorithm for clustering the customer

```
# Implementing K-means clustering with k=6
KMC = kmeans(data,6)
```

Plotting of K means clustering

```
# cluster plotting of K Means Clustering
autoplot(KMC,data,frame=TRUE)
```



Evaluation of K means clustering

```
#Evaluating K means clustering
eval(KMC)
```

```
## K-means clustering with 6 clusters of sizes 8, 73, 191, 7, 116, 45
##
## Cluster means:
##    Channel   Region      Age     Fresh      Milk   Grocery    Frozen
## 1 1.000000 2.625000 34.87500 61903.375 13358.375 10448.375 21728.750
## 2 1.917808 2.506849 38.98630  5125.548 12509.986 19326.548  1610.630
## 3 1.188482 2.518325 40.38743  4690.660  3552.749  4390.602  2266.361
## 4 2.000000 2.571429 35.00000 20031.286 38084.000 56126.143  2564.571
## 5 1.224138 2.568966 38.02586 16177.138  3123.224  4480.181  3620.595
## 6 1.133333 2.622222 38.13333 33290.133  4951.200  5621.067  4209.511
##   Detergents_Paper Delicatessen Annual.Income..k..
```

```
## 1        1301.2500     9270.125           79.12500
## 2        8443.1233     1893.945           66.75342
## 3        1454.4188     1000.686           67.53403
## 4       27644.5714     2548.143           50.42857
## 5        1093.0690     1402.250           65.66379
## 6         955.4889     1931.000           68.24444
##
## Clustering vector:
##   [1] 5 3 3 5 5 3 5 3 3 2 3 5 6 5 6 3 2 3 5 3 5 3 6 2 5 5 3 5 2 6 5 3 5 6 3 3 6
##  [38] 5 2 1 5 5 2 2 3 2 2 4 5 2 3 3 6 2 6 3 2 2 5 3 3 4 3 2 3 4 3 5 3 3 5 5 3 5
##  [75] 3 5 3 2 5 3 3 2 3 5 5 4 4 6 3 6 5 5 2 5 2 3 3 3 3 3 2 2 3 1 5 5 3 2 3 2 5
## [112] 2 5 5 5 5 5 3 5 3 5 3 5 5 6 1 5 5 3 6 3 3 5 3 3 3 3 3 5 3 5 6 6 5 5 2 3 3
## [149] 3 6 5 3 5 3 3 2 2 5 3 2 3 5 5 2 3 2 3 3 3 3 2 2 3 2 3 3 6 5 5 3 5 1 3 1 3
## [186] 3 3 3 2 2 5 5 3 2 3 5 6 3 5 3 2 2 6 3 3 2 3 3 3 2 5 4 3 3 3 2 2 5 2 3 5 3
## [223] 3 3 3 5 5 3 3 3 5 3 6 3 5 3 3 5 3 6 5 5 5 5 3 2 3 5 5 3 3 2 3 6 3 6 5 3 1
## [260] 6 3 3 5 3 2 2 2 5 2 5 3 3 3 6 3 3 6 5 5 5 3 5 6 6 1 6 3 5 5 6 3 3 3 2 5 3
## [297] 5 3 3 3 5 2 3 2 2 3 2 5 3 2 3 6 2 3 5 2 3 3 5 2 3 3 5 5 6 1 3 3 5 3 3 2 5
## [334] 4 5 6 5 3 3 3 3 3 3 2 3 3 2 6 3 2 3 2 3 2 5 3 5 2 3 3 5 3 3 3 3 3 3 3 5 3
## [371] 6 5 3 5 3 3 2 6 3 3 6 5 6 3 2 5 3 5 3 3 3 3 3 5 5 3 3 5 5 3 3 6 6 6 5 3 6
## [408] 2 3 3 3 3 3 3 3 3 2 3 2 3 2 5 6 5 5 5 2 6 3 3 2 3 5 3 5 6 6 2 3 3
##
## Within cluster sum of squares by cluster:
## [1] 10554334457  9683507670  7871670684  7469350496  6714463792  4964597655
##  (between_SS / total_SS =  70.0 %)
##
## Available components:
##
## [1] "cluster"      "centers"      "totss"        "withinss"     "tot.withinss"
## [6] "betweenss"    "size"         "iter"         "ifault"
```

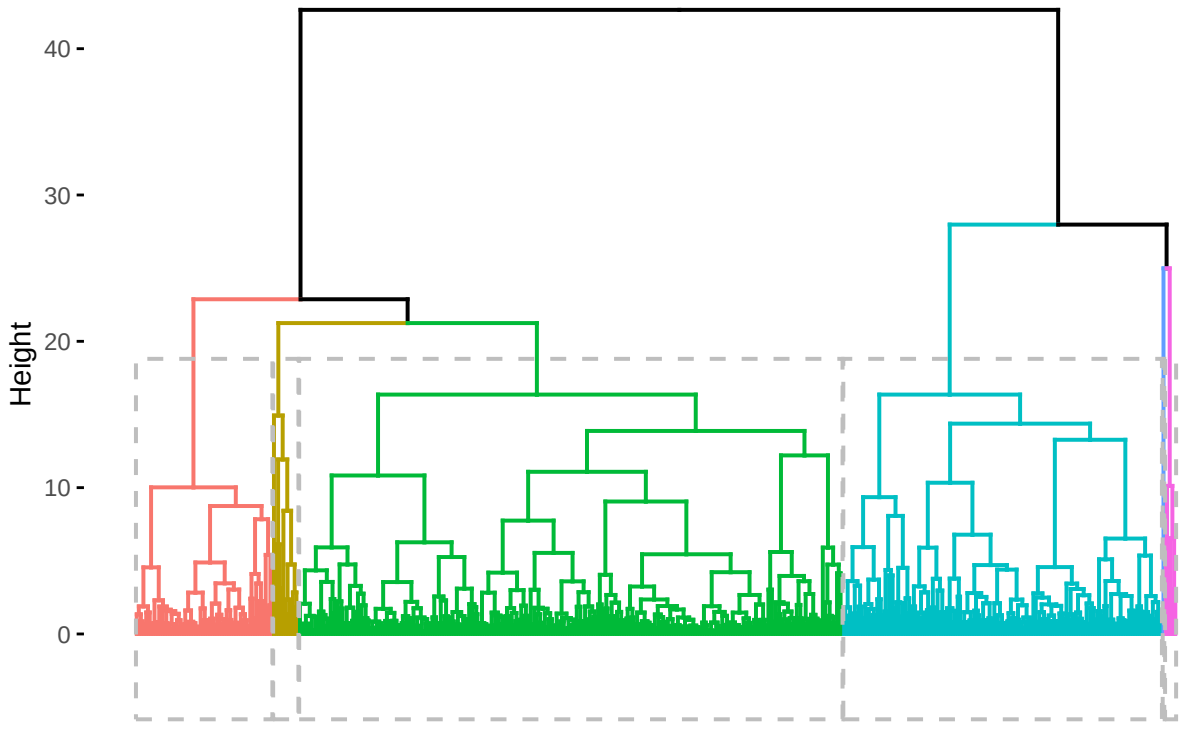
Implementing of Hierarchical Clustering Algorithm

```
# Implementing of hierarchical clustering in proprocessed dataset
hcluster <- hcut(data, k = 6, stand = TRUE)
```

Plotting of hierarchical clustering using a dendogram

```
# Plotting for the hierarchical clustering
fviz_dend(hcluster, show_labels = FALSE, rect = TRUE, cex =0.5)
```

```
## Warning: The `<scale>` argument of `guides()` cannot be `FALSE`. Use "none" instead as
## of ggplot2 3.3.4.
## i The deprecated feature was likely used in the factoextra package.
##   Please report the issue at <https://github.com/kassambara/factoextra/issues>.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```



Evaluation of Hierarchical clustering

```
#Evaluating Hierarchical clustering
eval(hcluster)
```

```
##
## Call:
## stats::hclust(d = x, method = hc_method)
##
## Cluster method   : ward.D2
## Distance         : euclidean
## Number of objects: 440
```