R for Marketing - Market Basket Analysis

This R code book written by Rohit Dhankar . GitHub - https://github.com/RohitDhankar

Code and Data > Rohit Dhankar-GITHUB

The dataset is Copyrighted by -

Brijs T., Swinnen G., Vanhoof K., and Wets G. (1999), The use of association rules for prod- uct assortment decisions: a case study, in: Proceedings of the Fifth International Conference on Knowledge Discovery and Data Mining, San Diego (USA), August 15-18, pp. 254-260. ISBN: 1-58113-143-7.

R for Marketing - Market Basket Analysis

```
# Getting the Retail Sales Data -- http://fimi.ua.ac.be/data/retail.pdf
# Data can also be taken from -- http://r-marketing.r-forge.r-project.org
# Also at -- http://www.cis.hut.fi/Opinnot/T-61.5060/2005/t615060-l-2005-09-29-b.pdf


# Set Seed -- ensure reproducible results

set.seed(123)

require(arules) # Mining Association Rules and Frequent Itemsets
```

```
## Loading required package: arules
```

```
## Loading required package: Matrix
```

```
##
## Attaching package: 'arules'
```

```
## The following objects are masked from 'package:base':
##
##     abbreviate, write
```

```
#fileURL <- "http://fimi.ua.ac.be/data/retail.dat.gz"
#download.file(fileURL, destfile="retail.data.gz", method="curl")
# Read the data in basket format
transaction_data = read.transactions("retail.data.gz", format = "basket", sep=" ");
#
# The Structure of the Data
str(transaction_data)
```

```
## Formal class 'transactions' [package "arules"] with 3 slots
##   ..@ data       :Formal class 'ngCMatrix' [package "Matrix"] with 5 slots
##   .. .. ..@ i       : int [1:908576] 0 1 2 1113 2224 3335 4446 5557 6668 7249 ...
##   .. .. ..@ p       : int [1:88163] 0 30 33 36 47 51 64 70 73 79 ...
##   .. .. ..@ Dim     : int [1:2] 16470 88162
##   .. .. ..@ Dimnames:List of 2
##   .. .. .. ..$ : NULL
##   .. .. .. ..$ : NULL
##   .. .. ..@ factors : list()
##   ..@ itemInfo   :'data.frame':  16470 obs. of  1 variable:
```

```
##   .. ..$ labels: chr [1:16470] "0" "1" "10" "100" ...
##   ..@ itemsetInfo:'data.frame':  0 obs. of  0 variables
```

```
##
# Highlighted for focus ---
# .. .. ..@ i
# : int [1:908576] 0 1 2 1113 2224 3335 4446 5557 6668 7249 ...
# ##
# .. .. ..@ p
# : int [1:88163] 0 30 33 36 47 51 64 70 73 79 ...
# ##
# .. .. ..@ Dim
# : int [1:2] 16470 88162
#
# The Summary of the Data
summary(transaction_data)
```

```
## transactions as itemMatrix in sparse format with
##  88162 rows (elements/itemsets/transactions) and
##  16470 columns (items) and a density of 0.0006257289
##
## most frequent items:
##      39      48      38      32      41 (Other)
##   50675   42135   15596   15167   14945  770058
##
## element (itemset/transaction) length distribution:
## sizes
##    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
## 3016 5516 6919 7210 6814 6163 5746 5143 4660 4086 3751 3285 2866 2620 2310
##   16   17   18   19   20   21   22   23   24   25   26   27   28   29   30
## 2115 1874 1645 1469 1290 1205  981  887  819  684  586  582  472  480  355
##   31   32   33   34   35   36   37   38   39   40   41   42   43   44   45
##  310  303  272  234  194  136  153  123  115  112   76   66   71   60   50
##   46   47   48   49   50   51   52   53   54   55   56   57   58   59   60
##   44   37   37   33   22   24   21   21   10   11   10    9   11    4    9
##   61   62   63   64   65   66   67   68   71   73   74   76
##    7    4    5    2    2    5    3    3    1    1    1    1
##
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00    4.00    8.00   10.31   14.00   76.00
##
## includes extended item information - examples:
##   labels
## 1      0
## 2      1
## 3     10
```

Data Summary

1. Each ROW or Obs of the data is - 1 - Market Basket.

2. Each Market Basket has many different purchase items.

3. There are - 88,162 ROWS.

4. Each ROW mostly has different no. of purchase items.

```
# Using Function - readLines() from BASE
#
transaction_data1<- readLines("~/Desktop/R_Own/R_Marketing/Mkt_DATA_Files/retail.dat")
#write.csv(transaction_data1, file = "~/Desktop/R_Own/R_Marketing/Mkt_DATA_Files/transaction_data1.csv"
# We could get a CSV at this stage but not sure if the CSV
# will capture the WHITESPACE " ".



#
```

```
# Read the HEAD  end of the Data
#
head(transaction_data1)
```

```
## [1] "0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 "
## [2] "30 31 32 "
## [3] "33 34 35 "
## [4] "36 37 38 39 40 41 42 43 44 45 46 "
## [5] "38 39 47 48 "
## [6] "38 39 48 49 50 51 52 53 54 55 56 57 58 "
```

```
#
```

```
# Read Only the 5th MARKET BASKET and see how many ITEMS in it and WHICH ALL Items ?
#
head(transaction_data1[5])
```

```
## [1] "38 39 47 48 "
```

```
# Read TAIL end of the Data
#
tail(transaction_data1)
```

```
## [1] "48 201 255 278 407 479 767 824 986 1395 1598 2022 2283 2375 6725 13334 14006 14099 "
## [2] "39 875 2665 2962 12959 14070 14406 15518 16379 "
## [3] "39 41 101 346 393 413 479 522 586 635 695 799 1466 1786 1994 2449 2830 3035 3591 3722 6217 1149
## [4] "2310 4267 "
## [5] "39 48 2528 "
## [6] "32 39 205 242 1393 "
```

We can now create a DATA STRUCTURE with LABELS for each,
Market basket. Each Market Basket is also called a - TRANSACTION.

To create LABELS or ROW Names we need a NAMES Vector.
Lets create a ROW_Labels Vector.

```
# Code for ROW_Labels vector
#
ROW_Labels <- paste("Market_basket_",1:length(transaction_data1),sep="")
#
typeof(ROW_Labels)
```

```
## [1] "character"
```

```
#
class(ROW_Labels)
```

```
## [1] "character"
```

```
#
ROW_Labels[1:20] # Prints initial 20 LABELS
```

```
##  [1] "Market_basket_1"  "Market_basket_2"  "Market_basket_3"
##  [4] "Market_basket_4"  "Market_basket_5"  "Market_basket_6"
##  [7] "Market_basket_7"  "Market_basket_8"  "Market_basket_9"
## [10] "Market_basket_10" "Market_basket_11" "Market_basket_12"
## [13] "Market_basket_13" "Market_basket_14" "Market_basket_15"
## [16] "Market_basket_16" "Market_basket_17" "Market_basket_18"
## [19] "Market_basket_19" "Market_basket_20"
```

```
#
tail(ROW_Labels) # Market_basket_88162"
```

```
## [1] "Market_basket_88157" "Market_basket_88158" "Market_basket_88159"
## [4] "Market_basket_88160" "Market_basket_88161" "Market_basket_88162"
```

```
#
str(ROW_Labels)
```

```
##  chr [1:88162] "Market_basket_1" "Market_basket_2" ...
```

```
# As seen above - we have created a CHARACTER Vector with
# ROW_Lables == Market_basket_1 to Market_basket_88162
```

We now use the Function - strsplit() , to SPLIT the data at WHITESPACE
into ROWS , thus whenever a WHITESPACE occurs or a MARKET BASKET or ROW ends
the data is split into the Next Row .

```
transaction_list <-strsplit(transaction_data1,"")
#
str(transaction_list)
```

```
## List of 88162
##  $ : chr [1:80] "0" " " "1" " " ...
##  $ : chr [1:9] "3" "0" " " "3" ...
##  $ : chr [1:9] "3" "3" " " "3" ...
##  $ : chr [1:33] "3" "6" " " "3" ...
##  $ : chr [1:12] "3" "8" " " "3" ...
##  $ : chr [1:39] "3" "8" " " "3" ...
##  $ : chr [1:18] "3" "2" " " "4" ...
##  $ : chr [1:8] "3" " " "3" "9" ...
##  $ : chr [1:18] "6" "3" " " "6" ...
##  $ : chr [1:6] "3" "2" " " "6" ...
##  $ : chr [1:12] "4" "8" " " "7" ...
##  $ : chr [1:24] "3" "9" " " "7" ...
##  $ : chr [1:24] "3" "6" " " "3" ...
##  $ : chr [1:9] "8" "2" " " "8" ...
##  $ : chr [1:15] "4" "1" " " "8" ...
##  $ : chr [1:47] "3" "9" " " "4" ...
##  $ : chr [1:15] "3" "6" " " "3" ...
##  $ : chr [1:34] "3" "9" " " "4" ...
##  $ : chr [1:17] "3" "8" " " "3" ...
##  $ : chr [1:35] "3" "9" " " "1" ...
##  $ : chr [1:60] "1" "1" "9" " " ...
##  $ : chr [1:15] "4" "8" " " "1" ...
```

```
##  $ : chr [1:58] "3" "9" " " " "4" ...
##  $ : chr [1:15] "3" "9" " " " "1" ...
##  $ : chr [1:21] "3" "8" " " " "3" ...
##  $ : chr [1:23] "4" "8" " " " "1" ...
##  $ : chr [1:9] "3" "9" " " " "4" ...
##  $ : chr [1:28] "1" "6" "1" " " ...
##  $ : chr [1:33] "3" "8" " " " "3" ...
##  $ : chr [1:32] "3" "2" " " " "3" ...
##  $ : chr [1:35] "3" "2" " " " "3" ...
##  $ : chr [1:15] "3" "9" " " " "1" ...
##  $ : chr [1:24] "3" "6" " " " "3" ...
##  $ : chr [1:58] "3" "9" " " " "4" ...
##  $ : chr [1:39] "3" "9" " " " "2" ...
##  $ : chr [1:34] "3" "9" " " " "6" ...
##  $ : chr [1:40] "1" "7" "9" " " ...
##  $ : chr [1:12] "2" "2" "5" " " ...
##  $ : chr [1:25] "3" "9" " " " "4" ...
##  $ : chr [1:53] "3" "6" " " " "3" ...
##  $ : chr [1:15] "3" "9" " " " "2" ...
##  $ : chr [1:29] "3" "9" " " " "4" ...
##  $ : chr [1:21] "3" "9" " " " "4" ...
##  $ : chr [1:11] "4" "8" " " " "2" ...
##  $ : chr [1:44] "3" "9" " " " "4" ...
##  $ : chr [1:10] "3" "9" " " " "4" ...
##  $ : chr [1:33] "3" "6" " " " "3" ...
##  $ : chr [1:23] "3" "9" " " " "2" ...
##  $ : chr [1:29] "3" "9" " " " "4" ...
##  $ : chr [1:4] "2" "7" "4" " "
##  $ : chr [1:48] "3" "2" " " " "3" ...
##  $ : chr [1:9] "3" "9" " " " "4" ...
##  $ : chr [1:35] "3" "8" " " " "3" ...
##  $ : chr [1:61] "3" "9" " " " "4" ...
##  $ : chr [1:12] "3" "0" "0" " " ...
##  $ : chr [1:89] "3" "6" " " " "3" ...
##  $ : chr [1:27] "1" "0" " " " "3" ...
##  $ : chr [1:18] "3" "9" " " " "4" ...
##  $ : chr [1:11] "3" "9" " " " "3" ...
##  $ : chr [1:39] "4" "8" " " " "3" ...
##  $ : chr [1:51] "1" "8" " " " "3" ...
##  $ : chr [1:24] "3" "2" " " " "3" ...
##  $ : chr [1:59] "4" "8" " " " "3" ...
##  $ : chr [1:8] "3" "6" "5" " " ...
##  $ : chr [1:51] "3" "8" " " " "3" ...
##  $ : chr [1:60] "1" " " " "1" "1" ...
##  $ : chr [1:16] "3" "8" "6" " " ...
##  $ : chr [1:10] "3" "8" " " " "4" ...
##  $ : chr [1:10] "3" "8" " " " "5" ...
##  $ : chr [1:58] "3" "2" " " " "4" ...
##  $ : chr [1:24] "3" "3" "8" " " ...
##  $ : chr [1:15] "3" "9" " " " "4" ...
##  $ : chr [1:86] "4" "8" " " " "8" ...
##  $ : chr [1:29] "3" "9" " " " "4" ...
##  $ : chr [1:28] "1" "4" "1" " " ...
##  $ : chr [1:15] "3" "9" " " " "4" ...
```

```
##  $ : chr [1:25] "3" "9" " " "4" ...
##  $ : chr [1:87] "1" "5" " " "2" ...
##  $ : chr [1:43] "4" "8" " " "4" ...
##  $ : chr [1:61] "3" "7" " " "3" ...
##  $ : chr [1:22] "3" "9" " " "4" ...
##  $ : chr [1:10] "3" "9" " " "4" ...
##  $ : chr [1:12] "4" "7" "7" " " ...
##  $ : chr [1:35] "3" "9" " " "1" ...
##  $ : chr [1:24] "3" "2" " " "3" ...
##  $ : chr [1:21] "3" "8" " " "3" ...
##  $ : chr [1:7] "6" "0" " " "3" ...
##  $ : chr [1:65] "1" "1" " " "3" ...
##  $ : chr [1:3] "3" "9" " "
##  $ : chr [1:11] "4" "1" " " "1" ...
##  $ : chr [1:28] "3" "2" " " "3" ...
##  $ : chr [1:10] "3" "8" " " "4" ...
##  $ : chr [1:56] "2" "2" "5" " " ...
##  $ : chr [1:32] "3" "8" " " "3" ...
##  $ : chr [1:6] "3" "9" " " "4" ...
##  $ : chr [1:14] "3" "8" " " "3" ...
##  $ : chr [1:14] "2" " " "5" "1" ...
##  $ : chr [1:12] "3" "1" "0" " " ...
##  $ : chr [1:11] "4" "1" " " "5" ...
##   [list output truncated]
```

```
#
# We Add the ROW_names Labels
#
names(transaction_list) <- paste("Market_basket_",1:length(transaction_data1),sep="")
#
# Again see the STRUCTURE
#
str(transaction_list) #
```

```
## List of 88162
##  $ Market_basket_1    : chr [1:80] "0" " " "1" " " ...
##  $ Market_basket_2    : chr [1:9] "3" "0" " " "3" ...
##  $ Market_basket_3    : chr [1:9] "3" "3" " " "3" ...
##  $ Market_basket_4    : chr [1:33] "3" "6" " " "3" ...
##  $ Market_basket_5    : chr [1:12] "3" "8" " " "3" ...
##  $ Market_basket_6    : chr [1:39] "3" "8" " " "3" ...
##  $ Market_basket_7    : chr [1:18] "3" "2" " " "4" ...
##  $ Market_basket_8    : chr [1:8] "3" " " "3" "9" ...
##  $ Market_basket_9    : chr [1:18] "6" "3" " " "6" ...
##  $ Market_basket_10   : chr [1:6] "3" "2" " " "6" ...
##  $ Market_basket_11   : chr [1:12] "4" "8" " " "7" ...
##  $ Market_basket_12   : chr [1:24] "3" "9" " " "7" ...
##  $ Market_basket_13   : chr [1:24] "3" "6" " " "3" ...
##  $ Market_basket_14   : chr [1:9] "8" "2" " " "8" ...
##  $ Market_basket_15   : chr [1:15] "4" "1" " " "8" ...
##  $ Market_basket_16   : chr [1:47] "3" "9" " " "4" ...
##  $ Market_basket_17   : chr [1:15] "3" "6" " " "3" ...
##  $ Market_basket_18   : chr [1:34] "3" "9" " " "4" ...
##  $ Market_basket_19   : chr [1:17] "3" "8" " " "3" ...
##  $ Market_basket_20   : chr [1:35] "3" "9" " " "1" ...
```

```
##  $ Market_basket_21   : chr [1:60] "1" "1" "9" " " ...
##  $ Market_basket_22   : chr [1:15] "4" "8" " " "1" ...
##  $ Market_basket_23   : chr [1:58] "3" "9" " " "4" ...
##  $ Market_basket_24   : chr [1:15] "3" "9" " " "1" ...
##  $ Market_basket_25   : chr [1:21] "3" "8" " " "3" ...
##  $ Market_basket_26   : chr [1:23] "4" "8" " " "1" ...
##  $ Market_basket_27   : chr [1:9] "3" "9" " " "4" ...
##  $ Market_basket_28   : chr [1:28] "1" "6" "1" " " ...
##  $ Market_basket_29   : chr [1:33] "3" "8" " " "3" ...
##  $ Market_basket_30   : chr [1:32] "3" "2" " " "3" ...
##  $ Market_basket_31   : chr [1:35] "3" "2" " " "3" ...
##  $ Market_basket_32   : chr [1:15] "3" "9" " " "1" ...
##  $ Market_basket_33   : chr [1:24] "3" "6" " " "3" ...
##  $ Market_basket_34   : chr [1:58] "3" "9" " " "4" ...
##  $ Market_basket_35   : chr [1:39] "3" "9" " " "2" ...
##  $ Market_basket_36   : chr [1:34] "3" "9" " " "6" ...
##  $ Market_basket_37   : chr [1:40] "1" "7" "9" " " ...
##  $ Market_basket_38   : chr [1:12] "2" "2" "5" " " ...
##  $ Market_basket_39   : chr [1:25] "3" "9" " " "4" ...
##  $ Market_basket_40   : chr [1:53] "3" "6" " " "3" ...
##  $ Market_basket_41   : chr [1:15] "3" "9" " " "2" ...
##  $ Market_basket_42   : chr [1:29] "3" "9" " " "4" ...
##  $ Market_basket_43   : chr [1:21] "3" "9" " " "4" ...
##  $ Market_basket_44   : chr [1:11] "4" "8" " " "2" ...
##  $ Market_basket_45   : chr [1:44] "3" "9" " " "4" ...
##  $ Market_basket_46   : chr [1:10] "3" "9" " " "4" ...
##  $ Market_basket_47   : chr [1:33] "3" "6" " " "3" ...
##  $ Market_basket_48   : chr [1:23] "3" "9" " " "2" ...
##  $ Market_basket_49   : chr [1:29] "3" "9" " " "4" ...
##  $ Market_basket_50   : chr [1:4] "2" "7" "4" " "
##  $ Market_basket_51   : chr [1:48] "3" "2" " " "3" ...
##  $ Market_basket_52   : chr [1:9] "3" "9" " " "4" ...
##  $ Market_basket_53   : chr [1:35] "3" "8" " " "3" ...
##  $ Market_basket_54   : chr [1:61] "3" "9" " " "4" ...
##  $ Market_basket_55   : chr [1:12] "3" "0" "0" " " ...
##  $ Market_basket_56   : chr [1:89] "3" "6" " " "3" ...
##  $ Market_basket_57   : chr [1:27] "1" "0" " " "3" ...
##  $ Market_basket_58   : chr [1:18] "3" "9" " " "4" ...
##  $ Market_basket_59   : chr [1:11] "3" "9" " " "3" ...
##  $ Market_basket_60   : chr [1:39] "4" "8" " " "3" ...
##  $ Market_basket_61   : chr [1:51] "1" "8" " " "3" ...
##  $ Market_basket_62   : chr [1:24] "3" "2" " " "3" ...
##  $ Market_basket_63   : chr [1:59] "4" "8" " " "3" ...
##  $ Market_basket_64   : chr [1:8] "3" "6" "5" " " ...
##  $ Market_basket_65   : chr [1:51] "3" "8" " " "3" ...
##  $ Market_basket_66   : chr [1:60] "1" " " "1" "1" ...
##  $ Market_basket_67   : chr [1:16] "3" "8" "6" " " ...
##  $ Market_basket_68   : chr [1:10] "3" "8" " " "4" ...
##  $ Market_basket_69   : chr [1:10] "3" "8" " " "5" ...
##  $ Market_basket_70   : chr [1:58] "3" "2" " " "4" ...
##  $ Market_basket_71   : chr [1:24] "3" "3" "8" " " ...
##  $ Market_basket_72   : chr [1:15] "3" "9" " " "4" ...
##  $ Market_basket_73   : chr [1:86] "4" "8" " " "8" ...
##  $ Market_basket_74   : chr [1:29] "3" "9" " " "4" ...
```

```
##  $ Market_basket_75   : chr [1:28] "1" "4" "1" " " ...
##  $ Market_basket_76   : chr [1:15] "3" "9" " " "4" ...
##  $ Market_basket_77   : chr [1:25] "3" "9" " " "4" ...
##  $ Market_basket_78   : chr [1:87] "1" "5" " " "2" ...
##  $ Market_basket_79   : chr [1:43] "4" "8" " " "4" ...
##  $ Market_basket_80   : chr [1:61] "3" "7" " " "3" ...
##  $ Market_basket_81   : chr [1:22] "3" "9" " " "4" ...
##  $ Market_basket_82   : chr [1:10] "3" "9" " " "4" ...
##  $ Market_basket_83   : chr [1:12] "4" "7" "7" " " ...
##  $ Market_basket_84   : chr [1:35] "3" "9" " " "1" ...
##  $ Market_basket_85   : chr [1:24] "3" "2" " " "3" ...
##  $ Market_basket_86   : chr [1:21] "3" "8" " " "3" ...
##  $ Market_basket_87   : chr [1:7] "6" "0" " " "3" ...
##  $ Market_basket_88   : chr [1:65] "1" "1" " " "3" ...
##  $ Market_basket_89   : chr [1:3] "3" "9" " "
##  $ Market_basket_90   : chr [1:11] "4" "1" " " "1" ...
##  $ Market_basket_91   : chr [1:28] "3" "2" " " "3" ...
##  $ Market_basket_92   : chr [1:10] "3" "8" " " "4" ...
##  $ Market_basket_93   : chr [1:56] "2" "2" "5" " " ...
##  $ Market_basket_94   : chr [1:32] "3" "8" " " "3" ...
##  $ Market_basket_95   : chr [1:6] "3" "9" " " "4" ...
##  $ Market_basket_96   : chr [1:14] "3" "8" " " "3" ...
##  $ Market_basket_97   : chr [1:14] "2" " " "5" "1" ...
##  $ Market_basket_98   : chr [1:12] "3" "1" "0" " " ...
##  $ Market_basket_99   : chr [1:11] "4" "1" " " "5" ...
##   [list output truncated]
```

```
#
tail(transaction_list)
```

```
## $Market_basket_88157
##  [1] "4" "8" " " " " "2" "0" "1" " " " " "2" "5" "5" " " " " "2" "7" "8" " " " " "4" "0"
## [18] "7" " " " " "4" "7" "9" " " " " "7" "6" "7" " " " " "8" "2" "4" " " " " "9" "8" "6"
## [35] " " " " "1" "3" "9" "5" " " " " "1" "5" "9" "8" " " " " "2" "0" "2" "2" " " " " "2"
## [52] "2" "8" "3" " " " " "2" "3" "7" "5" " " " " "6" "7" "2" "5" " " " " "1" "3" "3"
## [69] "3" "4" " " " " "1" "4" "0" "0" "6" " " " " "1" "4" "0" "9" "9" " " " "
##
## $Market_basket_88158
##  [1] "3" "9" " " " " "8" "7" "5" " " " " "2" "6" "6" "5" " " " " "2" "9" "6" "2" " " "
## [18] "1" "2" "9" "5" "9" " " " " "1" "4" "0" "7" "0" " " " " "1" "4" "4" "0" "6"
## [35] " " " " "1" "5" "5" "1" "8" " " " " "1" "6" "3" "7" "9" " " "
##
## $Market_basket_88159
##   [1] "3" "9" " " " " "4" "1" " " " " "1" "0" "1" " " " " "3" "4" "6" " " " " "3" "9" "3"
##  [18] " " " " "4" "1" "3" " " " " "4" "7" "9" " " " " "5" "2" "2" " " " " "5" "8" "6" " " "
##  [35] "6" "3" "5" " " " " "6" "9" "5" " " " " "7" "9" "9" " " " " "1" "4" "6" "6" " " "
##  [52] "1" "7" "8" "6" " " " " "1" "9" "9" "4" " " " " "2" "4" "4" "9" " " " " "2" "8"
##  [69] "3" "0" " " " " "3" "0" "3" "5" " " " " "3" "5" "9" "1" " " " " "3" "7" "2" "2"
##  [86] " " " " "6" "2" "1" "7" " " " " "1" "1" "4" "9" "3" " " " " "1" "2" "1" "2" "9"
## [103] " " " " "1" "3" "0" "3" "3" " " "
##
## $Market_basket_88160
##  [1] "2" "3" "1" "0" " " " " "4" "2" "6" "7" " " "
##
## $Market_basket_88161
```

```
##  [1] "3" "9" " " " " "4" "8" " " " " "2" "5" "2" "8" " " " "
##
## $Market_basket_88162
##  [1] "3" "2" " " " " "3" "9" " " " " "2" "0" "5" " " " " "2" "4" "2" " " " " "1" "3" "9"
## [18] "3" " " " "
```

```
#
#
# We can now clearly see the SPARSNESS of the Data
# The "" - Blanks occur eeven adjacent to each other
# seen in - $Market_basket_88159 - thus whatever Order
# is maintained in the Brick and Mortar RETAIL STORE
# is not always suggestive of Association
#
# Also looking at $Market_basket_88160
 #    [1] "2" "3" "1" "0" " " " " "4" "2" "6" "7" " " " "
# we can observe a FLIP FLOP Pattern
#
```

```
market_basket_rules <- apriori(transaction_data, parameter=list(supp=0.001, conf=0.4))
```

```
## Apriori
##
## Parameter specification:
##  confidence minval smax arem  aval originalSupport maxtime support minlen
##         0.4    0.1    1 none FALSE            TRUE       5   0.001      1
##  maxlen target   ext
##      10  rules FALSE
##
## Algorithmic control:
##  filter tree heap memopt load sort verbose
##     0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 88
##
## set item appearances ...[0 item(s)] done [0.00s].
## set transactions ...[16470 item(s), 88162 transaction(s)] done [0.40s].
## sorting and recoding items ... [2117 item(s)] done [0.02s].
## creating transaction tree ... done [0.13s].
## checking subsets of size 1 2 3 4 5 6 done [0.23s].
## writing ... [5944 rule(s)] done [0.02s].
## creating S4 object  ... done [0.06s].
```

```
# Create a DF of Rules
mba_rules_df<- as(market_basket_rules, "data.frame")
#
str(mba_rules_df)
```

```
## 'data.frame':    5944 obs. of  4 variables:
##  $ rules     : Factor w/ 5944 levels "{0} => {39}",..: 5100 4283 4211 4992 173 4671 3440 5750 5656 2
##  $ support   : num  0.47793 0.57479 0.00107 0.00108 0.0011 ...
##  $ confidence: num  0.478 0.575 0.913 0.651 0.907 ...
##  $ lift      : num  1 1 5.16 1.13 5.27 ...
```

```
#
write.csv(mba_rules_df, file = "~/Desktop/R_Own/R_Marketing/Mkt_DATA_Files/mba_rules_df.csv")
```

```
#
```

DATA VISUALIZATION - arulesVIZ

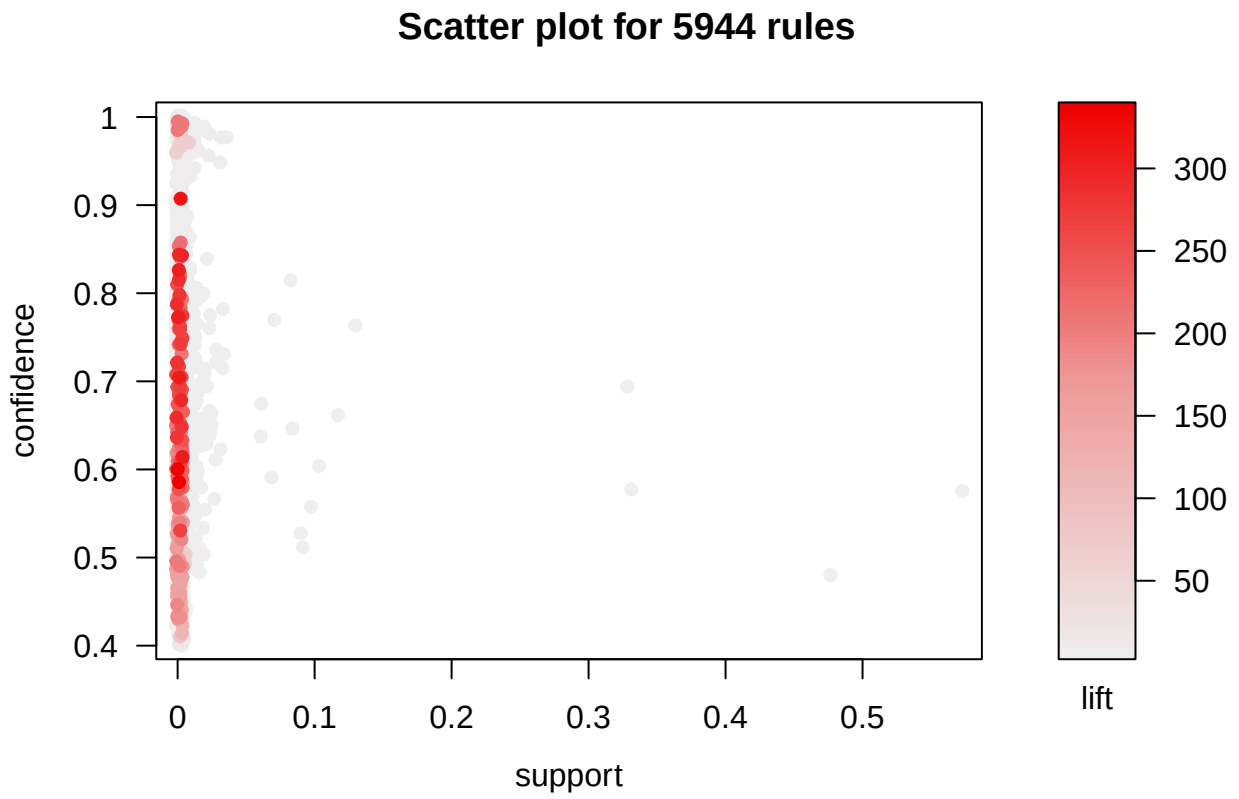
Visualize Data to make further sense of the Association Rules.

```
require(arulesViz)
```

```
## Loading required package: arulesViz
```

```
## Loading required package: grid
```

```
#
plot(market_basket_rules)
```




```
#
```

```
#plot(market_basket_rules,interactive=TRUE)
```