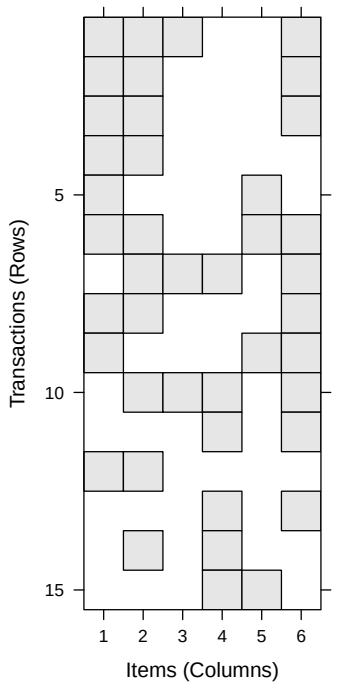
November 2, 2023

The results below are generated from an R script.

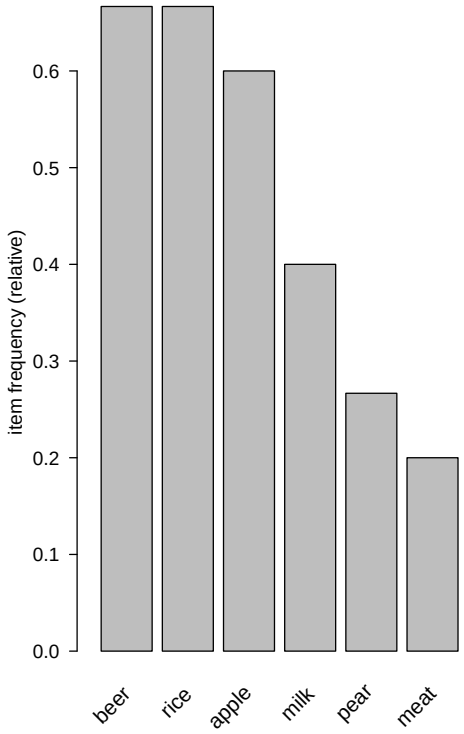
```r
# Liberías necesarias para resolver el ejercicio
library(arules)
library(arulesViz)
# Lista de compras
market_basket <-
  list(
    c("apple", "beer", "rice", "meat"),
    c("apple", "beer", "rice"),
    c("apple", "beer", "rice"),
    c("apple", "beer"),
    c("apple", "pear"),
    c("apple", "beer", "rice", "pear"),
    c("milk", "beer", "rice", "meat"),
    c("apple", "beer", "rice"),
    c("apple", "rice", "pear"),
    c("milk", "beer", "rice", "meat"),
    c("milk", "rice"),
    c("apple", "beer"),
    c("milk", "rice"),
    c("milk", "beer"),
    c("milk", "pear")
  )

# nombramos las compras
names(market_basket) <- paste("C", c(1:length(market_basket)), sep = "")

# Transformación
trans <- as(market_basket, "transactions")

# Lista de productos
itemLabels(trans)

## [1] "apple" "beer"  "meat"  "milk"  "pear"  "rice"

# Resumen de los datos
summary(trans)

## transactions as itemMatrix in sparse format with
##  15 rows (elements/itemsets/transactions) and
##  6 columns (items) and a density of 0.4666667
##
## most frequent items:
##    beer    rice   apple    milk    pear (Other)
##      10      10       9       6       4       3
```

```
##
## element (itemset/transaction) length distribution:
## sizes
## 2 3 4
## 7 4 4
##
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     2.0     2.0     3.0     2.8     3.5     4.0
##
## includes extended item information - examples:
##   labels
## 1  apple
## 2   beer
## 3   meat
##
## includes extended transaction information - examples:
##   transactionID
## 1            C1
## 2            C2
## 3            C3
```

```r
# Visualización
image(trans)
```




```r
# Frecuencia relativa de los productos
itemFrequencyPlot(trans, topN=10,  cex.names=1)
```




```
# A-Priori

#Min Support 0.3, confidence 0.5.
rules <- apriori(trans,
                 parameter = list(supp=0.3, conf=0.5,
                                  maxlen=10,
                                  target= "rules"))
```

```
## Apriori
##
## Parameter specification:
##  confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target
##         0.5    0.1    1 none FALSE            TRUE       5     0.3      1     10  rules
##   ext
##  TRUE
##
## Algorithmic control:
##  filter tree heap memopt load sort verbose
##     0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 4
##
## set item appearances ...[0 item(s)] done [0.00s].
## set transactions ...[6 item(s), 15 transaction(s)] done [0.00s].
## sorting and recoding items ... [4 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 3 done [0.00s].
## writing ... [12 rule(s)] done [0.00s].
## creating S4 object  ... done [0.00s].
```

```
summary(rules)
```

```
## set of 12 rules
##
## rule length distribution (lhs + rhs):sizes
## 1 2 3
## 3 6 3
##
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00    1.75    2.00    2.00    2.25    3.00
##
## summary of quality measures:
##     support         confidence        coverage           lift           count
##  Min.   :0.3333   Min.   :0.6000   Min.   :0.4000   Min.   :1.000   Min.   : 5.00
##  1st Qu.:0.3833   1st Qu.:0.6667   1st Qu.:0.5667   1st Qu.:1.000   1st Qu.: 5.75
##  Median :0.4667   Median :0.7000   Median :0.6667   Median :1.050   Median : 7.00
##  Mean   :0.4667   Mean   :0.6950   Mean   :0.6833   Mean   :1.079   Mean   : 7.00
##  3rd Qu.:0.5000   3rd Qu.:0.7143   3rd Qu.:0.7500   3rd Qu.:1.167   3rd Qu.: 7.50
##  Max.   :0.6667   Max.   :0.8333   Max.   :1.0000   Max.   :1.250   Max.   :10.00
##
## mining info:
##   data ntransactions support confidence
##  trans            15     0.3        0.5
##                                                                                call
##  apriori(data = trans, parameter = list(supp = 0.3, conf = 0.5, maxlen = 10, target = "rules"))
```

```
# Producto `beer`
beer_rules_lhs <- apriori(trans,
                          parameter = list(supp=0.3, conf=0.5,
                                           maxlen=10,
                                           minlen=2),
                          appearance = list(lhs="beer", default="rhs"))
```

```
## Apriori
##
## Parameter specification:
##  confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target
##         0.5    0.1    1 none FALSE            TRUE       5     0.3      2     10  rules
##   ext
##  TRUE
##
## Algorithmic control:
##  filter tree heap memopt load sort verbose
##     0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 4
##
## set item appearances ...[1 item(s)] done [0.00s].
## set transactions ...[6 item(s), 15 transaction(s)] done [0.00s].
## sorting and recoding items ... [4 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 done [0.00s].
## writing ... [2 rule(s)] done [0.00s].
## creating S4 object  ... done [0.00s].
```

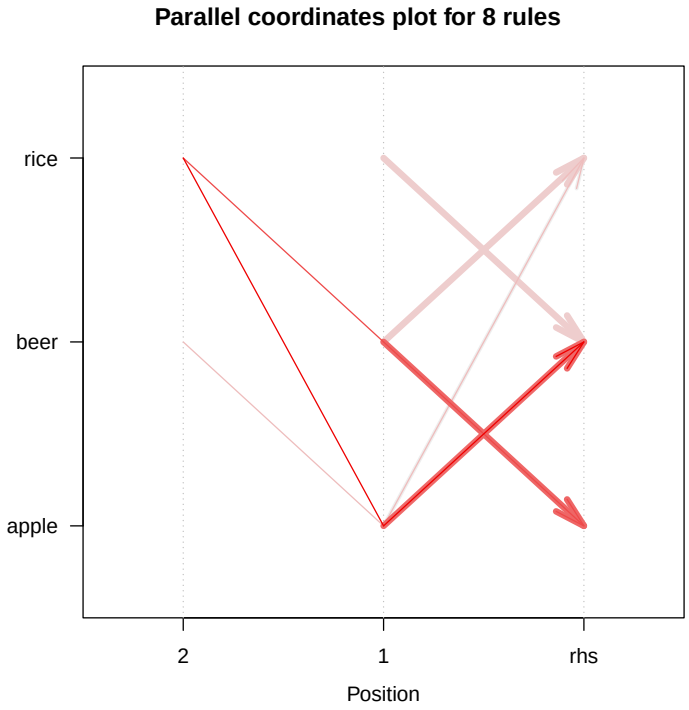
```
inspect(beer_rules_lhs)
```

```
##     lhs       rhs     support   confidence coverage  lift     count
## [1] {beer} => {apple} 0.4666667 0.7        0.6666667 1.166667 7
## [2] {beer} => {rice}  0.4666667 0.7        0.6666667 1.050000 7
```

```
# Visualizar las reglas
subrules <- head(rules, n=10, by = "confidence")

plot(subrules, method = "graph",  engine = "htmlwidget")
```

```
## Error:  package 'webshot' was installed before R 4.0.0:  please re-install it
```

```
plot(subrules, method="paracoord")
```



The R session information (including the OS info, R version and all packages used):

```
sessionInfo()

## R version 4.3.1 (2023-06-16)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 20.04.6 LTS
##
## Matrix products: default
## BLAS:   /usr/lib/x86_64-linux-gnu/atlas/libblas.so.3.10.3
## LAPACK: /usr/lib/x86_64-linux-gnu/atlas/liblapack.so.3.10.3;  LAPACK version 3.9.0
##
## locale:
##  [1] LC_CTYPE=es_ES.UTF-8       LC_NUMERIC=C               LC_TIME=es_ES.UTF-8
##  [4] LC_COLLATE=es_ES.UTF-8     LC_MONETARY=es_ES.UTF-8    LC_MESSAGES=es_ES.UTF-8
##  [7] LC_PAPER=es_ES.UTF-8       LC_NAME=C                  LC_ADDRESS=C
## [10] LC_TELEPHONE=C             LC_MEASUREMENT=es_ES.UTF-8 LC_IDENTIFICATION=C
##
```

```
## time zone: Europe/Madrid
## tzcode source: system (glibc)
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] arulesViz_1.5-2  arules_1.7-6     Matrix_1.6-1.1   liver_1.15       ggfortify_0.4.16
##  [6] factoextra_1.0.7 mlbench_2.1-3.1  readxl_1.4.3     caret_6.0-94     lattice_0.21-9
## [11] ggplot2_3.4.3    rpart.plot_3.1.1 rpart_4.1.19     caTools_1.18.2   dplyr_1.1.3
## [16] ISLR2_1.3-2
##
## loaded via a namespace (and not attached):
##  [1] bitops_1.0-7         pROC_1.18.4          gridExtra_2.3        rlang_1.1.1
##  [5] magrittr_2.0.3       e1071_1.7-13         compiler_4.3.1       vctrs_0.6.3
##  [9] reshape2_1.4.4       stringr_1.5.0        pkgconfig_2.0.3      fastmap_1.1.1
## [13] ellipsis_0.3.2       labeling_0.4.3       ggraph_2.1.0         utf8_1.2.3
## [17] rmarkdown_2.25       prodlim_2023.08.28   tzdb_0.4.0           tinytex_0.47
## [21] purrr_1.0.2          xfun_0.40            jsonlite_1.8.7       recipes_1.0.8
## [25] highr_0.10           tweenr_2.0.2         parallel_4.3.1       R6_2.5.1
## [29] stringi_1.7.12       parallelly_1.36.0    lubridate_1.9.3      cellranger_1.1.0
## [33] Rcpp_1.0.11          iterators_1.0.14     knitr_1.44           future.apply_1.11.0
## [37] readr_2.1.4          splines_4.3.1        nnet_7.3-19          igraph_1.5.1
## [41] timechange_0.2.0     tidyselect_1.2.0     rstudioapi_0.15.0    yaml_2.3.7
## [45] viridis_0.6.4        timeDate_4022.108    codetools_0.2-19     listenv_0.9.0
## [49] tibble_3.2.1         plyr_1.8.9           withr_2.5.1          evaluate_0.22
## [53] future_1.33.0        survival_3.5-7       proxy_0.4-27         polyclip_1.10-6
## [57] pillar_1.9.0         foreach_1.5.2        stats4_4.3.1         generics_0.1.3
## [61] hms_1.1.3            munsell_0.5.0        scales_1.2.1         globals_0.16.2
## [65] class_7.3-22         glue_1.6.2           tools_4.3.1          data.table_1.14.8
## [69] ModelMetrics_1.2.2.2 gower_1.0.1          visNetwork_2.1.2     graphlayouts_1.0.1
## [73] tidygraph_1.2.3      grid_4.3.1           tidyr_1.3.0          ipred_0.9-14
## [77] colorspace_2.1-0     nlme_3.1-163         ggforce_0.4.1        cli_3.6.1
## [81] fansi_1.0.5          viridisLite_0.4.2    lava_1.7.2.1         gtable_0.3.4
## [85] digest_0.6.33        ggrepel_0.9.3        htmlwidgets_1.6.2    farver_2.1.1
## [89] htmltools_0.5.6.1    lifecycle_1.0.3      hardhat_1.3.0        MASS_7.3-60

Sys.time()

## [1] "2023-11-02 18:33:30 CET"
```