

Trinay

2024-02-28

```
data <- read.csv("C:/Users/trina/Downloads/ARM_prepared.csv")
```

```
library(arules)
```

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

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

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

```
library(arulesViz)
```

```
# Selecting columns for the analysis  
columns_interested <- c('combined','State')
```

```
# Removing unwanted columns  
data <- data[sample(nrow(data), 30), columns_interested]
```

```
cat("Selected Rows:")
```

```
## Selected Rows:
```

```
print(head(data, 25))
```

```
##                                combined State
## 61 Crossing=1, Bump=1, Junction=1, Stop=1    DC
## 85 Crossing=1, Bump=1, Junction=0, Stop=1    NY
## 45 Crossing=1, Bump=1, Junction=0, Stop=1    MT
## 194 Crossing=1, Bump=1, Junction=1, Stop=1   CA
## 2 Crossing=1, Bump=1, Junction=1, Stop=1    CA
## 125 Crossing=1, Bump=1, Junction=1, Stop=1   TX
## 97 Crossing=1, Bump=1, Junction=1, Stop=1   IL
## 116 Crossing=1, Bump=1, Junction=1, Stop=1  FL
## 47 Crossing=1, Bump=1, Junction=1, Stop=1   NV
## 26 Crossing=1, Bump=1, Junction=1, Stop=1   FL
## 134 Crossing=1, Bump=1, Junction=1, Stop=1   TX
## 152 Crossing=0, Bump=1, Junction=1, Stop=1   FL
## 67 Crossing=1, Bump=1, Junction=1, Stop=1   TX
## 142 Crossing=1, Bump=1, Junction=1, Stop=1   FL
## 77 Crossing=1, Bump=1, Junction=1, Stop=1   AZ
## 200 Crossing=1, Bump=1, Junction=1, Stop=1   SC
## 150 Crossing=1, Bump=1, Junction=1, Stop=1   VA
## 183 Crossing=1, Bump=1, Junction=1, Stop=1   CA
## 113 Crossing=0, Bump=1, Junction=1, Stop=1   FL
## 184 Crossing=1, Bump=1, Junction=1, Stop=1   MO
## 133 Crossing=1, Bump=1, Junction=1, Stop=1   PA
## 59 Crossing=1, Bump=1, Junction=1, Stop=1   FL
## 148 Crossing=1, Bump=1, Junction=1, Stop=1   VA
## 163 Crossing=1, Bump=1, Junction=1, Stop=1   LA
## 146 Crossing=0, Bump=1, Junction=1, Stop=1   FL
```

```
transactions <- as(data, "transactions")
```

```
## Warning: Column(s) 1, 2 not logical or factor. Applying default discretization
## (see '? discretizeDF').
```

```
matrix <- as(as(transactions, "list"), "matrix")

write.csv(matrix, file = "selected_transactions.csv", row.names = FALSE)
cat("Transaction Data:")
```

```
## Transaction Data:
```

```
inspect(head(transactions, 25))
```

##	items	transactionID
## [1]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=DC}	61
## [2]	{combined=Crossing=1, Bump=1, Junction=0, Stop=1, State=NY}	85
## [3]	{combined=Crossing=1, Bump=1, Junction=0, Stop=1, State=MT}	45
## [4]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=CA}	194
## [5]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=CA}	2
## [6]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=TX}	125
## [7]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=IL}	97
## [8]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=FL}	116
## [9]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=NV}	47
## [10]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=FL}	26
## [11]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=TX}	134
## [12]	{combined=Crossing=0, Bump=1, Junction=1, Stop=1, State=FL}	152
## [13]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=TX}	67
## [14]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=FL}	142
## [15]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=AZ}	77
## [16]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=SC}	200
## [17]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=VA}	150
## [18]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=CA}	183
## [19]	{combined=Crossing=0, Bump=1, Junction=1, Stop=1, State=FL}	113
## [20]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=MO}	184
## [21]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=PA}	133
## [22]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=FL}	59
## [23]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=VA}	148
## [24]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1, State=LA}	163
## [25]	{combined=Crossing=0, Bump=1, Junction=1, Stop=1, State=FL}	146

```
rules <- apriori(transactions, parameter = list(support = 0.01, confidence = 0.1, minlen=2))
```

```
## Apriori
##
## Parameter specification:
## confidence minval smax arem aval originalSupport maxtime support minlen
##          0.1   0.1   1 none FALSE             TRUE       5   0.01     2
## maxlen target  ext
##      10  rules TRUE
##
## Algorithmic control:
## filter tree heap memopt load sort verbose
##    0.1 TRUE TRUE  FALSE TRUE    2    TRUE
##
## Absolute minimum support count: 0
##
## set item appearances ...[0 item(s)] done [0.00s].
## set transactions ...[18 item(s), 30 transaction(s)] done [0.00s].
## sorting and recoding items ... [18 item(s)] done [0.00s].
## creating transaction tree ... done [0.00s].
## checking subsets of size 1 2 done [0.00s].
## writing ... [22 rule(s)] done [0.00s].
## creating S4 object ... done [0.00s].
```

```
# Summary of rules
summary(rules)
```

```

## set of 22 rules
##
## rule length distribution (lhs + rhs):sizes
## 2
## 22
##
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##        2      2      2      2      2      2
##
## summary of quality measures:
##      support      confidence      coverage      lift
## Min.   :0.03333  Min.   :0.1200  Min.   :0.03333  Min.   : 0.800
## 1st Qu.:0.03333  1st Qu.:0.5417  1st Qu.:0.03333  1st Qu.: 1.200
## Median :0.03333  Median :1.0000  Median :0.05000  Median : 1.200
## Mean   :0.07424  Mean   :0.7982  Mean   :0.18333  Mean   : 3.867
## 3rd Qu.:0.10000  3rd Qu.:1.0000  3rd Qu.:0.15000  3rd Qu.: 2.800
## Max.   :0.20000  Max.   :1.0000  Max.   :0.83333  Max.   :15.000
##      count
## Min.   :1.000
## 1st Qu.:1.000
## Median :1.000
## Mean   :2.227
## 3rd Qu.:3.000
## Max.   :6.000
##
## mining info:
##      data ntransactions support confidence
## transactions      30    0.01      0.1
##
##
## apriori(data = transactions, parameter = list(support = 0.01, confidence = 0.1, minlen = 2))

```

call

```

# Inspecting the top 15 rules for support, confidence, and lift
top_rules_support <- head(sort(rules, by = "support"), 15)
top_rules_confidence <- head(sort(rules, by = "confidence"), 15)
top_rules_lift <- head(sort(rules, by = "lift"), 15)

# Print top rules for support, confidence, and lift
print("Top 15 rules for Support:")

```

```
## [1] "Top 15 rules for Support:"
```

```
inspect(top_rules_support)
```

##	lhs	rhs
	support confidence coverage lift count	
## [1]	{State=FL} ion=1, Stop=1} 0.20000000 0.6666667 0.30000000 0.800000	=> {combined=Crossing=1, Bump=1, Junct 6
## [2]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1} 0.20000000 0.2400000 0.83333333 0.800000 6	=> {State=FL}
## [3]	{State=CA} ion=1, Stop=1} 0.16666667 1.0000000 0.16666667 1.200000 5	=> {combined=Crossing=1, Bump=1, Junct 5
## [4]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1} 0.16666667 0.2000000 0.83333333 1.200000 5	=> {State=CA}
## [5]	{State=TX} ion=1, Stop=1} 0.10000000 1.0000000 0.10000000 1.200000 3	=> {combined=Crossing=1, Bump=1, Junct 3
## [6]	{combined=Crossing=1, Bump=1, Junction=1, Stop=1} 0.10000000 0.1200000 0.83333333 1.200000 3	=> {State=TX}
## [7]	{combined=Crossing=0, Bump=1, Junction=1, Stop=1} 0.10000000 1.0000000 0.10000000 3.333333 3	=> {State=FL}
## [8]	{State=FL} ion=1, Stop=1} 0.10000000 0.3333333 0.30000000 3.333333 3	=> {combined=Crossing=0, Bump=1, Junct 3
## [9]	{State=VA} ion=1, Stop=1} 0.06666667 1.0000000 0.06666667 1.200000 2	=> {combined=Crossing=1, Bump=1, Junct 2
## [10]	{State=MD} ion=1, Stop=1} 0.03333333 1.0000000 0.03333333 1.200000 1	=> {combined=Crossing=1, Bump=1, Junct 1
## [11]	{State=LA} ion=1, Stop=1} 0.03333333 1.0000000 0.03333333 1.200000 1	=> {combined=Crossing=1, Bump=1, Junct 1
## [12]	{State=PA} ion=1, Stop=1} 0.03333333 1.0000000 0.03333333 1.200000 1	=> {combined=Crossing=1, Bump=1, Junct 1
## [13]	{State=MO} ion=1, Stop=1} 0.03333333 1.0000000 0.03333333 1.200000 1	=> {combined=Crossing=1, Bump=1, Junct 1
## [14]	{State=SC} ion=1, Stop=1} 0.03333333 1.0000000 0.03333333 1.200000 1	=> {combined=Crossing=1, Bump=1, Junct 1
## [15]	{State=AZ} ion=1, Stop=1} 0.03333333 1.0000000 0.03333333 1.200000 1	=> {combined=Crossing=1, Bump=1, Junct 1

```
print("Top 15 rules for Confidence:")
```

```
## [1] "Top 15 rules for Confidence:"
```

```
inspect(top_rules_confidence)
```

##	lhs	rhs
support	confidence	coverage
lift	count	
## [1]	{State=MD} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [2]	{State=LA} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [3]	{State=PA} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [4]	{State=MO} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [5]	{State=SC} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [6]	{State=AZ} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [7]	{State=NV} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [8]	{State=IL} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [9]	{State=MT} ion=0, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [10]	{State=NY} ion=0, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [11]	{State=DC} ion=1, Stop=1} 0.03333333	=> {combined=Crossing=1, Bump=1, Junct 1 1
## [12]	{State=VA} ion=1, Stop=1} 0.06666667	=> {combined=Crossing=1, Bump=1, Junct 2 2
## [13]	{State=TX} ion=1, Stop=1} 0.10000000	=> {combined=Crossing=1, Bump=1, Junct 3 3
## [14]	{combined=Crossing=0, Bump=1, Junction=1, Stop=1} 0.10000000	=> {State=FL} 1 0.10000000 3.333333 3
## [15]	{State=CA} ion=1, Stop=1} 0.16666667	=> {combined=Crossing=1, Bump=1, Junct 5 5

```
print("Top 15 rules for Lift:")
```

```
## [1] "Top 15 rules for Lift:"
```

```
inspect(top_rules_lift)
```

##	lhs	rhs
	support confidence coverage lift count	
## [1]	{State=MT}	=> {combined=Crossing=1, Bump=1, Junction=0, Stop=1}
	0.03333333 1.0000000 0.03333333 15.000000	1
## [2]	{combined=Crossing=1, Bump=1, Junction=0, Stop=1}	=> {State=MT}
	0.03333333 0.5000000 0.06666667 15.000000	1
## [3]	{State=NY}	=> {combined=Crossing=1, Bump=1, Junction=0, Stop=1}
	0.03333333 1.0000000 0.03333333 15.000000	1
## [4]	{combined=Crossing=1, Bump=1, Junction=0, Stop=1}	=> {State=NY}
	0.03333333 0.5000000 0.06666667 15.000000	1
## [5]	{combined=Crossing=0, Bump=1, Junction=1, Stop=1}	=> {State=FL}
	0.10000000 1.0000000 0.10000000 3.333333	3
## [6]	{State=FL}	=> {combined=Crossing=0, Bump=1, Junction=1, Stop=1}
	0.10000000 0.3333333 0.30000000 3.333333	3
## [7]	{State=MD}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [8]	{State=LA}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [9]	{State=PA}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [10]	{State=MO}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [11]	{State=SC}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [12]	{State=AZ}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [13]	{State=NV}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [14]	{State=IL}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1
## [15]	{State=DC}	=> {combined=Crossing=1, Bump=1, Junction=1, Stop=1}
	0.03333333 1.0000000 0.03333333 1.200000	1

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.