

Team Gryffindor:

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R CODE DOCUMENTATION

#Create Transactions

```
> #Create transactions
> trans <- transactions(mydata)
> trans
transactions in sparse format with
600 transactions (rows) and
1271 items (columns)
> |
```

#show the structures of trans

```
> summary(trans)
transactions as itemMatrix in sparse format with
600 rows (elements/itemsets/transactions) and
1271 columns (items) and a density of 0.009441385

most frequent items:
current_act=YES      save_act=YES      married=YES      mortgage=NO      pep=NO      (other)
      455           414           396           391           326           5218

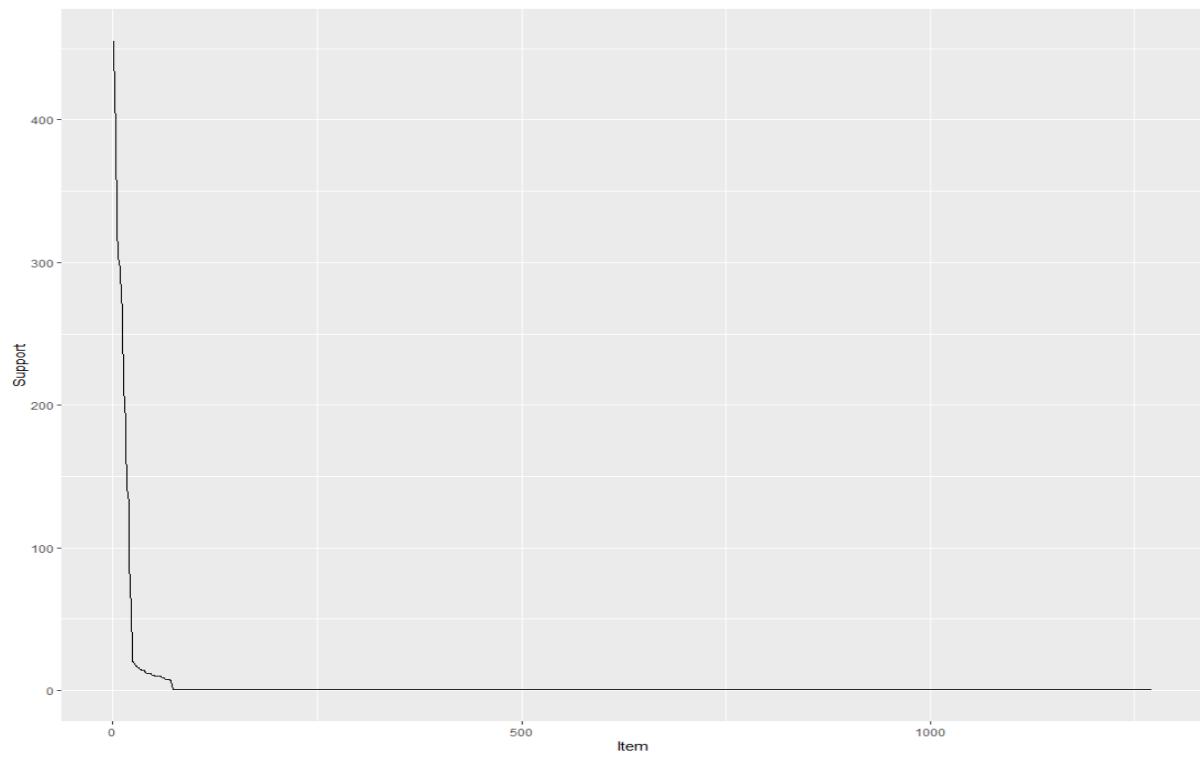
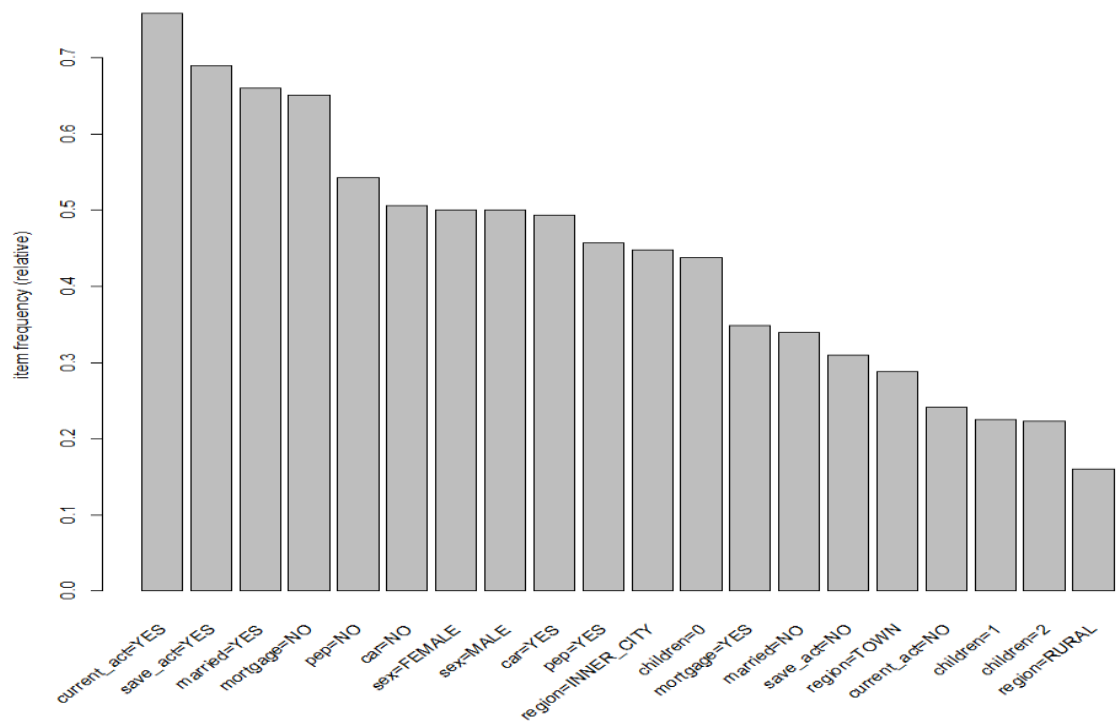
element (itemset/transaction) length distribution:
sizes
12
600

      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
      12      12      12      12      12      12

includes extended item information - examples:
      labels variables levels
1 id=ID12101      id ID12101
2 id=ID12102      id ID12102
3 id=ID12103      id ID12103

includes extended transaction information - examples:
      transactionID
1      1
2      2
3      3
> |
```

#Inspect Transactions
#Check the Most frequent Items



Model Creation

#Finding frequent itemsets (target="frequent") with the default settings.

```
> its <- apriori(trans, parameter=list(target = "frequent"))
Apriori

Parameter specification:
confidence minval smax arem aval originals support maxtime support minlen maxlen      target ext
NA      0.1    1 none FALSE                TRUE     5    0.1    1    10 frequent itemsets TRUE

Algorithmic control:
filter tree heap memopt load sort verbose
 0.1 TRUE TRUE  FALSE TRUE  2    TRUE

Absolute minimum support count: 60

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[1271 item(s), 600 transaction(s)] done [0.00s].
sorting and recoding items ... [22 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 done [0.02s].
sorting transactions ... done [0.00s].
writing ... [650 set(s)] done [0.00s].
creating S4 object ... done [0.00s].
> its
set of 650 itemsets
> |
```

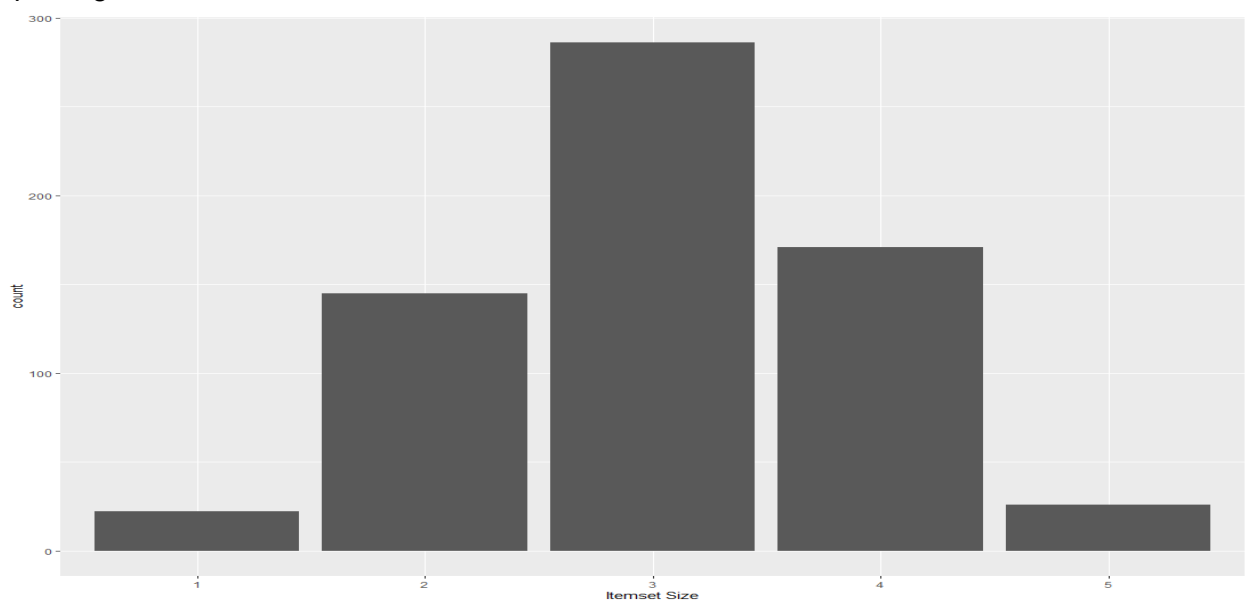
#Sorting by Support

```
> its <- sort(its, by = "support")
> #inspecting
> inspect(head(its, n = 10))
```

	items	support	count
[1]	{current_act=YES}	0.7583333	455
[2]	{save_act=YES}	0.6900000	414
[3]	{married=YES}	0.6600000	396
[4]	{mortgage=NO}	0.6516667	391
[5]	{pep=NO}	0.5433333	326
[6]	{save_act=YES, current_act=YES}	0.5316667	319
[7]	{car=NO}	0.5066667	304
[8]	{current_act=YES, mortgage=NO}	0.5016667	301
[9]	{sex=MALE}	0.5000000	300
[10]	{sex=FEMALE}	0.5000000	300

```
> |
```

#plotting



#Model Creation using APRIORI algorithm

```
> rules <- apriori(trans, parameter = list(support = 0.05, confidence = 0.9))
Apriori

Parameter specification:
 confidence minval smax arem aval originalsupport maxtime support minlen maxlen target ext
 0.9      0.1      1 none FALSE          TRUE      5      0.05      1      10 rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
 0.1 TRUE TRUE FALSE TRUE 2 TRUE

Absolute minimum support count: 30

set item appearances ... [0 item(s)] done [0.00s].
set transactions ... [1271 item(s), 600 transaction(s)] done [0.04s].
sorting and recoding items ... [22 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 7 done [0.01s].
writing ... [77 rule(s)] done [0.02s].
creating S4 object ... done [0.00s].
> length(rules)
[1] 77
```

Show rules 1-10

```
> #Show rules
> inspect(rules[1:10])
lhs                rhs                support  confidence  coverage  lift    count
[1] {region=SUBURBAN, mortgage=NO} => {current_act=YES} 0.06000000 0.90000000 0.06666667 1.186813 36
[2] {children=0, current_act=NO, pep=NO} => {married=YES} 0.06000000 0.90000000 0.06666667 1.363636 36
[3] {children=0, save_act=NO, mortgage=YES} => {pep=YES} 0.05666667 0.9189189 0.06166667 2.012231 34
[4] {children=0, save_act=NO, pep=NO} => {mortgage=NO} 0.05500000 0.9166667 0.06000000 1.406650 33
[5] {children=0, save_act=NO, pep=NO} => {married=YES} 0.05666667 0.9444444 0.06000000 1.430976 34
[6] {married=NO, children=0, mortgage=NO} => {pep=YES} 0.07500000 0.9375000 0.08000000 2.052920 45
[7] {children=0, mortgage=YES, pep=NO} => {save_act=YES} 0.09500000 0.9500000 0.10000000 1.376812 57
[8] {children=0, save_act=YES, mortgage=YES} => {pep=NO} 0.09500000 0.9193548 0.10333333 1.692064 57
[9] {children=0, mortgage=NO, pep=NO} => {married=YES} 0.17333333 0.9719626 0.17833333 1.472671 104
[10] {married=YES, children=1, save_act=YES, current_act=YES} => {pep=YES} 0.07333333 0.9166667 0.08000000 2.007299 44
```

#Look at rules with highest lift

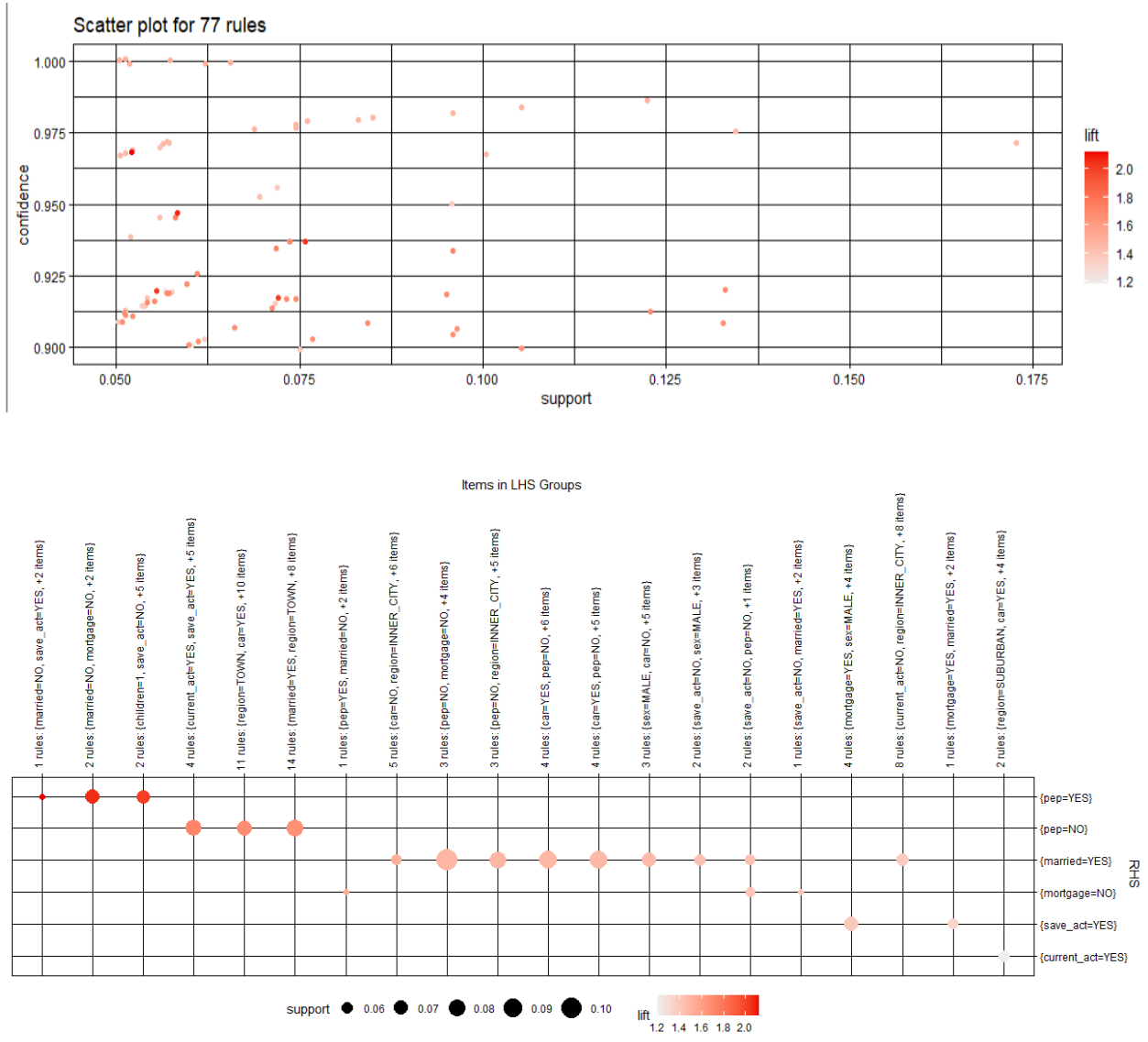
```
lhs                rhs                support  confidence  coverage  lift    count
[1] {married=NO, children=0, save_act=YES, mortgage=NO} => {pep=YES} 0.05166667 0.9687500 0.05333333 2.121350 31
[2] {married=NO, children=0, current_act=YES, mortgage=NO} => {pep=YES} 0.05833333 0.9459459 0.06166667 2.071414 35
[3] {married=NO, children=0, mortgage=NO} => {pep=YES} 0.07500000 0.9375000 0.08000000 2.052920 45
[4] {children=0, save_act=NO, mortgage=YES} => {pep=YES} 0.05666667 0.9189189 0.06166667 2.012231 34
[5] {married=NO, children=1, save_act=NO, current_act=YES} => {pep=YES} 0.07333333 0.9166667 0.08000000 2.007299 44
[6] {sex=FEMALE, married=YES, children=0, save_act=YES, current_act=YES, mortgage=NO} => {pep=NO} 0.05833333 0.9459459 0.06166667 1.741005 35
[7] {sex=FEMALE, married=YES, children=0, save_act=YES, current_act=YES} => {pep=NO} 0.07333333 0.9361702 0.07833333 1.723013 44
[8] {children=0, save_act=YES, current_act=YES, mortgage=YES} => {pep=NO} 0.07166667 0.9347826 0.07666667 1.720459 43
[9] {married=NO, children=0, save_act=NO, current_act=YES, mortgage=NO} => {pep=NO} 0.09500000 0.9344262 0.10166667 1.719803 57
[10] {region=TOWN, married=NO, children=0, save_act=YES} => {pep=NO} 0.06166667 0.9250000 0.06666667 1.702454 37
[11] {married=NO, children=0, car=YES, save_act=YES, current_act=YES} => {pep=NO} 0.06000000 0.9230769 0.06500000 1.698915 36
[12] {married=NO, children=0, save_act=YES, current_act=YES} => {pep=NO} 0.13333333 0.9195402 0.14500000 1.692405 80
[13] {children=0, save_act=YES, mortgage=YES} => {pep=NO} 0.09500000 0.9193548 0.10333333 1.692064 57
[14] {married=NO, children=0, car=YES, save_act=YES, mortgage=NO} => {pep=NO} 0.05666667 0.9189189 0.06166667 1.691262 34
[15] {married=NO, children=0, car=YES, current_act=YES, mortgage=NO} => {pep=NO} 0.05666667 0.9189189 0.06166667 1.691262 34
[16] {sex=MALE, children=0, save_act=YES, mortgage=YES} => {pep=NO} 0.05500000 0.9166667 0.06000000 1.687117 33
[17] {sex=FEMALE, married=YES, children=0, car=NO, save_act=YES} => {pep=NO} 0.05500000 0.9166667 0.06000000 1.687117 33
[18] {sex=FEMALE, married=YES, children=0, save_act=YES, mortgage=NO} => {pep=NO} 0.07333333 0.9166667 0.08000000 1.687117 44
[19] {married=NO, children=0, car=NO, save_act=YES, current_act=YES} => {pep=NO} 0.07333333 0.9166667 0.08000000 1.687117 44
[20] {region=INNER_CITY, married=YES, children=0, current_act=YES, mortgage=NO} => {pep=NO} 0.07000000 0.9130435 0.07666667 1.680448 42
[21] {married=NO, children=0, save_act=YES, mortgage=NO} => {pep=NO} 0.12166667 0.9125000 0.12333333 1.679448 73
[22] {region=TOWN, married=YES, children=0, current_act=YES} => {pep=NO} 0.05166667 0.9117647 0.05666667 1.678095 31
[23] {sex=FEMALE, region=INNER_CITY, married=YES, children=0, mortgage=NO} => {pep=NO} 0.05166667 0.9117647 0.05666667 1.678095 31
[24] {married=NO, children=0, car=NO, save_act=YES, current_act=YES, mortgage=NO} => {pep=NO} 0.05166667 0.9117647 0.05666667 1.678095 31
[25] {married=NO, children=0, current_act=YES, mortgage=NO} => {pep=NO} 0.13333333 0.9090909 0.14666667 1.673173 80
[26] {sex=MALE, married=YES, children=0, current_act=YES, mortgage=NO} => {pep=NO} 0.05000000 0.9090909 0.05500000 1.673173 30
[27] {sex=FEMALE, married=YES, children=0, current_act=YES, mortgage=NO} => {pep=NO} 0.08333333 0.9090909 0.09166667 1.673173 59
[28] {married=NO, children=0, car=NO, save_act=YES, mortgage=NO} => {pep=NO} 0.06500000 0.9069767 0.07166667 1.669282 30
[29] {married=NO, children=0, car=NO, save_act=YES} => {pep=NO} 0.09666667 0.9062500 0.10666667 1.667945 58
[30] {sex=FEMALE, married=YES, children=0, save_act=YES, current_act=YES} => {pep=NO} 0.06000000 0.9000000 0.06666667 1.654442 36
[31] {sex=FEMALE, married=YES, children=0, car=NO, mortgage=NO} => {pep=NO} 0.06166667 0.9024390 0.06833333 1.660931 37
[32] {married=NO, children=0, car=NO, current_act=YES, mortgage=NO} => {pep=NO} 0.07666667 0.9019608 0.08500000 1.660051 46
[33] {sex=FEMALE, married=YES, children=0, mortgage=NO} => {pep=NO} 0.10500000 0.9000000 0.11666667 1.654442 63
[34] {sex=MALE, married=YES, children=0, save_act=YES, current_act=YES} => {pep=NO} 0.06166667 0.9000000 0.06666667 1.654442 36
[35] {married=NO, children=0, save_act=YES, pep=YES} => {mortgage=NO} 0.05166667 1.0000000 0.05166667 1.534527 31
[36] {sex=FEMALE, region=INNER_CITY, children=0, mortgage=NO, pep=NO} => {married=YES} 0.05166667 1.0000000 0.05166667 1.515152 31
[37] {region=INNER_CITY, children=0, save_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.05666667 1.0000000 0.05666667 1.515152 31
[38] {sex=FEMALE, children=0, car=NO, mortgage=NO, pep=NO} => {married=YES} 0.06166667 1.0000000 0.06166667 1.515152 37
[39] {children=0, save_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.06500000 1.0000000 0.06500000 1.515152 39
[40] {children=0, car=NO, save_act=YES, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.05166667 1.0000000 0.05166667 1.515152 31
[41] {children=0, save_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.12166667 0.9864865 0.12333333 1.494676 73
[42] {sex=FEMALE, children=0, mortgage=NO, pep=NO} => {married=YES} 0.10500000 0.9843750 0.10666667 1.491477 63
[43] {children=0, save_act=YES, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.09500000 0.9827586 0.09666667 1.489028 57
[44] {region=INNER_CITY, children=0, mortgage=NO, pep=NO} => {married=YES} 0.08500000 0.9807692 0.08666667 1.486014 51
[45] {sex=FEMALE, children=0, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.08333333 0.9803922 0.08500000 1.484543 50
[46] {children=0, car=NO, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.06666667 0.9787234 0.07833333 1.482914 46
[47] {children=0, car=YES, mortgage=NO, pep=NO} => {married=YES} 0.07333333 0.9777778 0.07500000 1.481481 44
[48] {sex=FEMALE, children=0, save_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.07333333 0.9777778 0.07500000 1.481481 44
[49] {region=INNER_CITY, children=0, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.07000000 0.976442 0.07166667 1.479915 42
[50] {children=0, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.13333333 0.9756098 0.13666667 1.478197 80
[51] {sex=FEMALE, children=0, save_act=YES, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.05833333 0.9722222 0.06000000 1.472671 104
[52] {children=0, mortgage=NO, pep=NO} => {married=YES} 0.17333333 0.9719626 0.17833333 1.472671 104
[53] {children=0, car=YES, save_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.05666667 0.9714286 0.05833333 1.471861 34
[54] {children=0, car=NO, save_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.06666667 0.9714286 0.05833333 1.471861 34
[55] {children=0, car=NO, mortgage=NO, pep=NO} => {married=YES} 0.10000000 0.9677419 0.10333333 1.466276 60
[56] {region=INNER_CITY, children=0, car=NO, mortgage=NO, pep=NO} => {married=YES} 0.05000000 0.9677419 0.05166667 1.466276 30
[57] {sex=MALE, children=0, current_act=YES, mortgage=NO, pep=NO} => {married=YES} 0.05000000 0.9677419 0.05166667 1.466276 30
```

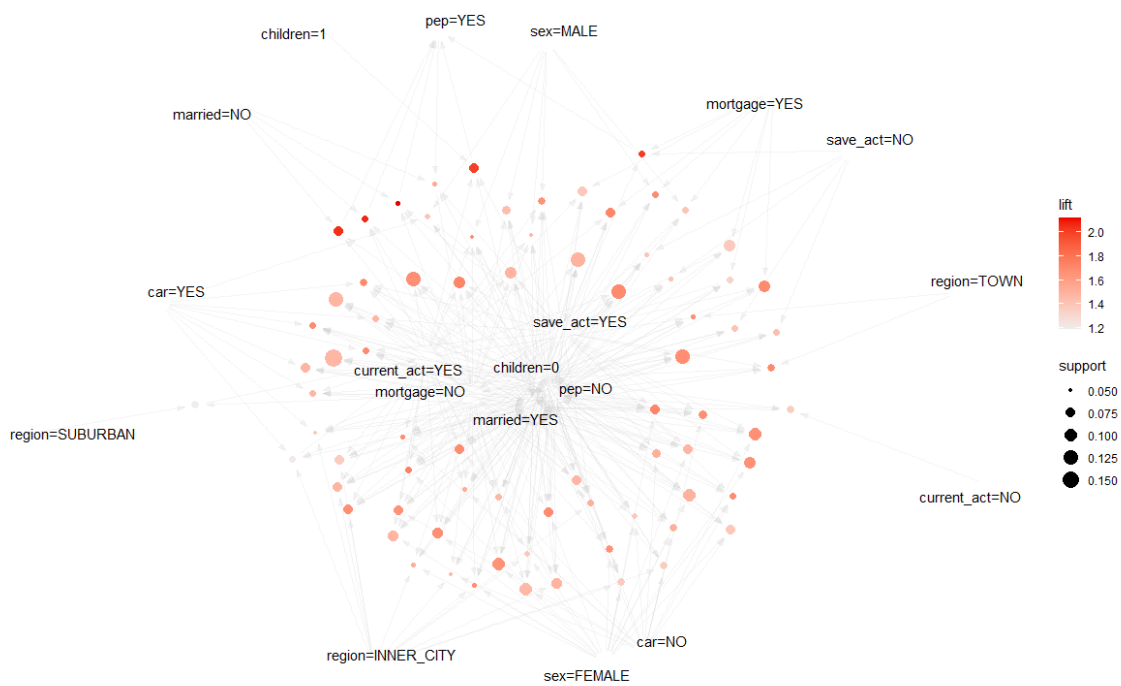
#Show rules 1-10 with highest lift

```
> inspect(head(rules, n = 10))
```

	lhs	rhs	support	confidence	coverage	lift	count
[1]	{married=NO, children=0, save_act=YES, mortgage=NO}	=> {pep=YES}	0.05166667	0.9687500	0.05333333	2.121350	31
[2]	{married=NO, children=0, current_act=YES, mortgage=NO}	=> {pep=YES}	0.05833333	0.9459459	0.06166667	2.071414	35
[3]	{married=NO, children=0, mortgage=NO}	=> {pep=YES}	0.07500000	0.9375000	0.08000000	2.052920	45
[4]	{children=0, save_act=NO, mortgage=YES}	=> {pep=YES}	0.05666667	0.9189189	0.06166667	2.012231	34
[5]	{married=YES, children=1, save_act=YES, current_act=YES}	=> {pep=YES}	0.07333333	0.9166667	0.08000000	2.007299	44
[6]	{sex=FEMALE, married=YES, children=0, save_act=YES, current_act=YES, mortgage=NO}	=> {pep=NO}	0.05833333	0.9459459	0.06166667	1.741005	35
[7]	{sex=FEMALE, married=YES, children=0, save_act=YES, current_act=YES}	=> {pep=NO}	0.07333333	0.9361702	0.07833333	1.723013	44
[8]	{children=0, save_act=YES, current_act=YES, mortgage=YES}	=> {pep=NO}	0.07166667	0.9347826	0.07666667	1.720459	43
[9]	{married=YES, children=0, save_act=YES, current_act=YES, mortgage=NO}	=> {pep=NO}	0.09500000	0.9344262	0.10166667	1.719803	57
[10]	{region=TOWN, married=YES, children=0, save_act=YES}	=> {pep=NO}	0.06166667	0.9250000	0.06666667	1.702454	37

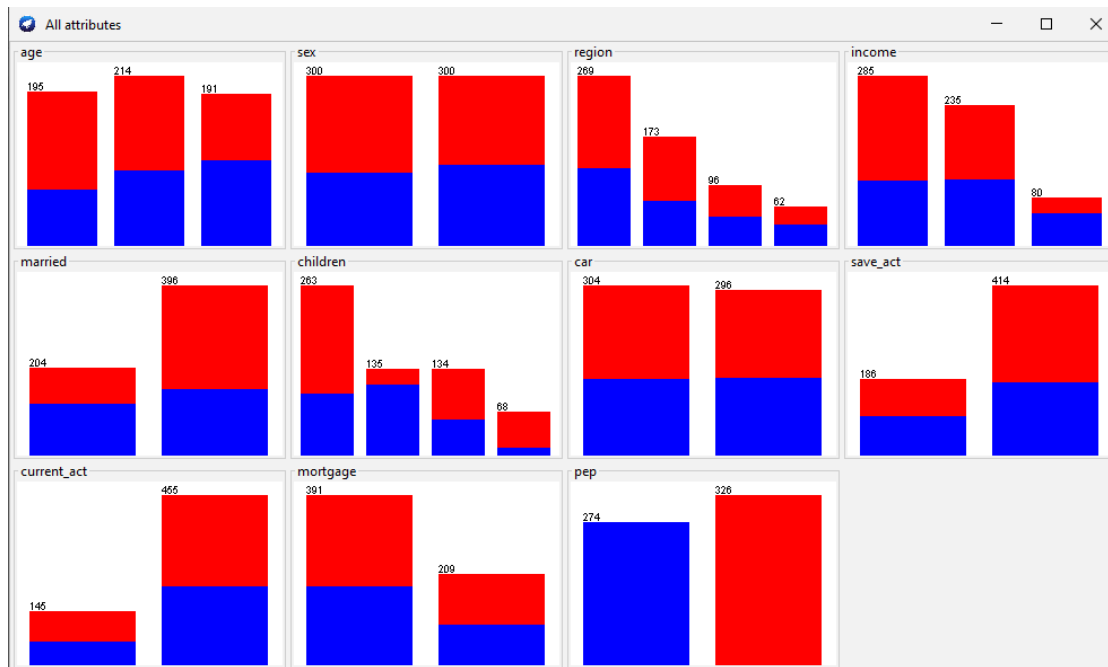
#Visualization





WEKA DOCUMENTATION

Visualization of the Attributes



Rule Mining Using APRIORI Parameters for Confidence

weka.gui.GenericObjectEditor

weka.associations.Apriori

About

Class implementing an Apriori-type algorithm.

More

Capabilities

car: False

classIndex: -1

delta: 0.05

doNotCheckCapabilities: False

lowerBoundMinSupport: 0.1

metricType: Confidence

minMetric: 0.9

numRules: 10

outputItemSets: False

removeAllMissingCols: False

significanceLevel: -1.0

treatZeroAsMissing: False

upperBoundMinSupport: 1.0

verbose: False

Open... Save... OK Cancel

Parameters for Lift

weka.gui.GenericObjectEditor

weka.associations.Apriori

About

Class implementing an Apriori-type algorithm.

More

Capabilities

car False

classIndex -1

delta 0.05

doNotCheckCapabilities False

lowerBoundMinSupport 0.1

metricType Lift

minMetric 1.5

numRules 10

outputItemSets False

removeAllMissingCols False

significanceLevel -1.0

treatZeroAsMissing False

upperBoundMinSupport 1.0

verbose False

Open... Save... OK Cancel

RESULTS OF ASSOCIATING RULE BASED ON APRIORI

1) Based on confidence:

```
=== Associator model (full training set) ===

Apriori
=====

Minimum support: 0.1 (60 instances)
Minimum metric <confidence>: 0.9
Number of cycles performed: 18

Generated sets of large itemsets:

Size of set of large itemsets L(1): 28

Size of set of large itemsets L(2): 232

Size of set of large itemsets L(3): 524

Size of set of large itemsets L(4): 277

Size of set of large itemsets L(5): 33

Best rules found:

1. income=43759_max 80 ==> save_act=YES 80 <conf:(1)> lift:(1.45) lev:(0.04) [24] conv:(24.8)
2. age=52_max income=43759_max 76 ==> save_act=YES 76 <conf:(1)> lift:(1.45) lev:(0.04) [23] conv:(23.56)
3. income=43759_max current_act=YES 63 ==> save_act=YES 63 <conf:(1)> lift:(1.45) lev:(0.03) [19] conv:(19.53)
4. age=52_max income=43759_max current_act=YES 61 ==> save_act=YES 61 <conf:(1)> lift:(1.45) lev:(0.03) [18] conv:(18.91)
5. children=0 save_act=YES mortgage=NO pep=NO 74 ==> married=YES 73 <conf:(0.99)> lift:(1.49) lev:(0.04) [24] conv:(12.58)
6. sex=FEMALE children=0 mortgage=NO pep=NO 64 ==> married=YES 63 <conf:(0.98)> lift:(1.49) lev:(0.03) [20] conv:(10.88)
7. children=0 current_act=YES mortgage=NO pep=NO 82 ==> married=YES 80 <conf:(0.98)> lift:(1.48) lev:(0.04) [25] conv:(9.29)
8. children=0 mortgage=NO pep=NO 107 ==> married=YES 104 <conf:(0.97)> lift:(1.47) lev:(0.06) [33] conv:(9.1)
9. income=43759_max current_act=YES 63 ==> age=52_max 61 <conf:(0.97)> lift:(3.04) lev:(0.07) [40] conv:(14.31)
10. income=43759_max save_act=YES current_act=YES 63 ==> age=52_max 61 <conf:(0.97)> lift:(3.04) lev:(0.07) [40] conv:(14.31)
```

2) Based on lift:

```
Apriori
=====

Minimum support: 0.15 (90 instances)
Minimum metric <lift>: 1.5
Number of cycles performed: 17

Generated sets of large itemsets:

Size of set of large itemsets L(1): 25

Size of set of large itemsets L(2): 166

Size of set of large itemsets L(3): 188

Size of set of large itemsets L(4): 38

Size of set of large itemsets L(5): 1

Best rules found:

1. age=0_34 195 ==> income=0_24386 current_act=YES 138 conf:(0.71) < lift:(1.97)> lev:(0.11) [68] conv:(2.16)
2. income=0_24386 current_act=YES 215 ==> age=0_34 138 conf:(0.64) < lift:(1.97)> lev:(0.11) [68] conv:(1.86)
3. age=0_34 car=NO 107 ==> income=0_24386 100 conf:(0.93) < lift:(1.97)> lev:(0.08) [49] conv:(7.02)
4. income=0_24386 285 ==> age=0_34 car=NO 100 conf:(0.35) < lift:(1.97)> lev:(0.08) [49] conv:(1.26)
5. income=0_24386 pep=NO 176 ==> age=0_34 111 conf:(0.63) < lift:(1.94)> lev:(0.09) [53] conv:(1.8)
6. age=0_34 195 ==> income=0_24386 pep=NO 111 conf:(0.57) < lift:(1.94)> lev:(0.09) [53] conv:(1.62)
7. age=0_34 195 ==> income=0_24386 save_act=YES 106 conf:(0.54) < lift:(1.91)> lev:(0.08) [50] conv:(1.55)
8. income=0_24386 save_act=YES 171 ==> age=0_34 106 conf:(0.62) < lift:(1.91)> lev:(0.08) [50] conv:(1.75)
9. income=0_24386 285 ==> age=0_34 mortgage=NO 113 conf:(0.4) < lift:(1.9)> lev:(0.09) [53] conv:(1.3)
10. age=0_34 mortgage=NO 125 ==> income=0_24386 113 conf:(0.9) < lift:(1.9)> lev:(0.09) [53] conv:(5.05)
```