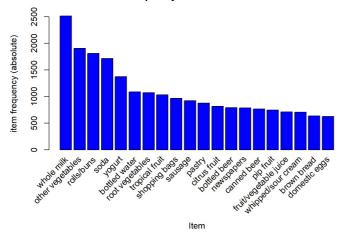
Practice with association rule mining

```
library(arules)
## Loading required package: Matrix
## Attaching package: 'arules'
## The following objects are masked from 'package:base':
library(arulesViz)
## Loading required package: grid
library(igraph)
## Attaching package: 'igraph'
## The following object is masked from 'package:arules':
##
## The following objects are masked from 'package:stats':
##
    decompose, spectrum
## The following object is masked from 'package:base':
##
##
grocery=read.transactions("groceries.txt", format="basket", sep=",")
#grocery graph=as.matrix(read.transactions("groceries.txt"))
itemFrequencyPlot(grocery,topN=20,type="absolute",col='blue',xlab='Item',main='Frequency of Item Purchased')
```

Frequency of Item Purchased



Cast this variable as a special arules "transactions" class.
gro_trans = as(grocery, "transactions")
summary(gro_trans)

```
\ensuremath{\mbox{\#\#}} transactions as item
Matrix in sparse format with
\#\# 9835 rows (elements/itemsets/transactions) and \#\# 169 columns (items) and a density of 0.02609146
##
## most frequent items:
                                                    rolls/buns
       whole milk other vegetables
##
             2513 1903
yogurt (Other)
                                                                                         1715
##
                                                                1809
##
                    1372
                                          34055
##
\#\# element (itemset/transaction) length distribution:
## sizes
## 51268

## 1 1 2 3 4 5 6 7 8 9 10 11 12 13 14

## 2159 1643 1299 1005 855 645 545 438 350 246 182 117 78 77

## 16 17 18 19 20 21 22 23 24 26 27 28 29 32

## 46 29 14 14 9 11 4 6 1 1 1 1 3 1
                                        6 7
                                                                                                     15
55
##
     Min. 1st Qu. Median Mean 3rd Qu. Max.
1.000 2.000 3.000 4.409 6.000 32.000
##
##
##
## includes extended item information - examples:
## 1 abrasive cleaner
## 2 artif. sweetener
## 3 baby cosmetics
```

```
gro_rules = apriori(gro_trans,parameter=list(support=.005, confidence=.5, maxlen=6))
```

```
## Apriori
## Parameter specification:
## confidence minval smax arem aval originalSupport maxtime support minlen
## 0.5 0.1 1 none FALSE TRUE 5 0.005 1
## maxlen target ext
## 6 rules FALSE
##
## Algorithmic control:
## filter tree heap memopt load sort verbose
## 0.1 TRUE TRUE FALSE TRUE 2 TRUE
##
## Absolute minimum support count: 49
##
## set item appearances ...[0 item(s)] done [0.00s].
## set transactions ...[169 item(s), 9835 transaction(s)] done [0.00s].
## screating transaction tree ... done [0.00s].
## creating transaction tree ... done [0.00s].
## creating Sybsets of size 1 2 3 4 done [0.00s].
## writing ... [120 rule(s)] done [0.00s].
## creating Sybsets of size 1 2 3 4 done [0.00s].
## creating Sybsets of size 1 2 3 done [0.00s].
## creating Sybsets of size 1 2 3 done [0.00s].
## creating Sybsets of size 1 2 3 done [0.00s].
```

inspect(gro_rules)

ins	spect (g	(ro_rules)								
##		lhs		rhs			confidence			
			=>	{whole	milk}	0.009252669	0.5229885	2.046793	91	
	[2]	{oil,								
##	[2]	other vegetables} {onions,	=>	{whole	milk}	0.005083884	0.5102041	1.996/60	50	
##			=>	{other	vegetables)	0.005693950	0.6021505	3.112008	56	
		{onions,		(,,					
##			=>	{other	vegetables}	0.006609049	0.5462185	2.822942	65	
##	[5]	{hygiene articles,								
##		other vegetables}	=>	{whole	milk}	0.005185562	0.5425532	2.123363	51	
		{other vegetables,								
##		<pre>sugar} {long life bakery product,</pre>		{whole	milk}	0.006304016	0.584905/	2.289115	62	
##		other vegetables}		{whole	milk}	0.005693950	0.5333333	2.087279	56	
		{cream cheese,			*					
##		yogurt}	=>	{whole	milk}	0.006609049	0.5327869	2.085141	65	
##		{chicken,								
##			=>	{other	vegetables}	0.005693950	0.5233645	2.704829	56	
##		{chicken,	_<	{whole	mille)	0.005998983	0 5514010	2 157002	59	
		root vegetables} {chicken,	-/	(WHOTE	milk)	0.003990903	0.3314019	2.13/993	33	
##			=>	{whole	milk}	0.005287239	0.5473684	2.142208	52	
		{coffee,								
##		yogurt}	=>	{whole	milk}	0.005083884	0.5208333	2.038359	50	
		{frozen vegetables,	_ <	(0.006100661	0 5263150	2 720002	60	
##		root vegetables} {frozen vegetables,	-/	(other	vegetables;	0.006100661	0.3263136	2.720002	60	
##			=>	{whole	milk}	0.006202339	0.5350877	2.094146	61	
		{frozen vegetables,								
##		rolls/buns}	=>	{whole	milk}	0.005083884	0.5000000	1.956825	50	
##		{frozen vegetables, other vegetables}	=>	{whole	milkl	0.009659380	0 5428571	2 124552	9.5	
		{beef,		(,					
##		yogurt}	=>	{whole	milk}	0.006100661	0.5217391	2.041904	60	
##	[18]	{beef, rolls/buns}	_ <	{whole	-:11-1	0.006812405	0 5000000	1 050005	67	
	[19]	{curd,		(WITOILE	MIIKI	0.000012403	0.3000000	1.550025	07	
##			=>	{whole	milk}	0.005897306	0.5631068	2.203802	58	
	[20]	{curd,								
##	[21]	tropical fruit} {curd,	=>	{yogur	E.}	0.005287239	0.5148515	3.690645	52	
##			=>	{other	vegetables}	0.005287239	0.5148515	2.660833	52	
		{curd,								
##		tropical fruit} {curd,	=>	{whole	milk}	0.006507372	0.6336634	2.479936	64	
##	[23]		=>	{other	vegetables}	0.005490595	0.5046729	2.608228	54	
##		{curd,								
##		root vegetables} {curd,	=>	{whole	milk}	0.006202339	0.5700935	2.231146	61	
##	[23]		=>	{whole	milk}	0.010066090	0.5823529	2.279125	99	
##	[26]	{curd,								
##		rolls/buns} {curd,	=>	{whole	milk}	0.005897306	0.5858586	2.292845	58	
##	[2/]		=>	{whole	milk}	0.009862735	0.5739645	2.246296	97	
	[28]	{pork,								
##			=>	{other	vegetables}	0.007015760	0.5149254	2.661214	69	
##	[29]	{pork, root vegetables}	-<	(whole	milk}	0.006812405	0.5000000	1 056025	67	
	[30]	{pork,		(WITOILE	MIIKI	0.000012403	0.3000000	1.550025	07	
##		rolls/buns}	=>	{whole	milk}	0.006202339	0.5495495	2.150744	61	
	[31]	{frankfurter,		, -						
##	[32]	tropical fruit} {frankfurter,	=>	{whole	milk}	0.005185562	U.5483871	2.146195	51	
##	1		=>	{whole	milk}	0.005083884	0.5000000	1.956825	50	
##	[33]	{frankfurter,								
##		= =	=>	{whole	milk}	0.006202339	0.5545455	2.170296	61	
##	[34]	{bottled beer, yogurt}	=>	{whole	milkl	0.005185562	0 5604396	2 193364	51	
	[35]	{brown bread,		(,					
##		=	=>	{whole	milk}	0.005693950	0.5333333	2.087279	56	
##		{brown bread, root vegetables}		{whole	millel	0.005693950	0.5600000	2 101642	56	
		{brown bread,	-/	(witOT6		0.00000000000	0.3000000		20	
##		other vegetables}	=>	{whole	milk}	0.009354347	0.5000000	1.956825	92	
	[38]	{domestic eggs,		(ada - 3	-:11-1	0.005105560	0 6010510	0 404000	F 4	
##	[391	margarine} {margarine,	=>	{whole	mllK}	0.005185562	0.6∠19512	∠.434099	51	
##			=>	{other	vegetables}	0.005897306	0.5321101	2.750028	58	
		{margarine,								
##			=>	{whole	milk}	0.007930859	0.5379310	2.105273	78	
##	[41]	{butter, domestic eggs}	=>	{whole	milk}	0.005998983	0.6210526	2.430582	59	
	[42]	{butter,			,					
##			=>	{other	vegetables}	0.005795628	0.5700000	2.945849	57	
##	[43]	{butter, whipped/sour cream}	=>	{whole	milk}	0.006710727	0.6600000	2.583008	66	
	[44]	{butter,		,	,					
##		citrus fruit}	=>	{whole	milk}	0.005083884	0.555556	2.174249	50	

##	[45]	{bottled water,							
##	[46]	butter} {butter,	=>	{whole	milk}	0.005388917	0.6022727	2.357084	53
##		tropical fruit}	=>	{other	vegetables}	0.005490595	0.5510204	2.847759	54
##	[47]	{butter, tropical fruit}	=>	{whole	milk}	0.006202339	0.6224490	2.436047	61
##	[48]	{butter, root vegetables}	=>	{other	vegetables}	0.006609049	0.5118110	2.645119	65
##	[49]	{butter, root vegetables}	=>	{whole	milk}	0.008235892	0.6377953	2.496107	81
##	[50]	{butter, yogurt}	->	{whole	milkl	0.009354347	0.6388889	2 500387	92
##	[51]	{butter,							
##	[52]	other vegetables} {newspapers,	=>	{whole	milk}	0.011489578	0.5736041	2.244885	113
##	[53]	root vegetables} {newspapers,	=>	{other	vegetables}	0.005998983	0.5221239	2.698417	59
##	[54]	root vegetables} {domestic eggs,	=>	{whole	milk}	0.005795628	0.5044248	1.974142	57
##	[55]	whipped/sour cream}	=>	{other	vegetables}	0.005083884	0.5102041	2.636814	50
##		{domestic eggs, whipped/sour cream}	=>	{whole	milk}	0.005693950	0.5714286	2.236371	56
##	[56]	{domestic eggs, pip fruit}	=>	{whole	milk}	0.005388917	0.6235294	2.440275	53
##	[57]	{citrus fruit, domestic eggs}	=>	{whole	milk}	0.005693950	0.5490196	2.148670	56
##	[58]	{domestic eggs, tropical fruit}	=>	{whole	milk}	0.006914082	0.6071429	2.376144	68
##	[59]	{domestic eggs,				0 007220702	0.5106383	2 620050	72
	[60]	root vegetables} {domestic eggs,			_	0.007320793			
##	[61]	root vegetables} {domestic eggs,	=>	{whole	milk}	0.008540925	0.5957447	2.331536	84
##	[62]	yogurt} {domestic eggs,	=>	{whole	milk}	0.007727504	0.5390071	2.109485	76
##	[63]	other vegetables} {fruit/vegetable juice,	=>	{whole	milk}	0.012302999	0.5525114	2.162336	121
##		root vegetables}	=>	{other	vegetables}	0.006609049	0.5508475	2.846865	65
##	[64]	<pre>{fruit/vegetable juice, root vegetables}</pre>	=>	{whole	milk}	0.006507372	0.5423729	2.122657	64
##	[65]	<pre>{fruit/vegetable juice, yogurt}</pre>	=>	{whole	milk}	0.009456024	0.5054348	1.978094	93
##	[66]	{pip fruit, whipped/sour cream}	=>	{other	vegetables}	0.005592272	0.6043956	3.123610	55
##	[67]	{pip fruit, whipped/sour cream}		{whole	_	0.005998983	0.6483516		59
##	[68]	{citrus fruit,							
##	[69]	whipped/sour cream} {citrus fruit,	=>	{other	vegetables}	0.005693950	0.5233645	2.704829	56
##	[70]	whipped/sour cream} {sausage,	=>	{whole	milk}	0.006304016	0.5794393	2.267722	62
##	[71]	whipped/sour cream} {tropical fruit,	=>	{whole	milk}	0.005083884	0.5617978	2.198679	50
##	[72]	whipped/sour cream} {tropical fruit,	=>	{other	vegetables}	0.007829181	0.5661765	2.926088	77
##		whipped/sour cream}	=>	{whole	milk}	0.007930859	0.5735294	2.244593	78
##	[73]	{root vegetables, whipped/sour cream}	=>	{other	vegetables}	0.008540925	0.5000000	2.584078	84
##	[74]	{root vegetables, whipped/sour cream}	=>	{whole	milk}	0.009456024	0.5535714	2.166484	93
##	[75]	<pre>{whipped/sour cream, yogurt}</pre>	=>	{whole	milk}	0.010879512	0.5245098	2.052747	107
	[76]	{rolls/buns, whipped/sour cream}		{whole		0.007829181			77
##	[77]	{other vegetables,							
##	[78]	whipped/sour cream} {pip fruit,		{whole		0.014641586			144
##	[79]	sausage} {pip fruit,	=>	{whole	milk}	0.005592272	0.5188679	2.030667	55
##	[80]	<pre>root vegetables} {pip fruit,</pre>	=>	{other	vegetables}	0.008134215	0.5228758	2.702304	80
##	[81]	root vegetables} {pip fruit,	=>	{whole	milk}	0.008947636	0.5751634	2.250988	88
##		yogurt}	=>	{whole	milk}	0.009557702	0.5310734	2.078435	94
##	[82]	<pre>{other vegetables, pip fruit}</pre>	=>	{whole	milk}	0.013523132	0.5175097	2.025351	133
##	[83]	<pre>{pastry, tropical fruit}</pre>	=>	{whole	milk}	0.006710727	0.5076923	1.986930	66
##	[84]	<pre>{pastry, root vegetables}</pre>	=>	{other	vegetables}	0.005897306	0.5370370	2.775491	58
##	[85]	<pre>{pastry, root vegetables}</pre>	=>	{whole	milk}	0.005693950	0.5185185	2.029299	56
	[86]	{pastry, yoqurt}		{whole			0.5172414		90
##	[87]	{citrus fruit,							
	[88]	root vegetables} {citrus fruit,			_	0.010371124			102
##	[89]	root vegetables} {root vegetables,	=>	{whole	milk}	0.009150991	0.5172414	2.024301	90
##	[90]	<pre>shopping bags} {sausage,</pre>	=>	{other	vegetables}	0.006609049	0.5158730	2.666112	65
##	[91]	tropical fruit} {root vegetables,	=>	{whole	milk}	0.007219115	0.5182482	2.028241	71
##		sausage}	=>	{whole	milk}	0.007727504	0.5170068	2.023383	76
##	[92]	{root vegetables, tropical fruit}	=>	{other	vegetables}	0.012302999	0.5845411	3.020999	121
##		{root vegetables, tropical fruit}	=>	{whole	milk}	0.011997966	0.5700483	2.230969	118
##	[94]	{tropical fruit, yogurt}	=>	{whole	milk}	0.015149975	0.5173611	2.024770	149
	[95]	{root vegetables, yogurt}				0.012913066			127
##	[96]	{root vegetables,			_		0.5629921		143
	[97]	yogurt} {rolls/buns,		{whole		0.014539908			
	[98]	<pre>root vegetables} {rolls/buns,</pre>			_	0.012201322			120
##	[99]	<pre>root vegetables} {other vegetables,</pre>	=>	{whole	milk}	0.012709710	0.5230126	2.046888	125
##		yogurt} {fruit/vegetable juice,	=>	{whole	milk}	0.022267412	0.5128806	2.007235	219
##		other vegetables, yogurt}	=>	{whole	milk}	0.005083884	0.6172840	2.415833	50
	[101]	{fruit/vegetable juice,			,		0 10		

yourt	##		whole milk,							
## (102) [cotter vegetables,				=>	{other	vegetables}	0.005083884	0.5376344	2.778578	50
## cot vegetables,		[102]				.,				
## (103) froot vegetables, whisped/sour cream, whisped/sour cream, whisped/sour cream, whisped/sour cream, whisped/sour cream, whole milk)										
## whipped/sour cream, ## whole milk)	##		whipped/sour cream}	=>	{whole	milk}	0.005185562	0.6071429	2.376144	51
## whipped/sour cream, ## whole milk)	##	[103]	{root vegetables.							
## (104) (other vegetables, whiped/sour cream, whiped/sour cream, whiped/sour cream, whiped/sour cream, whiped/sour cream, whole milk, who										
## [104] (other vegetables, whipped/sour cream, whitpped/sour cream, whitpped/s			= =	=>	{other	vegetables}	0.005185562	0.5483871	2.834150	51
## whipped/sour cream, ## yogurt		[104]				.,				
## (105) (whipped/sour cream, ## (105) (whipped/sour cream, ## (106) (whitped/sour cream, ## whole milk, ## yogurt)										
## [105] (whipped/sour cream,	##			=>	{whole	milk}	0.005592272	0.5500000	2.152507	5.5
## whole milk, yogurt)		[105]				*				
## (106) (other vegetables, pip fruit, pip f			= =							
## [106] Other vegetables, pip fruit, root vegetables	##			=>	{other	vegetables}	0.005592272	0.5140187	2.656529	55
## pip fruit,		[106]	= =			.,				
## [107] (pip fruit, ##		,	=							
## [107] {pip fruit,	##			=>	{whole	milk}	0.005490595	0.6750000	2.641713	54
## root vegetables, ## whole milk	##	[107]				*				
## whole milk										
## [108] (other vegetables, ## pip fruit, ## yogurt)	##			=>	{other	vegetables}	0.005490595	0.6136364	3.171368	54
## pip fruit, yogurt)		[108]			, , , , , , , ,	. 5 0)				-
## yogurt			=							
## [109] (pip fruit,	##		= =	=>	{whole	milk}	0.005083884	0.6250000	2.446031	50
## whole milk, yogurt)	##	[109]								
## [110] (citrus fruit, citrus fruit, cher vegetables, root vegetables)		-	= =							
## root vegetables,				=>	{other	vegetables}	0.005083884	0.5319149	2.749019	50
## [111] {citrus fruit,	##	[110]	{citrus fruit,							
<pre>## [111] {citrus fruit, ## root vegetables, ## whole milk}</pre>	##		other vegetables,							
## root vegetables, ## whole milk} => {other vegetables} 0.005795628 0.6333333 3.273165 57 ## [112] {root vegetables, ## tropical fruit, ## yogurt} => {whole milk} 0.005693950 0.7000000 2.739554 56 ## [113] {other vegetables, ## tropical fruit} => {whole milk} 0.007015760 0.5702479 2.231750 69 ## [114] {root vegetables, ## tropical fruit, ## whole milk} => {other vegetables} 0.007015760 0.5847458 3.022057 69 ## [115] {other vegetables, ## tropical fruit, ## whole milk} => {whole milk} 0.007625826 0.6198347 2.425816 75 ## [116] {tropical fruit, ## whole milk, ## yogurt} => {other vegetables} 0.007625826 0.5033557 2.601421 75 ## [117] {other vegetables, ## yogurt} => {whole milk} 0.007829181 0.6062992 2.372842 77 ## [118] {root vegetables, ## yogurt} => {other vegetables} 0.007829181 0.5384615 2.782853 77 ## [118] {other vegetables, ## yogurt} => {other vegetables} 0.007829181 0.5384615 2.782853 77 ## [118] {other vegetables, ## root vegetables, ## rolls/buns, ## root vegetables, ## rolls/buns, ## root vegetables, ## rolls/buns,	##		root vegetables}	=>	{whole	milk}	0.005795628	0.5588235	2.187039	57
## (112) {root vegetables, ## tropical fruit, ## yogurt}	##	[111]	{citrus fruit,							
<pre>## [112] (root vegetables, ## tropical fruit, ## yogurt)</pre>	##		root vegetables,							
<pre>## tropical fruit, ## yogurt)</pre>	##		whole milk}	=>	{other	vegetables}	0.005795628	0.6333333	3.273165	57
## 113 {other vegetables, root vegetables, whole milk}	##	[112]	{root vegetables,							
<pre>## [113] {other vegetables, # root vegetables, # tropical fruit)</pre>	##		tropical fruit,							
## root vegetables,	##		yogurt}	=>	{whole	milk}	0.005693950	0.7000000	2.739554	56
## tropical fruit)	##	[113]	{other vegetables,							
<pre>## [114] {root vegetables, ## tropical fruit, ## whole milk} => {other vegetables} 0.007015760 0.5847458 3.022057 69 ## [115] {other vegetables, ## tropical fruit, ## yogurt) => {whole milk} 0.007625826 0.6198347 2.425816 75 ## [116] {tropical fruit, ## whole milk, ## yogurt) => {other vegetables} 0.007625826 0.5033557 2.601421 75 ## [117] {other vegetables, ## root vegetables, ## yogurt) => {whole milk} 0.007829181 0.6062992 2.372842 77 ## [118] {root vegetables, ## whole milk, ## yogurt) => {other vegetables} 0.007829181 0.5384615 2.782853 77 ## [119] {other vegetables, ## root vegetables, ## root vegetables, ## root vegetables} => {whole milk} 0.007829181 0.5384615 2.782853 77 ## [119] {other vegetables, ## root vegetables} => {whole milk} 0.006202339 0.5083333 1.989438 61 ## [120] {other vegetables, ## roolls/buns,</pre>	##		root vegetables,							
<pre>## tropical fruit, ## whole milk}</pre>	##		tropical fruit}	=>	{whole	milk}	0.007015760	0.5702479	2.231750	69
## whole milk} => {other vegetables} 0.007015760 0.5847458 3.022057 69	##	[114]	{root vegetables,							
<pre>## [115] {other vegetables, ## tropical fruit, ## yogurt)</pre>	##		tropical fruit,							
## tropical fruit, ## yogurt	##		whole milk}	=>	{other	vegetables}	0.007015760	0.5847458	3.022057	69
## yogurt	##	[115]	{other vegetables,							
<pre>## [116] {tropical fruit, ## whole milk, ## yogurt)</pre>	##		tropical fruit,							
## whole milk, ## yogurt) => {other vegetables} 0.007625826 0.5033557 2.601421 75 ## [117] {other vegetables, ## yogurt} => {whole milk} 0.007829181 0.6062992 2.372842 77 ## [118] {root vegetables, ## whole milk, ## yogurt} => {other vegetables} 0.007829181 0.5384615 2.782853 77 ## [119] {other vegetables, ## rolls/buns, ## root vegetables} => {whole milk} 0.006202339 0.5083333 1.989438 61 ## [120] {other vegetables, ## rolls/buns,	##		yogurt}	=>	{whole	milk}	0.007625826	0.6198347	2.425816	75
## yogurt) => {other vegetables} 0.007625826 0.5033557 2.601421 75		[116]								
## [117] {other vegetables,	##		whole milk,							
## root vegetables, ## yogurt			= =	=>	{other	vegetables}	0.007625826	0.5033557	2.601421	75
## yogurt	##	[117]								
## [118] {root vegetables,										
<pre>## whole milk, ## yogurt} => {other vegetables} 0.007829181 0.5384615 2.782853 77 ## [119] {other vegetables, ## rool vegetables} => {whole milk} 0.006202339 0.5083333 1.989438 61 ## [120] {other vegetables, ## rolls/buns,</pre>				=>	{whole	milk}	0.007829181	0.6062992	2.372842	77
<pre>## yogurt)</pre>		[118]								
<pre>## [119] (other vegetables, ## rolls/buns, ## rover vegetables) => {whole milk} 0.006202339 0.5083333 1.989438 61 ## [120] {other vegetables, ## rolls/buns,</pre>										
## rolls/buns,				=>	{other	vegetables}	0.007829181	0.5384615	2.782853	77
## root vegetables} => {whole milk} 0.006202339 0.5083333 1.989438 61		[119]	=							
<pre>## [120] {other vegetables, ## rolls/buns,</pre>										
## rolls/buns,			=	=>	{whole	milk}	0.006202339	0.5083333	1.989438	61
		[120]	=							
## yogurt} => {whole milk} 0.005998983 0.5221239 2.043410 59										
	##		yogurt}	=>	{whole	milk}	0.005998983	0.5221239	2.043410	59

inspect(subset(gro_rules, subset=lift > 3))

<pre>lhs] {onions, root vegetables}] {curd, tropical fruit}</pre>		rhs {other vege			confidence	lift	count
root vegetables}] {curd,	=>	{other vege					
] {curd,	=>	{other vege					
			(abres	0.005693950	0.6021505	3.112008	56
tropical fruit}							
	=>	{yogurt}		0.005287239	0.5148515	3.690645	52
{pip fruit,							
whipped/sour cream}	=>	{other vege	tables}	0.005592272	0.6043956	3.123610	55
] {citrus fruit,		-					
root vegetables}	=>	{other vege	tables}	0.010371124	0.5862069	3.029608	102
] {root vegetables,		-					
tropical fruit}	=>	{other vege	tables}	0.012302999	0.5845411	3.020999	121
{pip fruit,							
root vegetables,							
whole milk}	=>	{other vege	tables}	0.005490595	0.6136364	3.171368	54
{citrus fruit,							
root vegetables,							
whole milk}	=>	{other vege	tables}	0.005795628	0.6333333	3.273165	57
] {root vegetables,		_					
tropical fruit,							
whole milk}	=>	{other vege	tables}	0.007015760	0.5847458	3.022057	69
	whipped/sour cream} { (citrus fruit, root vegetables} } { root vegetables, tropical fruit} } { pip fruit, root vegetables, whole milk} } { citrus fruit, root vegetables, whole milk} } { root vegetables, tropical fruit, root vegetables, tropical fruit,	<pre>whipped/sour cream} =></pre>	whipped/sour cream) => (other vege] (citrus fruit, root vegetables) => (other vege] (root vegetables, tropical fruit) => (other vege] (pip fruit, root vegetables, whole milk) => (other vege] (citrus fruit, root vegetables, whole milk) => (other vege] (root vegetables, tropical fruit, root vegetables, tropical fruit,	<pre>whipped/sour cream) => {other vegetables} { citrus fruit, root vegetables} => {other vegetables} } {root vegetables, tropical fruit} => {other vegetables} } {pip fruit, root vegetables, whole milk} => {other vegetables} } {citrus fruit, root vegetables, whole milk} => {other vegetables} } {root vegetables, tropical fruit,</pre>	<pre>whipped/sour cream) => {other vegetables} 0.005592272 { citrus fruit, root vegetables} => {other vegetables} 0.010371124 } {root vegetables, tropical fruit} => {other vegetables} 0.012302999 } {pip fruit, root vegetables, whole milk} => {other vegetables} 0.005490595 } {citrus fruit, root vegetables, whole milk} => {other vegetables} 0.005795628 } {root vegetables, tropical fruit,</pre>	<pre>whipped/sour cream} => {other vegetables} 0.005592272 0.6043956] {citrus fruit, root vegetables} => {other vegetables} 0.010371124 0.5862069] {root vegetables, tropical fruit} => {other vegetables} 0.012302999 0.5845411] {pip fruit, root vegetables, whole milk} => {other vegetables} 0.005490595 0.6136364] {citrus fruit, root vegetables, whole milk} => {other vegetables} 0.005795628 0.6333333] {root vegetables, tropical fruit,</pre>	<pre>whipped/sour cream} => {other vegetables} 0.005592272 0.6043956 3.123610] {citrus fruit, root vegetables} => {other vegetables} 0.010371124 0.5862069 3.029608] {root vegetables, tropical fruit) => {other vegetables} 0.012302999 0.5845411 3.020999] {pip fruit, root vegetables, whole milk} => {other vegetables} 0.005490595 0.6136364 3.171368] {citrus fruit, root vegetables, whole milk} => {other vegetables} 0.005795628 0.6333333 3.273165] {root vegetables,</pre>

inspect(subset(gro_rules, subset=confidence > 0.5))

##		lhs		rhs		support	confidence	lift	count
##	[1]	{baking powder}	=>	{whole	milk}	0.009252669	0.5229885	2.046793	91
##	[2]	{oil,							
##		other vegetables}	=>	{whole	milk}	0.005083884	0.5102041	1.996760	50
##	[3]	{onions,							
##		root vegetables}	=>	{other	vegetables}	0.005693950	0.6021505	3.112008	56
##	[4]	{onions,							
##		whole milk}	=>	{other	vegetables}	0.006609049	0.5462185	2.822942	65
##	[5]	{hygiene articles,							
##		other vegetables}	=>	{whole	milk}	0.005185562	0.5425532	2.123363	51
##	[6]	{other vegetables,							
##		sugar}	=>	{whole	milk}	0.006304016	0.5849057	2.289115	62
		{long life bakery product,							
##		other vegetables}	=>	{whole	milk}	0.005693950	0.5333333	2.087279	56
		{cream cheese,							
##		yogurt}	=>	{whole	milk}	0.006609049	0.5327869	2.085141	65
		{chicken,							
##		root vegetables}	=>	{other	vegetables}	0.005693950	0.5233645	2.704829	56
		{chicken,							
##		root vegetables}	=>	{whole	milk}	0.005998983	0.5514019	2.157993	59
		{chicken,							
##		rolls/buns}	=>	{whole	milk}	0.005287239	0.5473684	2.142208	52
		{coffee,							
##		yogurt}	=>	{whole	milk}	0.005083884	0.5208333	2.038359	50
		{frozen vegetables,							
##		root vegetables}	=>	{other	vegetables)	0 006100661	0 5263158	2 720082	60

##	[14]	{frozen vegetables,							
##	[15]	root vegetables} {frozen vegetables,	=>	{whole	milk}	0.006202339	0.5350877	2.094146	61
##	[16]	other vegetables} {beef,	=>	{whole	milk}	0.009659380	0.5428571	2.124552	95
##		yogurt}	=>	{whole	milk}	0.006100661	0.5217391	2.041904	60
##	[17]	{curd, whipped/sour cream}	=>	{whole	milk}	0.005897306	0.5631068	2.203802	58
##	[18]	{curd, tropical fruit}	=>	{yogur	E}	0.005287239	0.5148515	3.690645	52
##	[19]	{curd, tropical fruit}	=>	{other	vegetables}	0.005287239	0.5148515	2.660833	52
##	[20]	{curd, tropical fruit}	=>	{whole	milk}	0.006507372	0.6336634	2.479936	64
	[21]	{curd, root vegetables}	=>	{other	vegetables}	0.005490595	0.5046729	2 608228	5.4
	[22]	{curd, root vegetables}		{whole	_	0.006202339	0.5700935		61
##	[23]	{curd,							
	[24]	yogurt} {curd,		{whole		0.010066090	0.5823529		99
##	[25]	rolls/buns} {curd,		{whole		0.005897306	0.5858586		58
##	[26]	other vegetables} {pork,	=>	{whole	milk}	0.009862735	0.5739645		97
##	[27]	<pre>root vegetables} {pork,</pre>	=>	{other	vegetables}	0.007015760	0.5149254	2.661214	69
##	[28]	rolls/buns} {frankfurter,	=>	{whole	milk}	0.006202339	0.5495495	2.150744	61
##	[29]	tropical fruit} {frankfurter,	=>	{whole	milk}	0.005185562	0.5483871	2.146195	51
##	[30]	yogurt} {bottled beer,	=>	{whole	milk}	0.006202339	0.5545455	2.170296	61
##		yogurt}	=>	{whole	milk}	0.005185562	0.5604396	2.193364	51
##	[31]	{brown bread, tropical fruit}	=>	{whole	milk}	0.005693950	0.5333333	2.087279	56
##	[32]	{brown bread, root vegetables}	=>	{whole	milk}	0.005693950	0.5600000	2.191643	56
##	[33]	{domestic eggs, margarine}	=>	{whole	milk}	0.005185562	0.6219512	2.434099	51
##	[34]	<pre>{margarine, root vegetables}</pre>	=>	{other	vegetables}	0.005897306	0.5321101	2.750028	58
##	[35]	{margarine, rolls/buns}	=>	{whole	milk}	0.007930859	0.5379310	2.105273	78
##	[36]	{butter, domestic eggs}	=>	{whole	milk}	0.005998983	0.6210526	2.430582	59
	[37]	{butter, whipped/sour cream}			vegetables}	0.005795628	0.5700000	2.945849	57
	[38]	{butter, whipped/sour cream}		{whole	-	0.006710727	0.6600000		66
	[39]	{butter, citrus fruit}		{whole		0.005083884	0.5555556		50
##	[40]	{bottled water,							
	[41]	butter} {butter,		{whole		0.005388917	0.6022727		53
##	[42]	tropical fruit} {butter,	=>	{other	vegetables}	0.005490595	0.5510204	2.847759	54
##	[43]	<pre>tropical fruit} {butter,</pre>	=>	{whole	milk}	0.006202339	0.6224490	2.436047	61
##	[44]	<pre>root vegetables} {butter,</pre>	=>	{other	vegetables}	0.006609049	0.5118110	2.645119	65
##	[45]	<pre>root vegetables} {butter,</pre>	=>	{whole	milk}	0.008235892	0.6377953	2.496107	81
##	[46]	yogurt} {butter,	=>	{whole	milk}	0.009354347	0.6388889	2.500387	92
##	[47]	other vegetables} {newspapers,	=>	{whole	milk}	0.011489578	0.5736041	2.244885	113
##	[48]	root vegetables} {newspapers,	=>	{other	vegetables}	0.005998983	0.5221239	2.698417	59
##		root vegetables}	=>	{whole	milk}	0.005795628	0.5044248	1.974142	57
##	[49]	{domestic eggs, whipped/sour cream}	=>	{other	vegetables}	0.005083884	0.5102041	2.636814	50
##	[50]	{domestic eggs, whipped/sour cream}	=>	{whole	milk}	0.005693950	0.5714286	2.236371	56
##	[51]	{domestic eggs, pip fruit}	=>	{whole	milk}	0.005388917	0.6235294	2.440275	53
##	[52]	{citrus fruit, domestic eggs}	=>	{whole	milk}	0.005693950	0.5490196	2.148670	56
##	[53]	{domestic eggs, tropical fruit}	=>	{whole	milk}	0.006914082	0.6071429	2.376144	68
##	[54]	{domestic eggs, root vegetables}	=>	{other	vegetables}	0.007320793	0.5106383	2.639058	72
	[55]	{domestic eggs, root vegetables}		{whole	_	0.008540925	0.5957447		84
	[56]	{domestic eggs, yoqurt}		{whole		0.007727504	0.5390071		
	[57]	{domestic eggs, other vegetables}		{whole		0.012302999	0.5525114		121
##	[58]	{fruit/vegetable juice,							
	[59]	root vegetables} {fruit/vegetable juice,			_	0.006609049			65
	[60]	root vegetables} {fruit/vegetable juice,		{whole		0.006507372			64
	[61]	yogurt} {pip fruit,		{whole		0.009456024	0.5054348		93
##	[62]	<pre>whipped/sour cream} {pip fruit,</pre>	=>	{other	vegetables}	0.005592272	0.6043956	3.123610	55
##	[63]	whipped/sour cream} {citrus fruit,	=>	{whole	milk}	0.005998983	0.6483516	2.537421	59
##	[64]	whipped/sour cream} {citrus fruit,	=>	{other	vegetables}	0.005693950	0.5233645	2.704829	56
##	[65]	whipped/sour cream} {sausage,	=>	{whole	milk}	0.006304016	0.5794393	2.267722	62
##		whipped/sour cream}	=>	{whole	milk}	0.005083884	0.5617978	2.198679	50
##	[66]	{tropical fruit, whipped/sour cream}	=>	{other	vegetables}	0.007829181	0.5661765	2.926088	77
##		{tropical fruit, whipped/sour cream}	=>	{whole	milk}	0.007930859	0.5735294	2.244593	78
##		<pre>{root vegetables, whipped/sour cream}</pre>	=>	{whole	milk}	0.009456024	0.5535714	2.166484	93
##	[69]	<pre>{whipped/sour cream, yogurt}</pre>	=>	{whole	milk}	0.010879512	0.5245098	2.052747	107
##	[70]	<pre>{rolls/buns, whipped/sour cream}</pre>	=>	{whole	milk}	0.007829181	0.5347222	2.092715	77

##	[71]	{other vegetables,						
##		whipped/sour cream}	=>	{whole	milk}	0.014641586	0.5070423 1.984385	144
##		<pre>{pip fruit, sausage}</pre>	=>	{whole	milk}	0.005592272	0.5188679 2.030667	55
##	[73]	{pip fruit, root vegetables}	=>	{other	vegetables}	0.008134215	0.5228758 2.702304	80
##	[74]	{pip fruit, root vegetables}		{whole	-		0.5751634 2.250988	88
##	[75]	{pip fruit,						
##	[76]	yogurt} {other vegetables,	=>	{whole	milk}	0.009557702	0.5310734 2.078435	94
##	[77]	<pre>pip fruit} {pastry,</pre>	=>	{whole	milk}	0.013523132	0.5175097 2.025351	133
##		tropical fruit}	=>	{whole	milk}	0.006710727	0.5076923 1.986930	66
##		<pre>{pastry, root vegetables}</pre>	=>	{other	vegetables}	0.005897306	0.5370370 2.775491	58
##	[79]	{pastry, root vegetables}	=>	{whole	milk}	0.005693950	0.5185185 2.029299	56
##	[80]	{pastry, yogurt}	=>	{whole	milk}	0 009150991	0.5172414 2.024301	90
##	[81]	{citrus fruit,						
##	[82]	root vegetables} {citrus fruit,	=>	{other	vegetables}	0.0103/1124	0.5862069 3.029608	102
##	[83]	root vegetables} {root vegetables,	=>	{whole	milk}	0.009150991	0.5172414 2.024301	90
##	[8/1]	shopping bags} {sausage,	=>	{other	vegetables}	0.006609049	0.5158730 2.666112	65
##		tropical fruit}	=>	{whole	milk}	0.007219115	0.5182482 2.028241	71
##	[85]	<pre>{root vegetables, sausage}</pre>	=>	{whole	milk}	0.007727504	0.5170068 2.023383	76
##	[86]	<pre>{root vegetables, tropical fruit}</pre>	=>	{other	vegetables}	0.012302999	0.5845411 3.020999	121
	[87]	{root vegetables,		{whole	-		0.5700483 2.230969	118
##	[88]	tropical fruit} {tropical fruit,						
##	[89]	yogurt} {root vegetables,		{whole			0.5173611 2.024770	149
##	[901	yogurt} {rolls/buns,	=>	{whole	milk}	0.014539908	0.5629921 2.203354	143
##		root vegetables} {rolls/buns,	=>	{other	vegetables}	0.012201322	0.5020921 2.594890	120
##		root vegetables}	=>	{whole	milk}	0.012709710	0.5230126 2.046888	125
##	[92]	{other vegetables, yogurt}	=>	{whole	milk}	0.022267412	0.5128806 2.007235	219
##	[93]	<pre>{fruit/vegetable juice, other vegetables,</pre>						
##	[04]	yogurt}	=>	{whole	milk}	0.005083884	0.6172840 2.415833	50
##	[24]	<pre>{fruit/vegetable juice, whole milk,</pre>						
##	[95]	yogurt} {other vegetables,	=>	{other	vegetables}	0.005083884	0.5376344 2.778578	50
##		root vegetables, whipped/sour cream}	=>	{whole	milk}	0.005185562	0.6071429 2.376144	51
	[96]	{root vegetables, whipped/sour cream,						
##		whole milk}	=>	{other	vegetables}	0.005185562	0.5483871 2.834150	51
##	[97]	{other vegetables, whipped/sour cream,						
##	[98]	yogurt} {whipped/sour cream,	=>	{whole	milk}	0.005592272	0.5500000 2.152507	55
##		whole milk, yogurt}		(other	wogotables)	0 005502272	0.5140187 2.656529	55
##		{other vegetables,		(Ocher	vegecables;	0.003332272	0.3140107 2.030323	33
##		<pre>pip fruit, root vegetables}</pre>	=>	{whole	milk}	0.005490595	0.6750000 2.641713	54
##		{pip fruit, root vegetables,						
##		whole milk} {other vegetables,	=>	{other	vegetables}	0.005490595	0.6136364 3.171368	54
##		pip fruit,		() .)		0.005000004	0.6050000 0.446001	50
	[102]	yogurt} {pip fruit,	=>	{wnore	milk}	0.005083884	0.6250000 2.446031	50
##		whole milk, yogurt}	=>	{other	vegetables}	0.005083884	0.5319149 2.749019	50
##		{citrus fruit, other vegetables,						
##		root vegetables} {citrus fruit,	=>	{whole	milk}	0.005795628	0.5588235 2.187039	57
##		root vegetables,		(0+)	woodstable of	0.005705600	0 6000000 0 000100	5.7
	[105]	whole milk} {root vegetables,	=>	totner	vegetables}	0.005/95628	0.6333333 3.273165	57
##		tropical fruit, yogurt}	=>	{whole	milk}	0.005693950	0.7000000 2.739554	56
##		{other vegetables, root vegetables,						
##		tropical fruit} {root vegetables,	=>	{whole	milk}	0.007015760	0.5702479 2.231750	69
##		tropical fruit,		, .		0.00===	0.5048:	
##		whole milk} {other vegetables,	=>	{other	vegetables}	U.007015760	0.5847458 3.022057	69
##		tropical fruit, yogurt}	=>	{whole	milk}	0.007625826	0.6198347 2.425816	75
	[109]	{tropical fruit, whole milk,			•			
##		yogurt}	=>	{other	vegetables}	0.007625826	0.5033557 2.601421	75
##		{other vegetables, root vegetables,						
##		yogurt} {root vegetables,	=>	{whole	milk}	0.007829181	0.6062992 2.372842	77
##		whole milk, yogurt}	= \	{other	vegetableel	0.007829181	0.5384615 2.782853	77
##	[112]	{other vegetables,	-/	, Junet	yetabite)		2.702033	**
##		rolls/buns, root vegetables}	=>	{whole	milk}	0.006202339	0.5083333 1.989438	61
##		{other vegetables, rolls/buns,						
##		yogurt}	=>	{whole	milk}	0.005998983	0.5221239 2.043410	59
_		pect, we can see that other vege	4-1-1					

From the inspect, we can see that other vegetables and whole milk are the items mostly purchased and they are the items with highest support values. We can also find the two kinds of item are most frequently purchased in the plot of the Top 20 frequency of item purchased.

We can see that there are associations between people who buy a certain kind of items and also buy some of the more frequently purchased items. For instance, people who buy onion or root vegetables also tend to purchase other vegetables. And customers who buy diary products will also be more likely to buy whole milk.