

Market Basket Analysis Report

ElectronIndex Company

Nastaran Mahmoodzadeh
Fall 2020

Getting to know the transactional data

What are the most frequent items?

```
> head(sort, n=15)
```

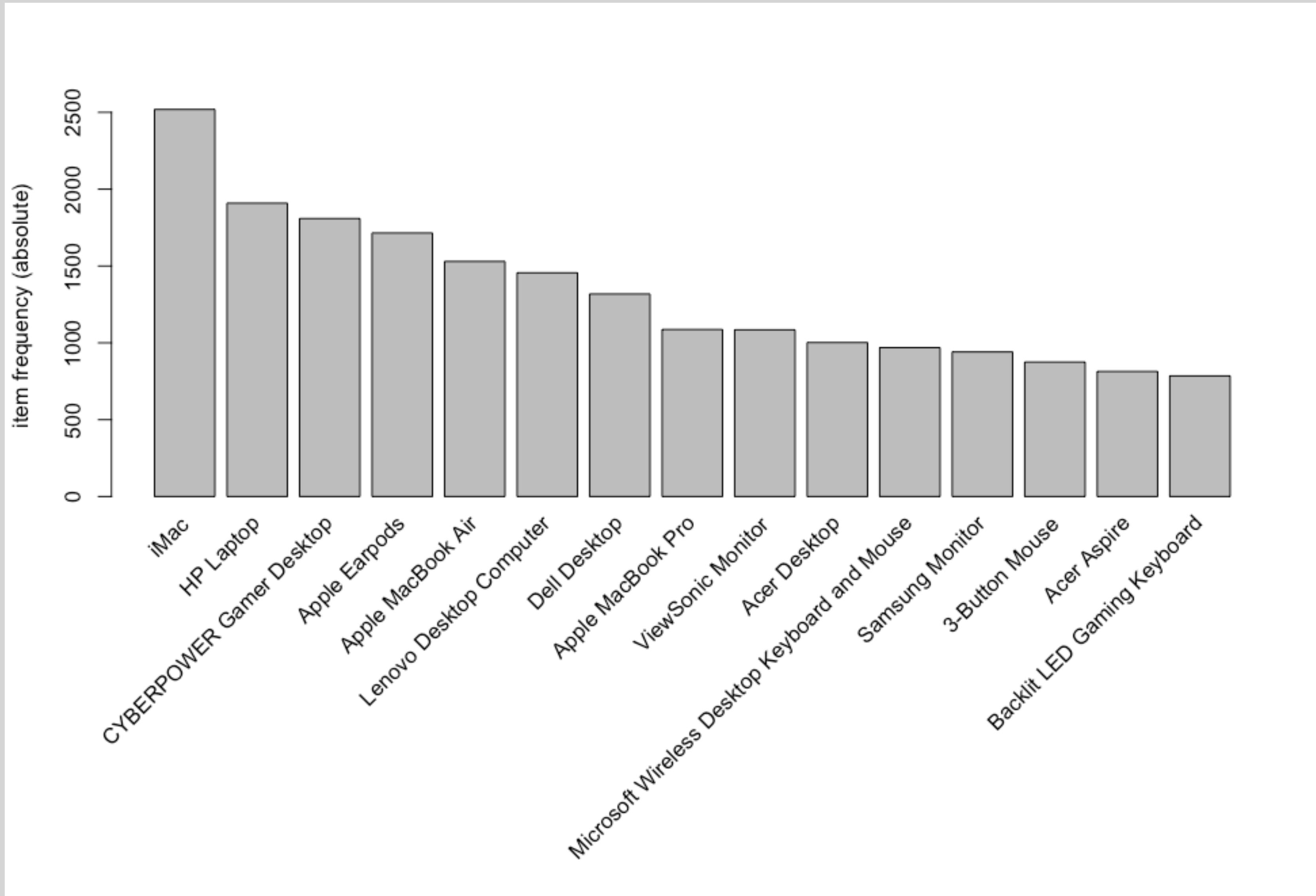
iMac	2519	HP Laptop	1909
CYBERPOWER Gamer Desktop	1809	Apple Earpods	1715
Apple MacBook Air	1530	Lenovo Desktop Computer	1456
Dell Desktop	1318	Apple MacBook Pro	1087
ViewSonic Monitor	1085	Acer Desktop	1002
Microsoft Wireless Desktop Keyboard and Mouse	969	Samsung Monitor	941
3-Button Mouse	875	Acer Aspire	814
Backlit LED Gaming Keyboard	785		
.	.		

How many items do customers purchase the most? 30 items

How many items do customers purchase the least? 1 items

What's the average? 4 items

Top 15 Frequent Sold Items



As we observed in previous plots, the most frequently purchased item amongst all transactions are **iMac**, and then **HP Laptop**.

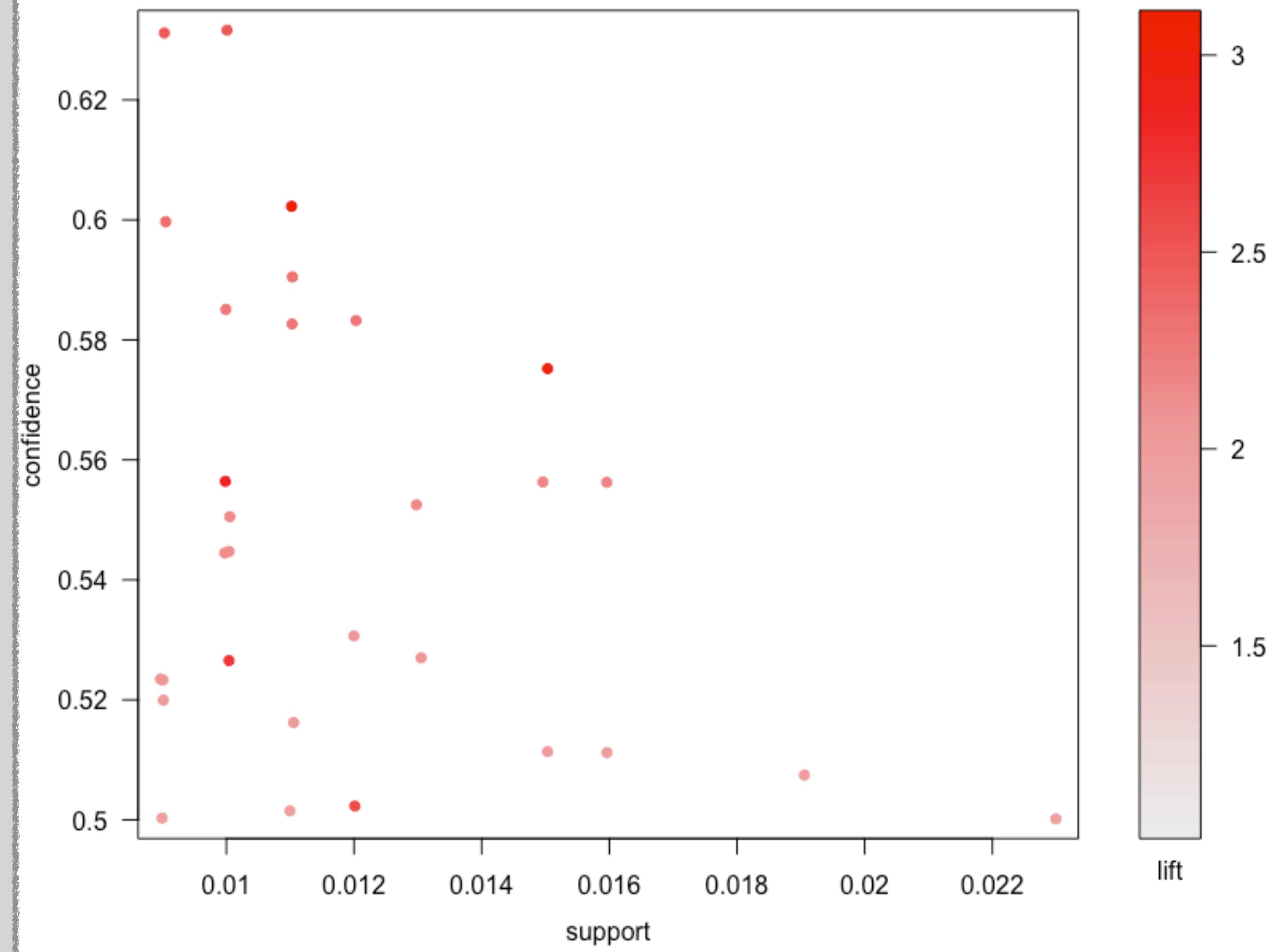
We did some experiments with multiple rulesets of which we got results from the second and the third one. We will go through the details of each ruleset and related plots in the following pages.

RuleSet(2)

Support of 0.009 & Confidence of 0.5

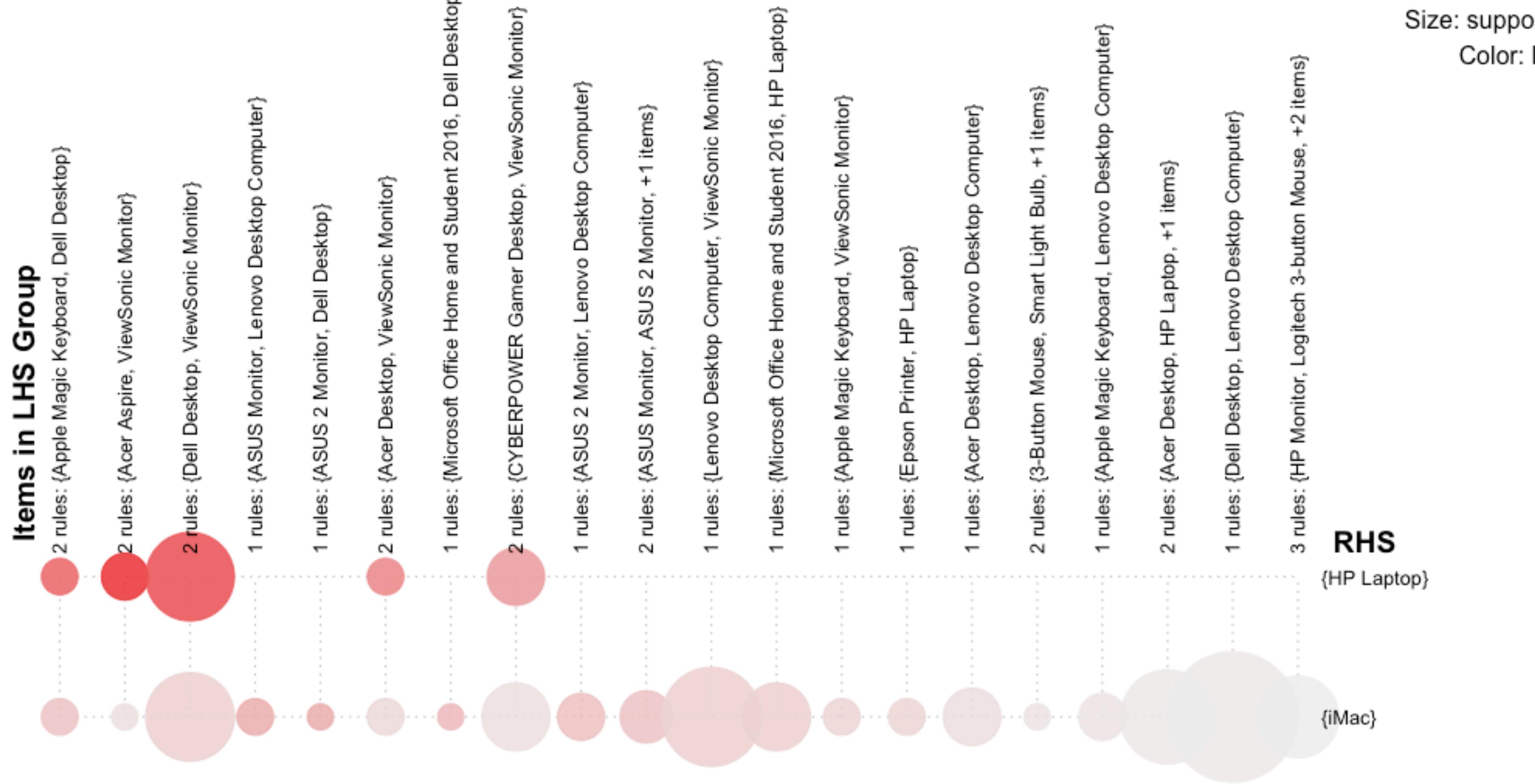
Result: 30 Rules

Scatter plot for 30 rules



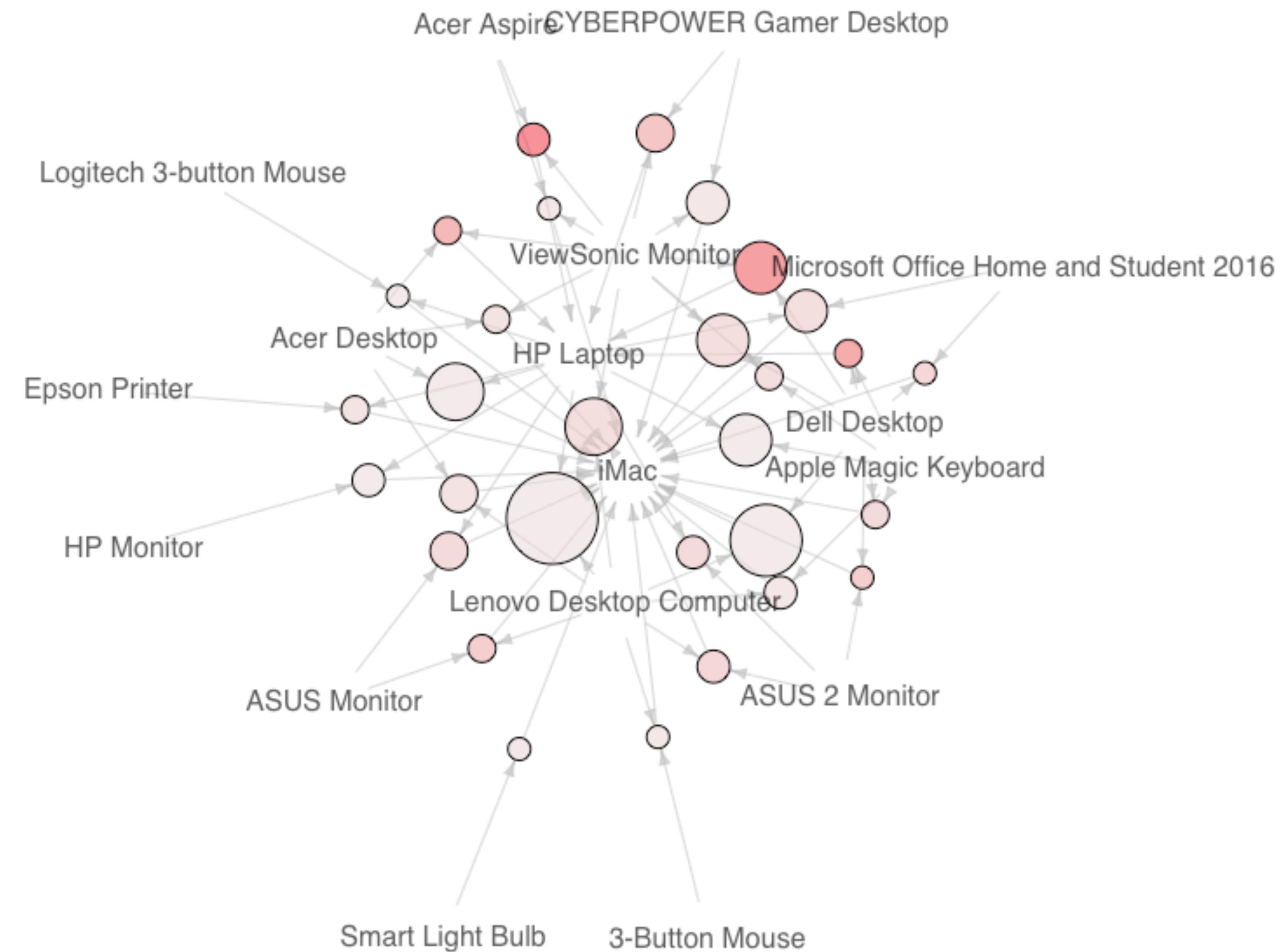
Grouped Matrix for 30 Rules

Items in LHS Group

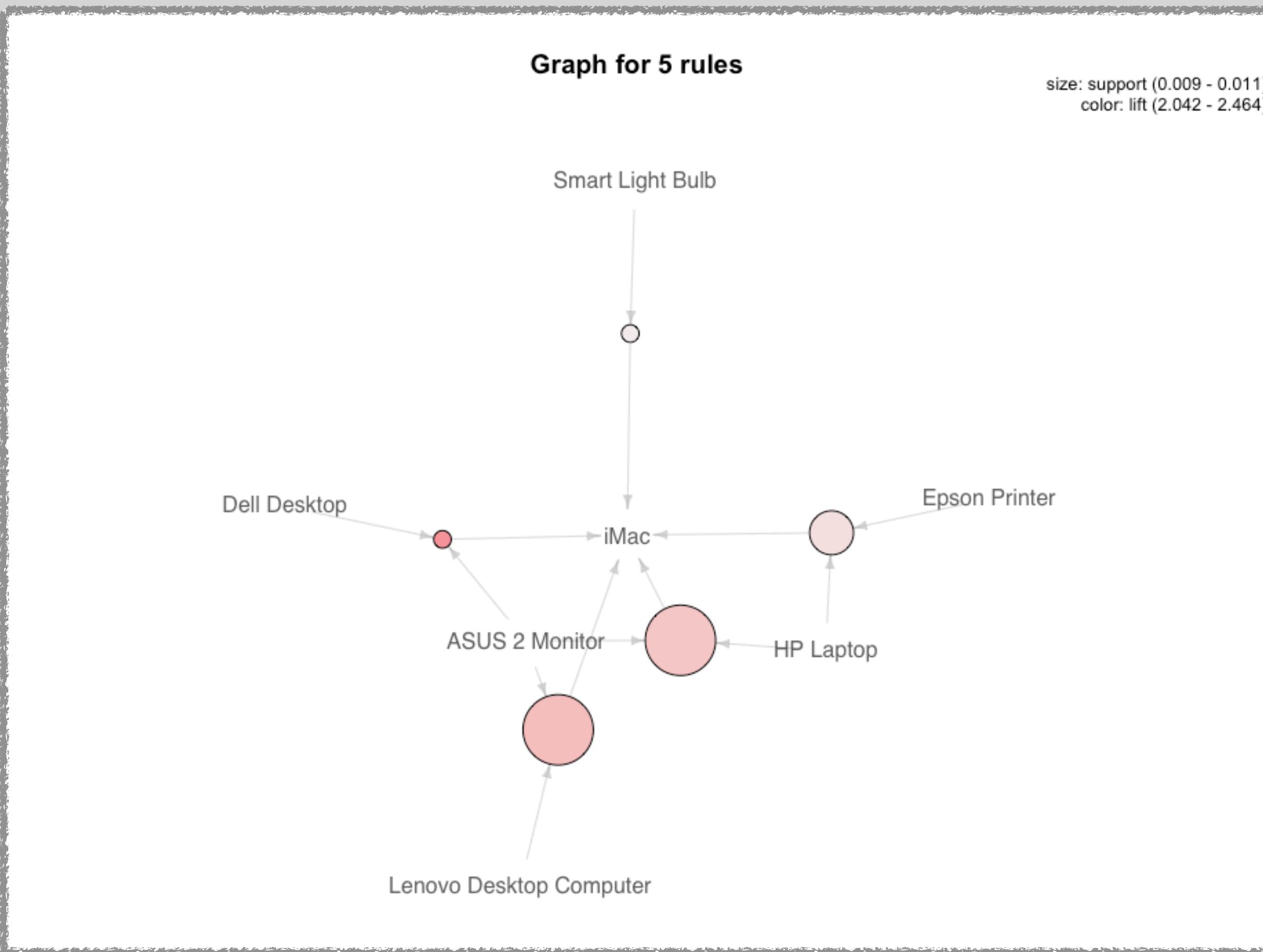


Graph for 30 rules

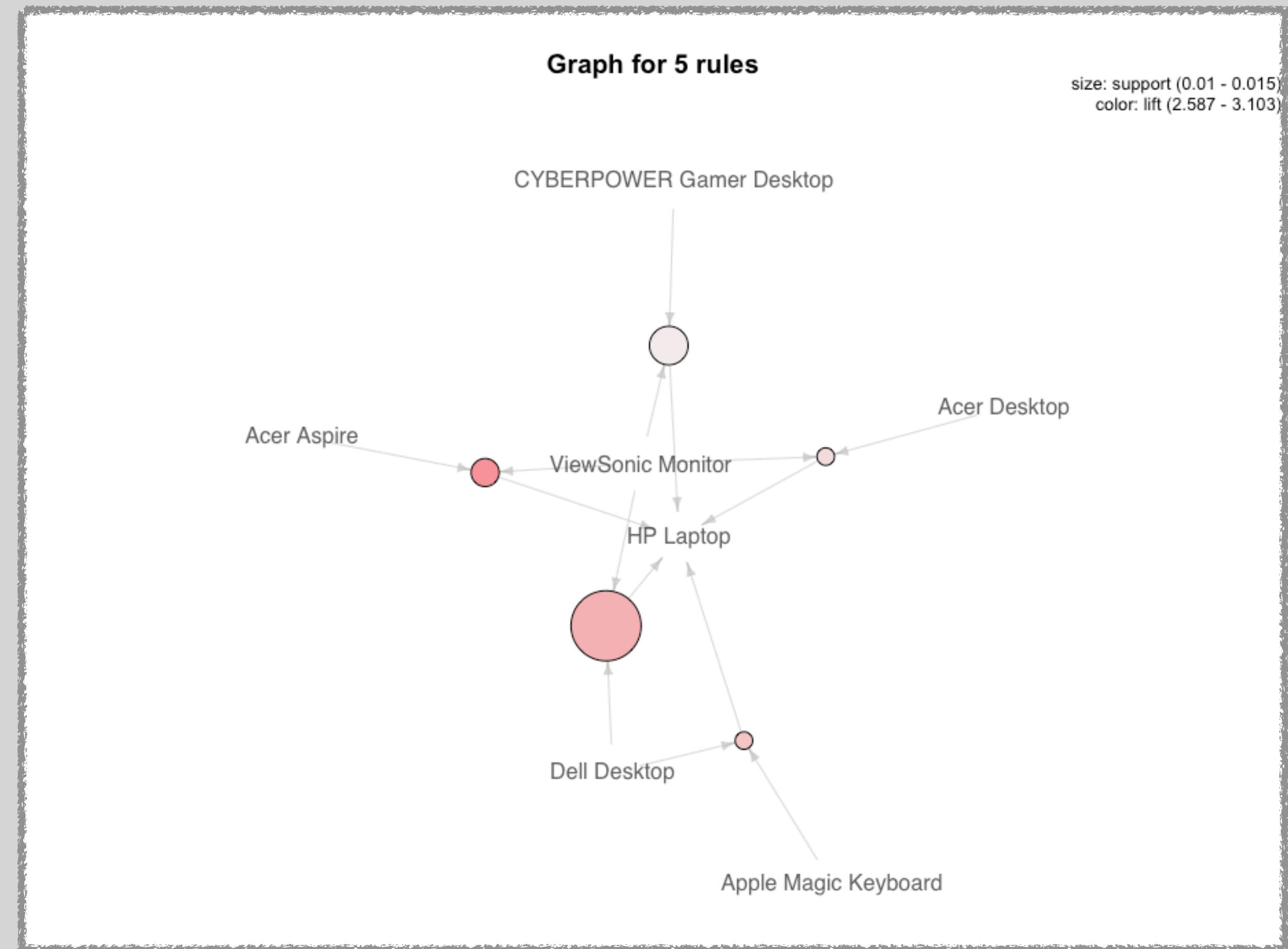
size: support (0.009 - 0.023)
color: lift (1.952 - 3.103)



Top 5 rules



Top 5 rules based on lift



RuleSet(2): Sorted by Support, Confidence, and Lift

```
> # Sort RuleZ by Support
> inspect(head(sort(rules2, by="supp")), 5)
  lhs                                rhs support confidence coverage lift count
[1] {HP Laptop,Lenovo Desktop Computer} => {iMac} 0.023  0.500      0.046   1.952 227
[2] {Dell Desktop,Lenovo Desktop Computer}=> {iMac} 0.019  0.507      0.037   1.979 183
[3] {Acer Desktop,HP Laptop}              => {iMac} 0.016  0.511      0.031   1.997 157
[4] {Lenovo Desktop Computer,ViewSonic Monitor}=> {iMac} 0.016  0.556      0.028   2.169 155
[5] {Apple Magic Keyboard,HP Laptop}       => {iMac} 0.015  0.511      0.029   1.993 145
```

```
> # Sort RuleZ by Confidence
> inspect(head(sort(rules2, by="conf")), 5)
  lhs                                rhs support confidence coverage lift count
[1] {ASUS Monitor,Lenovo Desktop Computer}=> {iMac} 0.010  0.632      0.015   2.466 96
[2] {ASUS 2 Monitor,Dell Desktop}          => {iMac} 0.009  0.631      0.014   2.464 89
[3] {Acer Aspire,ViewSonic Monitor}        => {HP Laptop} 0.011  0.602      0.018   3.103 106
[4] {Dell Desktop,Microsoft Office Home and Student 2016}=> {iMac} 0.009  0.600      0.016   2.343 93
[5] {ASUS 2 Monitor,Lenovo Desktop Computer}=> {iMac} 0.011  0.591      0.018   2.308 107
```

```
> # Sort RuleZ by Lift
> inspect(head(sort(rules2, by="lift")), 5)
  lhs                                rhs support confidence coverage lift count
[1] {Acer Aspire,ViewSonic Monitor}        => {HP Laptop} 0.011  0.602      0.018   3.103 106
[2] {Dell Desktop,ViewSonic Monitor}       => {HP Laptop} 0.015  0.575      0.027   2.961 150
[3] {Apple Magic Keyboard,Dell Desktop}    => {HP Laptop} 0.010  0.556      0.017   2.862 95
[4] {Acer Desktop,ViewSonic Monitor}       => {HP Laptop} 0.010  0.527      0.019   2.717 96
[5] {CYBERPOWER Gamer Desktop,ViewSonic Monitor}=> {HP Laptop} 0.012  0.502      0.024   2.587 120
```

First table shows the top 5 most frequent rules in ruleset(2). The first one suggests that “customers who bought HP Laptop and Lenovo Desktop Computer also bought iMac.” This has happened with the frequency (support) of 0.02.

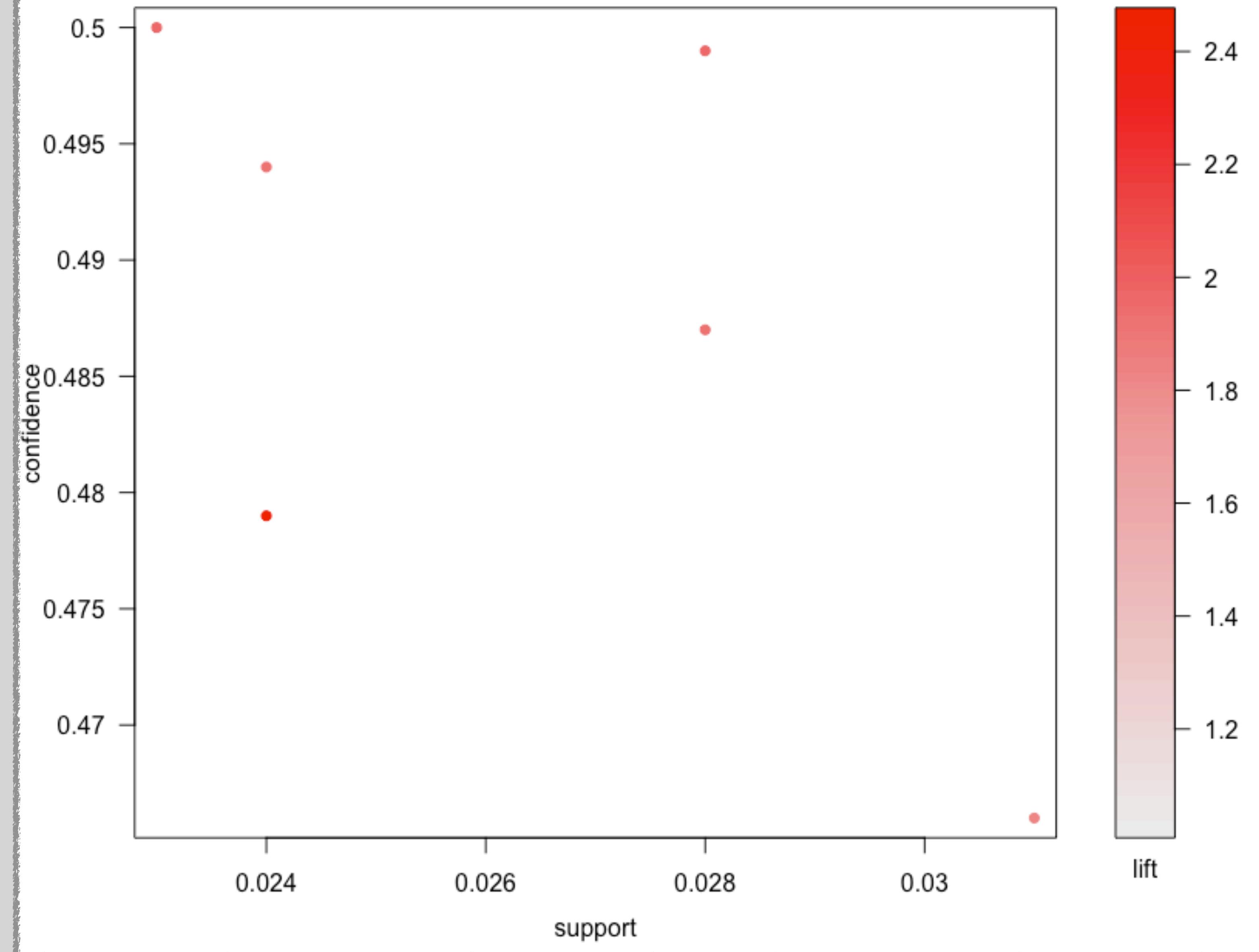
Second table shows the top 5 most strong rules in ruleset(2). The first one indicates that “there was a strong chance that customers who bought ASUS Monitor and Lenovo Desktop Computer also bought iMac.” This has happened with the strength (confidence) of 0.63.

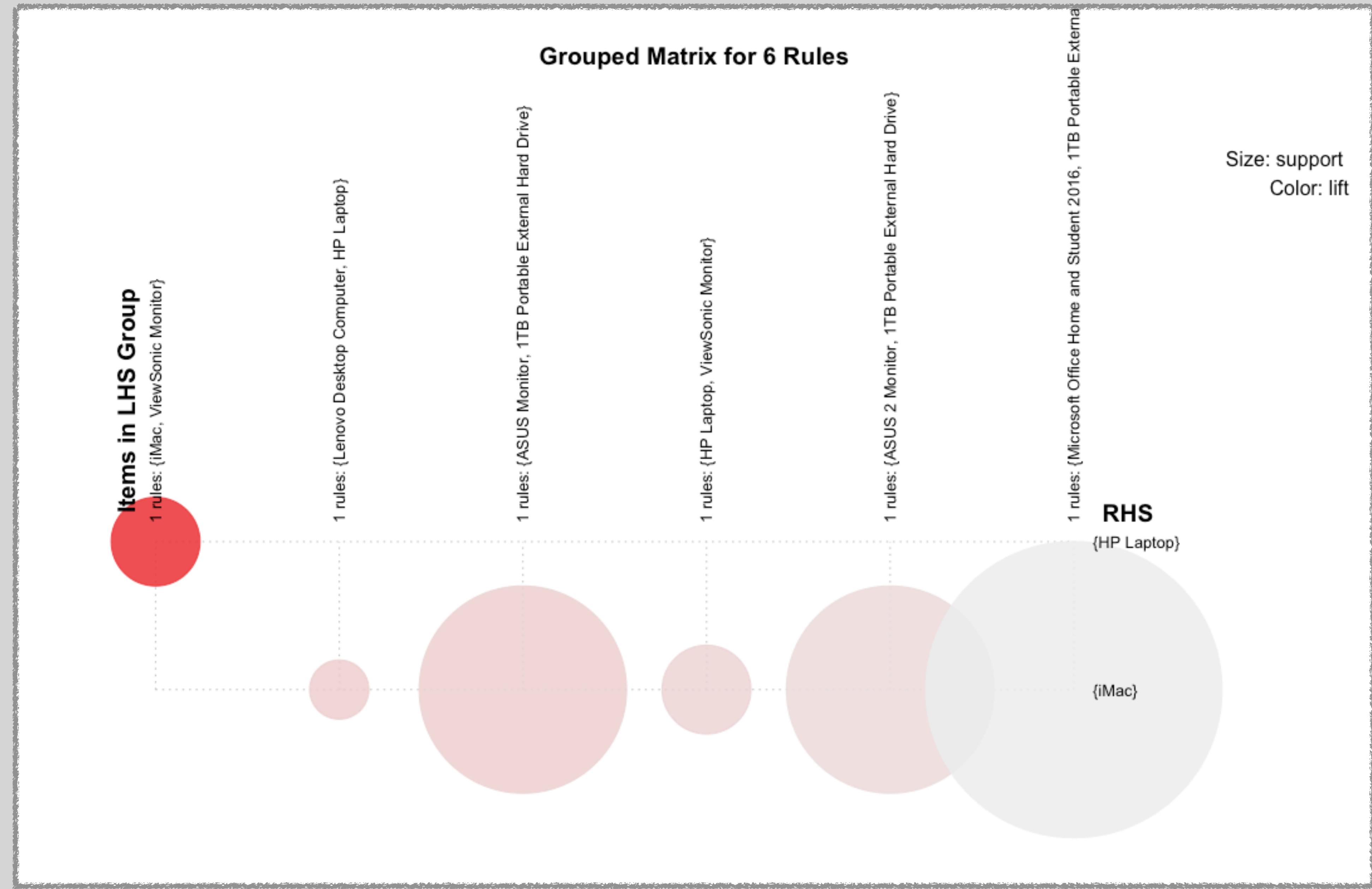
Third table shows the top 5 best rules in ruleset(2). The first one demonstrates that “there is a balanced relationship between buying Acer Aspire and View Sonic Monitor and HP Laptop with regards to frequency and strength of the relationship. (Lift = 3.103)

RuleSet(3)

Support of 0.023 & Confidence of 0.46
Result: 6 Rules

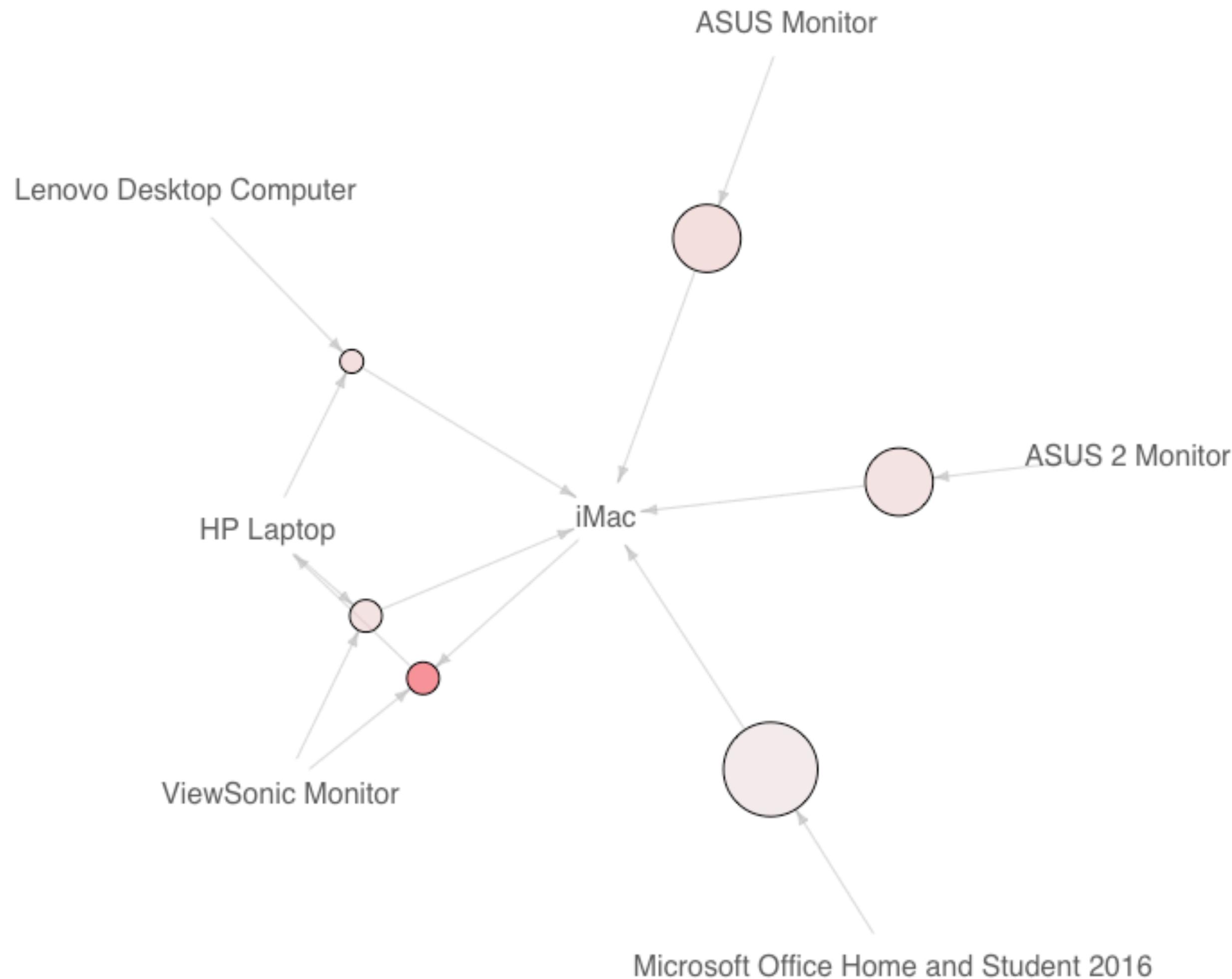
Scatter plot for 6 rules





Graph for 6 rules

size: support (0.023 - 0.031)
color: lift (1.821 - 2.47)



RuleSet(3): Sorted by Support, Confidence, and Lift

```
> # Sort Rule3 by Support
> inspect(head(sort(rules3, by="supp")), 6)
  lhs                                rhs      support confidence coverage lift count
[1] {Microsoft Office Home and Student 2016} => {iMac}    0.031    0.466     0.066   1.821 305
[2] {ASUS 2 Monitor}                      => {iMac}    0.028    0.487     0.058   1.901 276
[3] {ASUS Monitor}                       => {iMac}    0.028    0.499     0.055   1.949 272
[4] {HP Laptop,ViewSonic Monitor}         => {iMac}    0.024    0.494     0.048   1.927 233
[5] {iMac,ViewSonic Monitor}              => {HP Laptop} 0.024    0.479     0.049   2.470 233
[6] {HP Laptop,Lenovo Desktop Computer}  => {iMac}    0.023    0.500     0.046   1.952 227
```

```
> # Sort Rule3 by Confidence
> inspect(head(sort(rules3, by="conf")), 6)
  lhs                                rhs      support confidence coverage lift count
[1] {HP Laptop,Lenovo Desktop Computer} => {iMac}    0.023    0.500     0.046   1.952 227
[2] {ASUS Monitor}                      => {iMac}    0.028    0.499     0.055   1.949 272
[3] {HP Laptop,ViewSonic Monitor}        => {iMac}    0.024    0.494     0.048   1.927 233
[4] {ASUS 2 Monitor}                    => {iMac}    0.028    0.487     0.058   1.901 276
[5] {iMac,ViewSonic Monitor}            => {HP Laptop} 0.024    0.479     0.049   2.470 233
[6] {Microsoft Office Home and Student 2016} => {iMac}    0.031    0.466     0.066   1.821 305
```

```
> # Sort Rule3 by Lift
> inspect(head(sort(rules3, by="lift")), 6)
  lhs                                rhs      support confidence coverage lift count
[1] {iMac,ViewSonic Monitor}             => {HP Laptop} 0.024    0.479     0.049   2.470 233
[2] {HP Laptop,Lenovo Desktop Computer} => {iMac}      0.023    0.500     0.046   1.952 227
[3] {ASUS Monitor}                     => {iMac}      0.028    0.499     0.055   1.949 272
[4] {HP Laptop,ViewSonic Monitor}       => {iMac}      0.024    0.494     0.048   1.927 233
[5] {ASUS 2 Monitor}                  => {iMac}      0.028    0.487     0.058   1.901 276
[6] {Microsoft Office Home and Student 2016} => {iMac}    0.031    0.466     0.066   1.821 305
```

First table shows the most frequent rules in ruleset(3). The first one suggests that “customers who bought Microsoft Office Home and Student 2016 also bought iMac.” This has happened with the frequency (support) of 0.03.

Second table shows the strongest rules in ruleset(3). The first one indicates that “there was a strong chance that customers who bought HP Laptop and Lenovo Desktop Computer also bought iMac.” This has happened with the strength (confidence) of 0.50.

Third table shows the best rules in ruleset(3) from top to bottom. The first one demonstrates that “there is a balanced relationship between buying iMac and View Sonic Monitor and HP Laptop with regards to frequency and strength of the relationship. (Lift = 2.47)

Recommendations

Are there any interesting patterns or item relationships within ElectronIndex's transactions?

We definitely observe interesting patterns within purchase habits of ElectronIndex customers amongst View Sonic Monitor and HP Laptops, Lenovo Desktop Computer and iMac, and HP Laptops and iMac.

Would Blackwell benefit from selling any of ElectronIndex's items?

Since we predicted high volumes for Blackwell's PC and Laptops (new products), we believe that they will gain more revenue by selling ElectronIndex items; especially the ones we mentioned above as the best add-ons to be sold together.

In your opinion, should Blackwell acquire ElectronIndex?

We do encourage Blackwell to acquire ElectronIndex company since it will help in reducing inventory cost for Blackwell while increasing the revenue.

If Blackwell does acquire ElectronIndex, do you have any recommendations for Blackwell?

We recommend that they start with the most frequently sold items and use more strong relationships (rules) for cross-selling to customers. They can also design promotion plans based on the best relationships (higher lifts). They definitely omit the items with low frequency and strength since they may not be as beneficial as others.