

Market Basket Analysis

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Overview

- Blackwell Electronics' is considering acquiring Electronidex, a start-up electronics online retailer.
- Blackwell needs help answering the following questions:
 - Are there any interesting patterns or item relationships within Electronidex's transactions?
 - Would Blackwell benefit from selling any of Electronidex's items?
 - In your opinion, should Blackwell acquire Electronidex?
 - If Blackwell does acquire Electronidex, do you have any recommendations for Blackwell? (Ex: cross-selling items, sale promotions, should they remove items, etc.)



```

> summary(tr)
transactions as itemMatrix in sparse format with
9835 rows (elements/itemsets/transactions) and
125 columns (items) and a density of 0.03506172

most frequent items:
      iMac      HP Laptop CYBERPOWER Gamer Desktop      Apple Earpods      Apple MacBook Air
      2519      1909      1809      1715      1530
(Other)
33622

element (itemset/transaction) length distribution:
sizes
  0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  25  26  27  29  30
2 2163 1647 1294 1021  856  646  540  439  353  247  171  119  77  72  56  41  26  20  10  10  10  5  3  1  1  3  1  1

      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
0.000   2.000   3.000   4.383   6.000  30.000

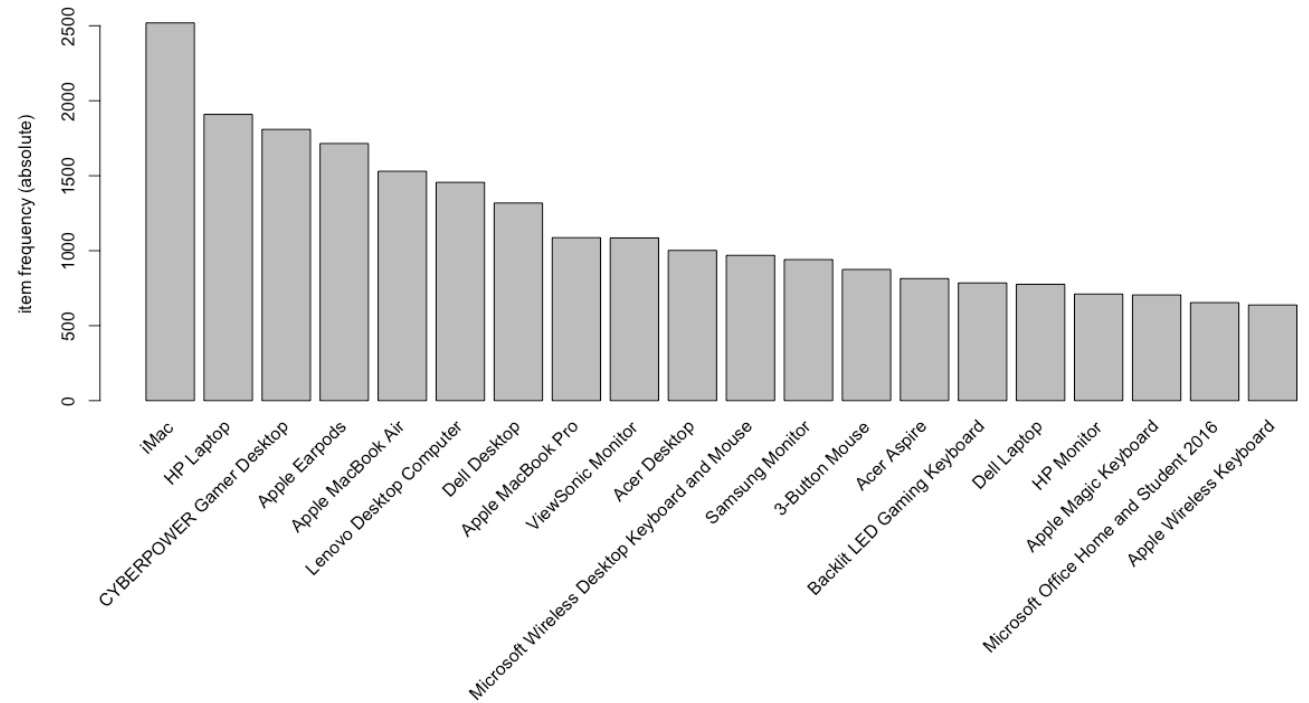
includes extended item information - examples:
      labels
1 1TB Portable External Hard Drive
2 2TB Portable External Hard Drive
3      3-Button Mouse
> |

```

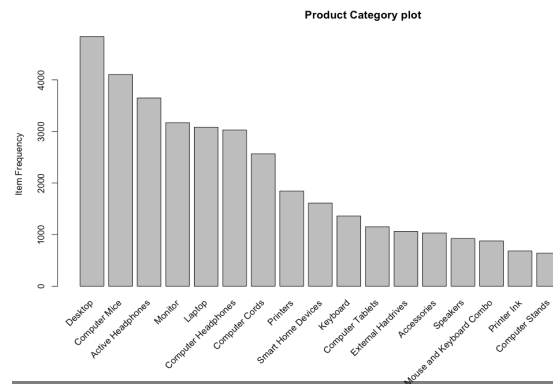
Approach

- Transaction data(csv file) with categorical explanation pdf is provided for analysis
- Data contains 9835 rows with 125 items and 17 product types
- Using arules and arulesViz library in r is used for this market basket analysis

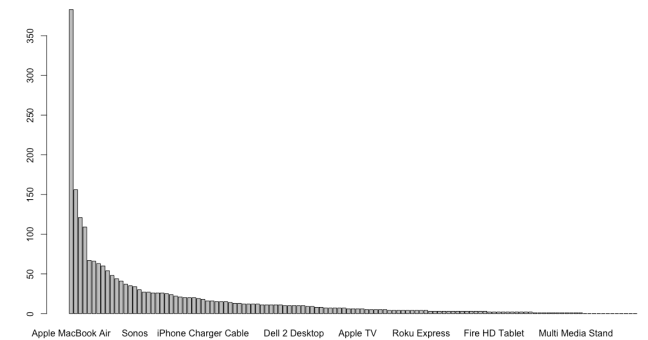
Visualization



Most Frequent Items



Category Plot



Single Items sold

Overview of the high frequent Rules



```
> inspect(mostfrequent[1:10])
```

	lhs	rhs	support	confidence	coverage	lift	count
[1]	{Acer Aspire,Dell Desktop,ViewSonic Monitor}	=> {HP Laptop}	0.005287239	0.8125000	0.006507372	4.185928	52
[2]	{Acer Aspire,Dell Desktop,iMac,ViewSonic Monitor}	=> {HP Laptop}	0.003762074	0.9024390	0.004168785	4.649286	37
[3]	{Acer Desktop,Dell Desktop,iMac,ViewSonic Monitor}	=> {HP Laptop}	0.003253686	0.8000000	0.004067107	4.121530	32
[4]	{Dell Desktop,Mackie CR Speakers}	=> {iMac}	0.002643620	0.8666667	0.003050330	3.383750	26
[5]	{Computer Game,Dell Desktop,ViewSonic Monitor}	=> {HP Laptop}	0.002643620	0.8666667	0.003050330	4.464990	26
[6]	{Dell Desktop,HP Black & Tri-color Ink}	=> {iMac}	0.002541942	0.8064516	0.003152008	3.148651	25
[7]	{CYBERPOWER Gamer Desktop,HP Black & Tri-color Ink}	=> {iMac}	0.002440264	0.8000000	0.003050330	3.123462	24
[8]	{ASUS 2 Monitor,ASUS Monitor,Lenovo Desktop Computer}	=> {iMac}	0.002440264	0.8000000	0.003050330	3.123462	24
[9]	{ASUS 2 Monitor,Dell Desktop,Microsoft Office Home and Student 2016}	=> {iMac}	0.002440264	0.8275862	0.002948653	3.231167	24
[10]	{Apple Magic Keyboard,Dell Desktop,Microsoft Office Home and Student 2016}	=> {iMac}	0.002440264	0.8275862	0.002948653	3.231167	24

```
> inspect(mostconf[1:10])
```

	lhs	rhs	support	confidence	coverage	lift	count
[1]	{Brother Printer,Halter Acrylic Monitor Stand}	=> {iMac}	0.001118454	1	0.001118454	3.904327	11
[2]	{ASUS Monitor,Mackie CR Speakers,ViewSonic Monitor}	=> {iMac}	0.001016777	1	0.001016777	3.904327	10
[3]	{Apple Magic Keyboard,Rii LED Gaming Keyboard & Mouse Combo,ViewSonic Monitor}	=> {iMac}	0.001728521	1	0.001728521	3.904327	17
[4]	{ASUS Monitor,Koss Home Headphones,Microsoft Office Home and Student 2016}	=> {iMac}	0.001016777	1	0.001016777	3.904327	10
[5]	{Acer Aspire,Koss Home Headphones,ViewSonic Monitor}	=> {HP Laptop}	0.001220132	1	0.001220132	5.151912	12
[6]	{Dell Desktop,Koss Home Headphones,ViewSonic Monitor}	=> {HP Laptop}	0.001118454	1	0.001118454	5.151912	11
[7]	{ASUS 2 Monitor,Dell Desktop,Logitech Keyboard}	=> {iMac}	0.001016777	1	0.001016777	3.904327	10
[8]	{Alienware Laptop,ASUS Desktop,Lenovo Desktop Computer}	=> {iMac}	0.001016777	1	0.001016777	3.904327	10
[9]	{Brother Printer,Dell Desktop,Epson Printer}	=> {iMac}	0.001118454	1	0.001118454	3.904327	11
[10]	{Apple Magic Keyboard,Brother Printer,ViewSonic Monitor}	=> {iMac}	0.001016777	1	0.001016777	3.904327	10

```
> inspect(mostlift[1:10])
```

	lhs	rhs	support	confidence	coverage	lift	count
[1]	{Apple MacBook Pro,HP Black & Tri-color Ink,HP Laptop,iMac}	=> {Acer Aspire}	0.001016777	0.8333333	0.001220132	10.068591	10
[2]	{Dell Desktop,iMac,Lenovo Desktop Computer,Mackie CR Speakers}	=> {ViewSonic Monitor}	0.001118454	1.0000000	0.001118454	9.064516	11
[3]	{Dell Desktop,Lenovo Desktop Computer,Mackie CR Speakers}	=> {ViewSonic Monitor}	0.001220132	0.9230769	0.001321810	8.367246	12
[4]	{Dell Desktop,Etekcit Power Extension Cord Cable,HP Laptop,iMac,Lenovo Desktop Computer}	=> {ViewSonic Monitor}	0.001118454	0.9166667	0.001220132	8.309140	11
[5]	{Acer Aspire,Apple Earpods,HP Laptop,HP Monitor}	=> {ViewSonic Monitor}	0.001016777	0.9090909	0.001118454	8.240469	10
[6]	{HP Laptop,iMac,Lenovo Desktop Computer,Mackie CR Speakers}	=> {ViewSonic Monitor}	0.001321810	0.8666667	0.001525165	7.855914	13
[7]	{Acer Aspire,Dell Desktop,Epson Printer,HP Laptop}	=> {ViewSonic Monitor}	0.001220132	0.8571429	0.001423488	7.769585	12
[8]	{Acer Aspire,ASUS Chromebook,Dell Desktop,HP Laptop}	=> {ViewSonic Monitor}	0.001220132	0.8571429	0.001423488	7.769585	12
[9]	{Dell Desktop,HP Laptop,iMac,Mackie CR Speakers}	=> {ViewSonic Monitor}	0.001321810	0.8125000	0.001626843	7.364919	13
[10]	{Acer Aspire,HP Laptop,Koss Home Headphones}	=> {ViewSonic Monitor}	0.001220132	0.8000000	0.001525165	7.251613	12

Top Rule Sets

- The most frequent, confident and higher frequency rules set

Summary

- **Are there any interesting patterns or item relationships within Electronidex's transactions?**
 - Electronidex has more transaction when purchase is between 1 to 5 items
 - Laptop, Desktop, and EarPods are sold more
 - items - the strongest pattern found is when someone purchases Acer Aspire, Dell Desktop, ViewSonic Monitor they buy HP laptop
 - Brother Printer, Halter Acrylic Monitor Stand are always purchased with iMac
 - Apple Mac Book is mostly sold alone
- **Would Blackwell benefit from selling any of Electronidex's items?**
 - Yes, Electronidex sells more desktop, laptops, printers, and Keyboards which aligns with Blackwell product type which are best categories with Blackwell which we found from last regression analysis.
- **In your opinion, should Blackwell acquire Electronidex?**
 - Yes, the transactions from Electronidex makes it clear that more B2B transaction take place seeing the bulk orders which will be added benefit for Blackwell but need some business type investment expansion as B2B will be a new addition.
- **If Blackwell does acquire Electronidex, do you have any recommendations for Blackwell? (Ex: cross-selling items, sale promotions, should they remove items, etc.)**
 - Best cross-selling items will be Acer Aspire and ViewSonic Monitor
 - Sales Promotion should be placed on Keyboards, smart home devices, and printers as these categories are selling less compared to others. And the placements of them in the stores should be revisited for best sales.
 - I highly recommend to add thermostat and other devices in smart device category and remove Roku express, Fire HD tablet, and multi-media stand which are poor performers.