

Market Basket Analysis Report

Introduction

Blackwell Electronics is considering acquiring Electronidex, a start-up electronics online retailer. So the board of directors want to know more about the Electronidex's clientele. This report covers the market basket analysis of the last month transactions from this company to identify purchasing patterns. Its objective is to help Blackwell's board of directors form a clearer picture of Electronidex's customer buying patterns to decide on the possibility of an acquisition.

General Insights

In order to look for any customer buying patterns, we used data that contains 9833 transactions with up to 30 products each. The data shows all the 125 products that Electronidex currently have on sales. These products are divided into 17 categories. At figure 1, we can see the 10 top selling. As we can see, their customers have a preference for Apple products.

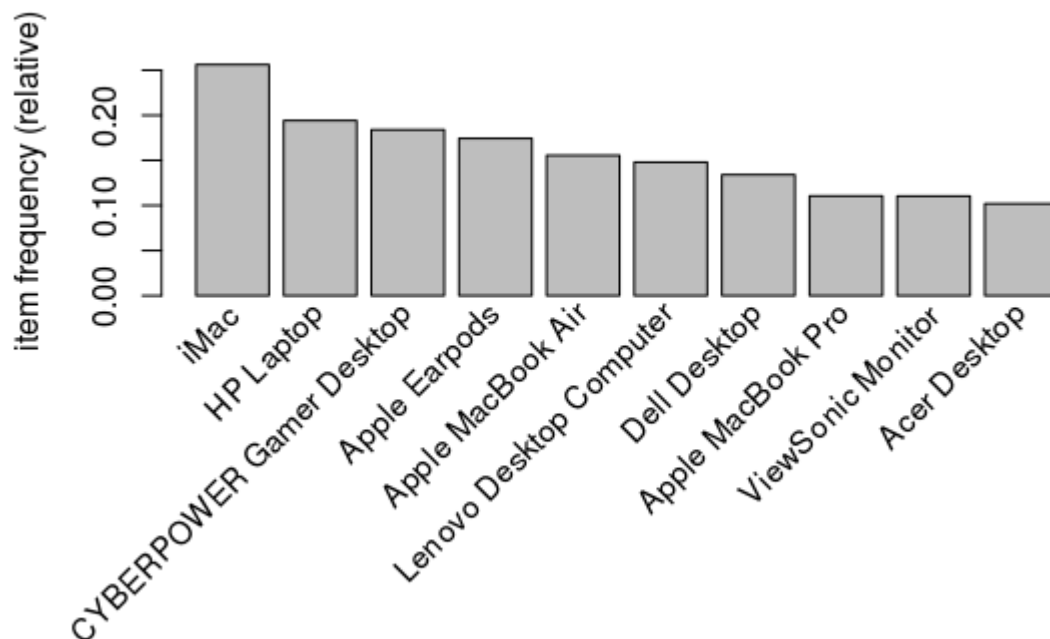


Figure 1: Relative frequency of the 10 top selling products.

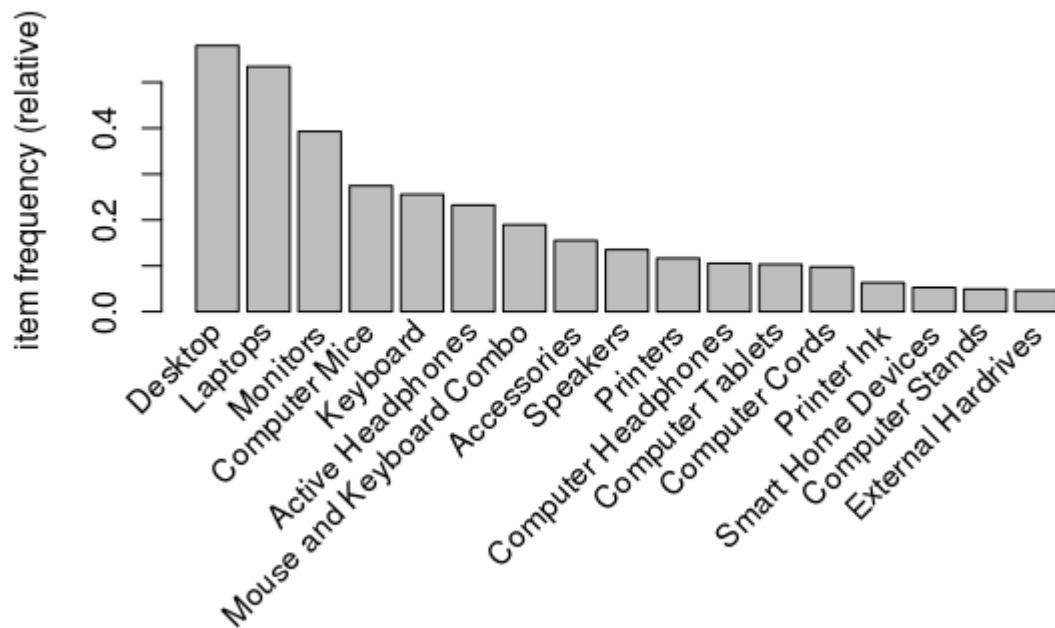


Figure 2: Relative frequency of the 17 products types. Shows the different product types in a transaction.

Figure 2 shows us that their customers are used to buy computers (desktops and/or laptops). While the figure 1 shows that over 30% of the transactions have an iMac product, the figure 2 shows that more than 50% of the transactions have at least one desktop and/or at least one laptop. Figure 3 is to show that more than 20% of the transactions were with only one product.

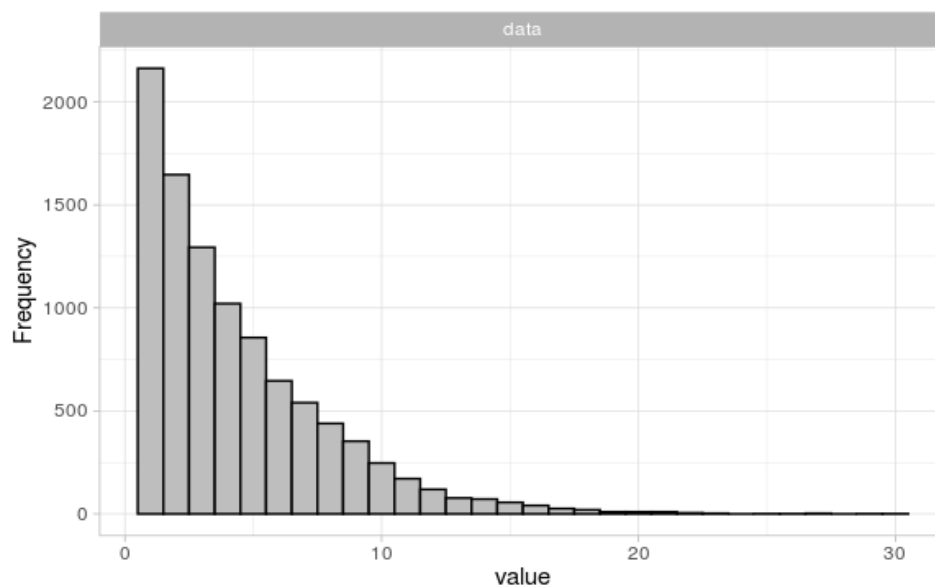


Figure 3: Frequency of the size of the transactions. Shows how many products were sold per transaction.

As we can see, Electronidex is a company B2B (business to business) and B2C (business to consumer). This is because a usual consumer will not buy as many products in a single transaction, as figure 3 shows. That said, figure 4 shows the top products consumed alone.

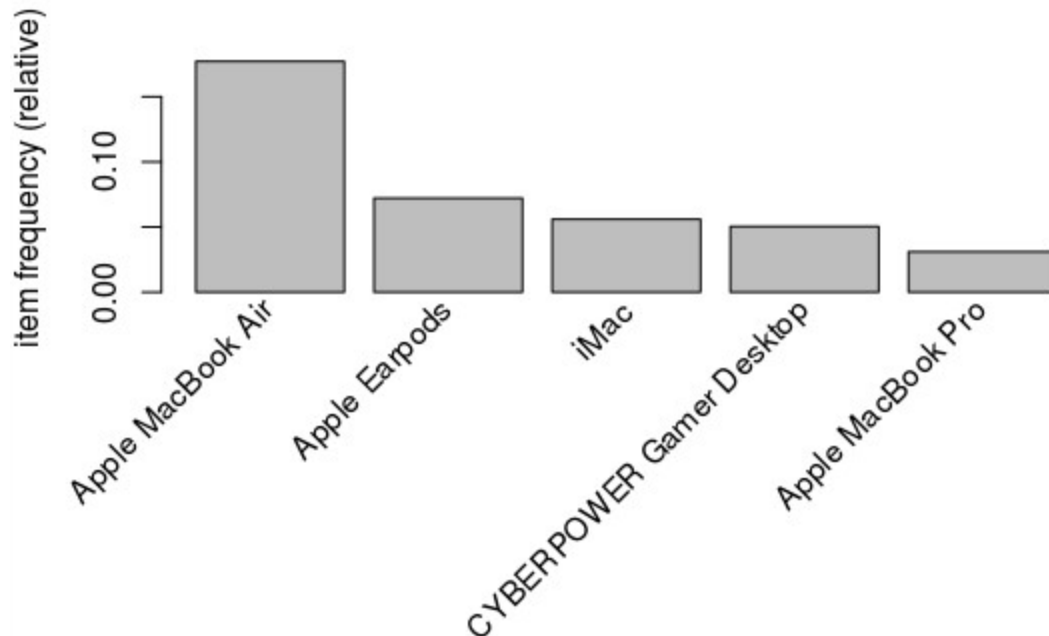


Figure 4: Relative frequency of the 5 top alone selling products.

So we need to consider this information in our association to avoid trying to find patterns between different types of client.

Association rules

After getting some general insights from the transaction data, we started to look for association rules using the Apriori Algorithm.

First, we used the algorithm in the whole data, but we faced some problems. The first problem was that the support and confidence metrics because the rules only appear in about 1% of the data and in this showed the confidence of about 55%. This means that the probability of the rule be right is 55% in the 1% of the data that the association happens. But more than that, the rules showed that a certain combination of products should result in a sell of an iMac or HP Laptop. The problem here is that these products are the 2 top selling, so, naturally, that they appear in a lot of transactions. So we were not able to get an insight from these rules because it were irrelevant rules.

So we decided to divide the data by size. Then we split into a data with 4 or more items per transaction and a data with 3 or fewer items. The results were not much better than before if we compare the metrics. But it confirmed that Electronidex has more than one type of client since the rules were really different for each data. So these were unclear rules.

After that, we changed the data to show the product type instead of the product and then we found some insightful rules as shown below and graphically in figure 5.

lhs	rhs
[1] {Desktop,Laptops}	=> {Monitors}
[2] {Desktop,Laptops}	=> {Keyboard}
[3] {Desktop,Laptops}	=> {Computer Mice}
[4] {Desktop}	=> {Monitors}
[5] {Desktop}	=> {Keyboard}
[6] {Desktop}	=> {Computer Mice}
[7] {Laptops}	=> {Monitors}
[8] {Laptops}	=> {Computer Mice}

This means that the product type or combination of product type in the LHS column results in the RHS column. For example, normally who buy a desktop should buy a monitor as well (rule 4).

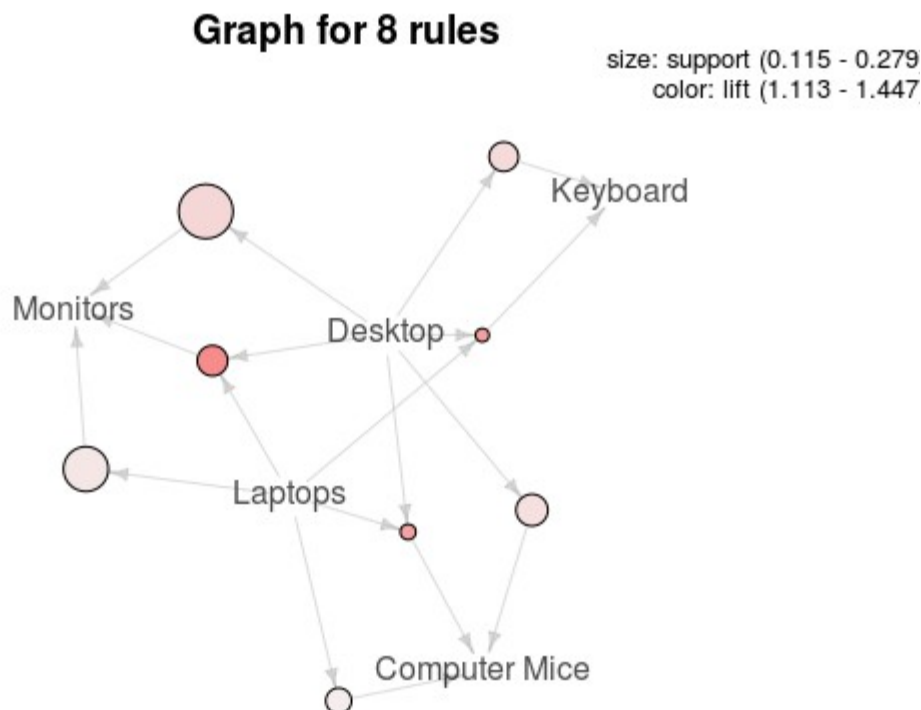


Figure 5: Graph the shows the 8 insightful association rules.

Conclusions and recommendations

After the analysis, we can conclude that the type of clients is different between both companies. Since Electronidex is a B2B and B2C company with clients that have a higher preference for Apple products and they tend to buy computers (desktops and laptops) whether the customer is a consumer or a business. On the other hand, Blackwell is a B2C company with clients that trend to buy secondary products like game consoles and accessories.

That said, acquiring Electronidex is recommendable if Blackwell has the budget available and want to diversify our clients. If it's not the case and we want to compete with them, we should think about diversifying our products to sell more Apple products and primary products like computers.

In case that we acquire the company, we should try to do some cross-sales between their products and ours since it's complimentary to each other. Sale promotions with discount in the Blackwell products also sounds a good idea because as secondary products its cheaper and the client will tend to buy it.

It's important to notice that we analyzed with only a month data. So before acquiring Electronidex its crucial to ask to more data to improve our knowledge from their sales and portfolio.