Market Basket Analysis

Purchasing patterns of Electronidex's clientele

Discover any interesting relationships (or associations) between customer’s transactions and the item(s) they’ve purchase

Focal 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.)

Supervised vs Unsupervised algorithms

* Supervised: we are given a data set and already know what our correct output should look like, having the idea that there is a relationship between the input and the output 🡪 e.g. classification and regression
* Unsupervised: allows us to approach problems with little or no idea what our results should look like 🡪 e.g. clustering

Association rule

* Support: how often a rule is applicable to a given data set
  + A rule with a low support may occur simply by chance
  + Used to eliminate uninteresting rules
* Confidence: how frequently items in Y appear in transcations that contain X
  + Measures the reliability of the inference made by the rule
* Strong rule 🡪 rule that measures high in both support and confidence
* Correlation is not causality
* Association rule mining problem
  + Frequent itemset generation: all itemsets that satisfy the minimal support threshold
  + Rule generation: extract all high-confidence rules from the frequent itemsets
* Apriori principle 🡪 if an itemset is frequent, then all of its subsets must also be frequent
* Support-based pruning 🡪 if an itemset is infrequent, then all its subsets are also infrequent
* Sorting each frequent itemset by its lexicographic order 🡪 way to avoid duplicate candidates

The goal of the assignment is to determine whether Electronidex is profitable for Blackwell Electronics or not

Think about the type of customers at Electronidex and how they compare to the ones of Blackwell

Referring to the profitability report from module 1, we had that the top 5 most profitable products for Blackwell Electronics would be:

1. 186 – Tablet by Apple
2. 187 – Tablet by Amazon
3. 171 – PC by Dell
4. 199 – Console by Sony
5. 180 – Netbook by Acer

Observations about the products sold by Electronidex

* They do not sell game consoles
* They do not sell the Sony laptop, but they have the Acer and Asus one (though they have a greater variety)
* They sell the same monitors as Blackwell (but lesser variety)
* They do not sell any netbooks
* They have 5 types of tablets that are not in the existing products of Blackwell
* They do not sell smartphones
* They do not sell projectors
* They have a wider range of printer supplies
* They have less variety of printers, but include Epson and DYMO Label Manker
* They have larger variety of desktops, but no Sony or iPower

Blackwell currently sells 80 products

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| {Keyboard,Laptops,Monitors} | {Desktops} | 0.07484999 | 0.8430699 | 1.453350 | 736 |
| {Accessories,Laptops,Monitors} | {Desktops} | 0.05542561 | 0.8384615 | 1.445405 | 545 |
| {Computer Mice,Keyboard,Laptops} | {Desktops} | 0.05369674 | 0.8341232 | 1.437927 | 528 |
| {Laptops,Monitors,Mouse and Keyboard Combo} | {Desktops} | 0.05939184 | 0.8213783 | 1.415956 | 584 |
| {Computer Mice,Laptops,Monitors} | {Desktops} | 0.08013831 | 0.8157350 | 1.406228 | 788 |
| {Desktops,Monitors,Mouse and Keyboard Combo} | {Laptops} | 0.05939184 | 0.7448980 | 1.393566 | 584 |
| {Keyboard,Monitors} | {Desktops} | 0.10474931 | 0.8053167 | 1.388268 | 1030 |
| {Active Headphones,Laptops,Monitors} | {Desktops} | 0.06244279 | 0.8036649 | 1.385420 | 614 |
| {Accessories,Desktops,Monitors} | {Laptops} | 0.05542561 | 0.7394844 | 1.383438 | 545 |
| {Computer Mice,Keyboard} | {Desktops} | 0.07312112 | 0.7997775 | 1.378719 | 719 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| {Acer Aspire,ViewSonic Monitor} | {HP Laptop} | 0.01077783 | 0.6022727 | 3.102856 | 106 |
| {Dell Desktop,ViewSonic Monitor} | {HP Laptop} | 0.01525165 | 0.5747126 | 2.960869 | 150 |
| {CYBERPOWER Gamer Desktop,ViewSonic Monitor} | {HP Laptop} | 0.01220132 | 0.5020921 | 2.586734 | 120 |
| {Lenovo Desktop Computer,ViewSonic Monitor} | {HP Laptop} | 0.01403152 | 0.4946237 | 2.548258 | 138 |
| {iMac,ViewSonic Monitor} | {HP Laptop} | 0.02369090 | 0.4794239 | 2.469950 | 233 |
| {Apple Magic Keyboard,Lenovo Desktop Computer} | {HP Laptop} | 0.01057448 | 0.4792627 | 2.469119 | 104 |
| {Acer Aspire,Dell Desktop} | {HP Laptop} | 0.01108287 | 0.4678112 | 2.410122 | 109 |
| {iMac,LG Monitor} | {HP Laptop} | 0.01026945 | 0.4611872 | 2.375996 | 101 |
| {Apple Magic Keyboard,iMac} | {HP Laptop} | 0.01474326 | 0.4559748 | 2.349142 | 145 |
| {Acer Desktop,Dell Desktop} | {HP Laptop} | 0.01240468 | 0.4485294 | 2.310784 | 122 |