This entire process of analyzing the shopping trends of customers is called '***Market Basket Analysis***'. It is an analyzing technique based on the idea that if we buy an item then we are bound to buy or not-buy a group (or single) items. For example, if a customer is buying bread then the chances of him/her buying jam is more. This is represented by the following equation:

This equation is called the Association Mining Rule. This can be thought of as an IF-THEN relationship. If item A is bought by a customer then the chances of item B being bought by the same user in the same transaction is found out. Here A is called the Antecedent and B the consequent. Antecedents are primary item that are found in the basket and consequents are the items that are found with an antecedent/group of antecedents.

Market basket analysis is a powerful data science application that improves user experience and encourages purchases, which adds direct business value to companies.

In the past, marketers would often use their intuition when creating product combinations and building marketing strategies. Now that organizations are able to collect and store more data than ever before, they use their findings to target customers and increase sales. They hire data scientists and analysts in marketing teams to make these decisions instead.

Market basket analysis is used by companies to identify items that are frequently purchased together. Notice, when you visit the grocery store, how baby formula and diapers are always sold in the same aisle. Similarly, bread, butter, and jam are all placed near each other so that customers can easily purchase them together. The technique uncovers hidden correlations that cannot be identified by the human eye by using a set of statistical rules to identify product combinations that occur frequently in transactions.

Amazon's website uses a well-known example of market basket analysis. On a product page, Amazon presents users with related products, under the headings of "Frequently bought together" and "Customers who bought this item also bought."

Market basket analysis also applies to bricks-and-mortar stores. If analysis showed that magazine purchases often include the purchase of a bookmark, which could be considered an unexpected combination as the consumer did not purchase a book, then the bookstore might place a selection of bookmarks near the magazine rack.

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Product placement. Identifying products that may often be purchased together and arranging the placement of those items (such as in a catalog or on a web site) close by to encourage the purchaser to buy both items.

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Physical shelf arrangement. An alternate use for physical product placement in a store is to separate items that are often purchased at the same time to encourage individuals to wander through the store to find what they are looking for to potentially increase the probability of additional impulse purchases.

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Up-sell, cross-sell, and bundling opportunities. Companies may use the affinity grouping of multiple products as an indication that customers may be predisposed to buying the grouped products at the same time. This enables the presentation of items for cross-selling, or may suggest that customers may be willing to buy more items when certain products are bundled together.

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Customer retention. When customers contact a business to sever a relationship, a company representative may use market basket analysis to determine the right incentives to offer in order to retain the customer's business.

Market basket analysis is a process that looks for relationships among entities and objects that frequently appear together, such as the collection of items in a shopper's cart. For the purposes of customer centricity, market basket analysis examines collections of items to identify affinities that are relevant within the different contexts of the customer touch points. Some examples include:

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Product placement—Identifying products that may often be purchased together and arranging the placement of those close by to encourage the purchaser to buy both items. That placement can be physical, such as in the arrangement of products on shelves in a brick and mortar location, or virtual, such as in a print catalog or on an e-commerce site.

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Point-of-Sale—Companies may use the affinity grouping of multiple products as an indication that customers may be predisposed to buying certain sets of products at the same time. This enables the presentation of items for cross-selling, or may suggest that customers may be willing to buy more items when certain products are bundled together.

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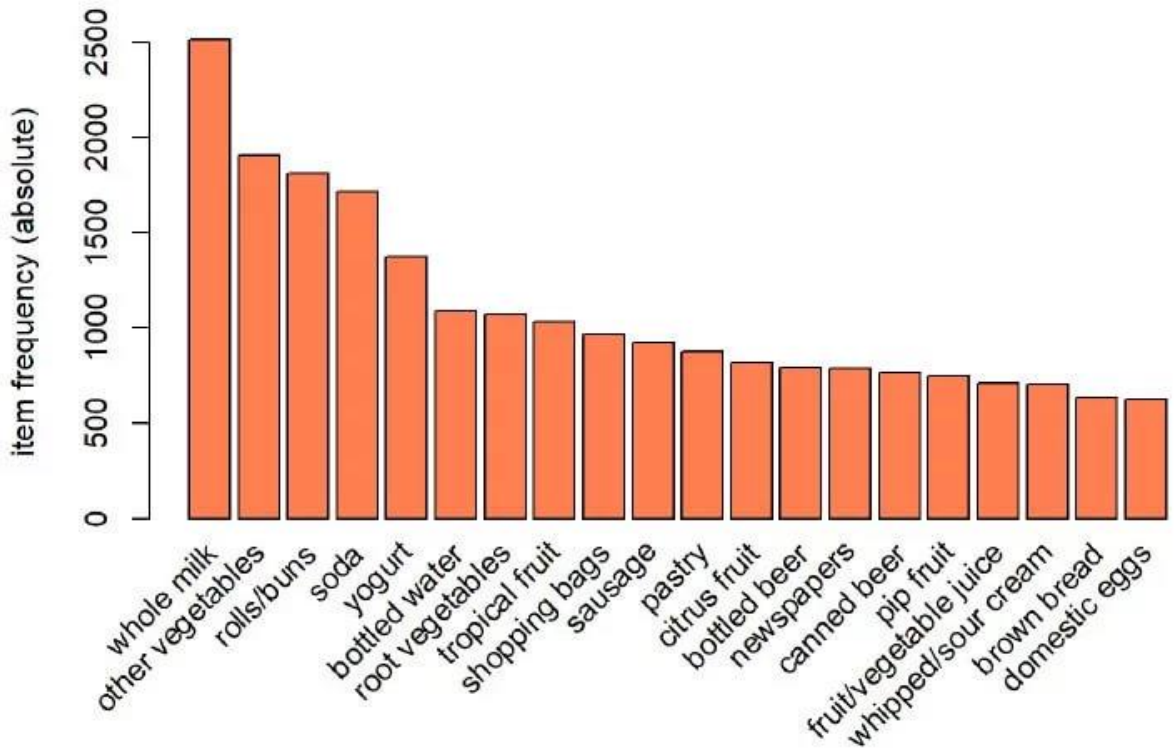
Customer retention—When customers contact a business to sever a relationship, a company representative may use market basket analysis to determine the right incentives to offer in order to retain the customer's business.

Suppose, as manager of an *AllElectronics* branch, you would like to learn more about the buying habits of your customers. Specifically, you wonder, "Which groups or sets of items are customers likely to purchase on a given trip to the store?" To answer your question, market basket analysis may be performed on the retail data of customer transactions at your store. You can then use the results to plan marketing or advertising strategies, or in the design of a new catalo analysis may help you design

different store layouts. In one strategy, items that are frequently purchased together can be placed in proximity to further encourage the combined sale of such items. If customers who purchase computers also tend to buy antivirus software at the same time, then placing the hardware display close to the software display may help increase the sales of both items.

In an alternative strategy, placing hardware and software at opposite ends of the store may entice customers who purchase such items to pick up other items along the way. For instance, after deciding on an expensive computer, a customer may observe security systems for sale while heading toward the software display to purchase antivirus software, and may decide to purchase a home security system as well. Market basket analysis can also help retailers plan which items to put on sale at reduced prices. If customers tend to purchase computers and printers together, then having a sale on printers may encourage the sale of printers as well as computers.



Market Basket Analysis (MBA) is a data mining technique that helps businesses uncover relationships between products frequently purchased together—hense, it's often referred to as association analysis. This type of analysis is based on the principle that if a customer buys one item, they are likely to buy another item(s) as well. By analyzing transactional data, such as customer purchase history or shopping cart contents, MBA aims to identify patterns and associations among products.

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The first step in market basket analysis is to gather transactional data containing information about customer purchases. This data can be obtained from various sources, such as point-of-sale systems, e-commerce platforms, or customer loyalty programs. The data should include details such as customer identifiers, transaction IDs, and the items purchased.

Preprocessing and transformation

Once the data is collected, it needs to be preprocessed and transformed into a suitable format for analysis. This step involves removing any irrelevant or duplicate data, handling missing values, and converting the data into a transactional format where each row represents a unique transaction and the items purchased within that transaction. By ensuring data quality from the start, you improve the quality of your insights down the road.

Association rule mining

Association rule mining is the core process of market basket analysis. In this step, algorithms such as the Apriori algorithm or the FP-Growth algorithm are applied to the preprocessed data to discover frequent itemsets and generate association rules. Frequent itemsets are sets of items that appear together in a significant number of transactions, while association rules represent the relationships between items based on their co-occurrence.

Rule evaluation and selection

After generating a set of association rules, the next step is to evaluate and select the most relevant and actionable rules. This involves applying various measures such as support, confidence, and lift to assess the significance and strength of each rule—higher values are typically considered more reliable and valuable for further analysis.

Generating insights and recommendations

The final step of market basket analysis is to interpret the generated rules and derive meaningful insights and recommendations. These insights can help businesses understand customer behavior, identify product associations, optimize pricing and promotions, enhance cross-selling and upselling strategies, and improve overall business performance.

Conclusion

This looked at market basket analysis in data mining and calculated the measures of association rules. Just as you've read, market basket analysis helps companies and retailers to evaluate their buying

behavior and foretell their succeeding purchases. If used efficiently, it can considerably increase cross-selling and raise your customer’s lifetime value.