DEFINITION

market basket analysis

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Market basket analysis is a data mining technique used by retailers to increase sales by better understanding customer purchasing patterns. It involves analyzing large data sets, such as purchase history, to reveal product groupings, as well as products that are likely to be purchased together.

The adoption of market basket analysis was aided by the advent of electronic point-of-sale (POS) systems. Compared to handwritten records kept by store owners, the digital records generated by POS systems made it easier for applications to process and analyze large volumes of purchase data.

Implementation of market basket analysis requires a background in statistics and data science, as well as some algorithmic computer programming skills. For those without the needed technical skills, commercial, off-the-shelf tools exist.

Types of market basket analysis

Retailers should understand the following types of market basket analysis:

- **Predictive market basket analysis.** This type considers items purchased in sequence to determine cross-sell.
- **Differential market basket analysis.** This type considers data across different stores, as well as purchases from different customer groups during different times of the day, month or year. If a rule holds in one dimension, such as store, time period or customer group, but does not hold in the others, analysts can determine the factors responsible for the exception. These insights can

can determine the factors responsible for the exception. These insights can lead to new product offers that drive higher sales.

Algorithms for market basket analysis

In market basket analysis, association rules are used to predict the likelihood of products being purchased together. Association rules count the frequency of items that occur together, seeking to find associations that occur far more often than expected.

Algorithms that use association rules include AIS, SETM and Apriori. The Apriori algorithm is commonly cited by data scientists in research articles about market basket analysis and is used to identify frequent items in the database, then evaluate their frequency as the datasets are expanded to larger sizes.

The arules package for R is an open source toolkit for association mining using the R programming language. This package supports the Apriori algorithm, along with the following other mining algorithms:

- arulesNBMiner
- Opusminer
- RKEEL
- RSarules

Examples of market basket analysis

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.

Benefits of market basket analysis

Market basket analysis can increase sales and customer satisfaction. Using data to determine that products are often purchased together, retailers can optimize product placement, offer special deals and create new product bundles to encourage further sales of these combinations.

These improvements can generate additional sales for the retailer, while making the shopping experience more productive and valuable for customers. By using market basket analysis, customers may feel a stronger sentiment or brand loyalty toward the company.

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