ThoughtSpot
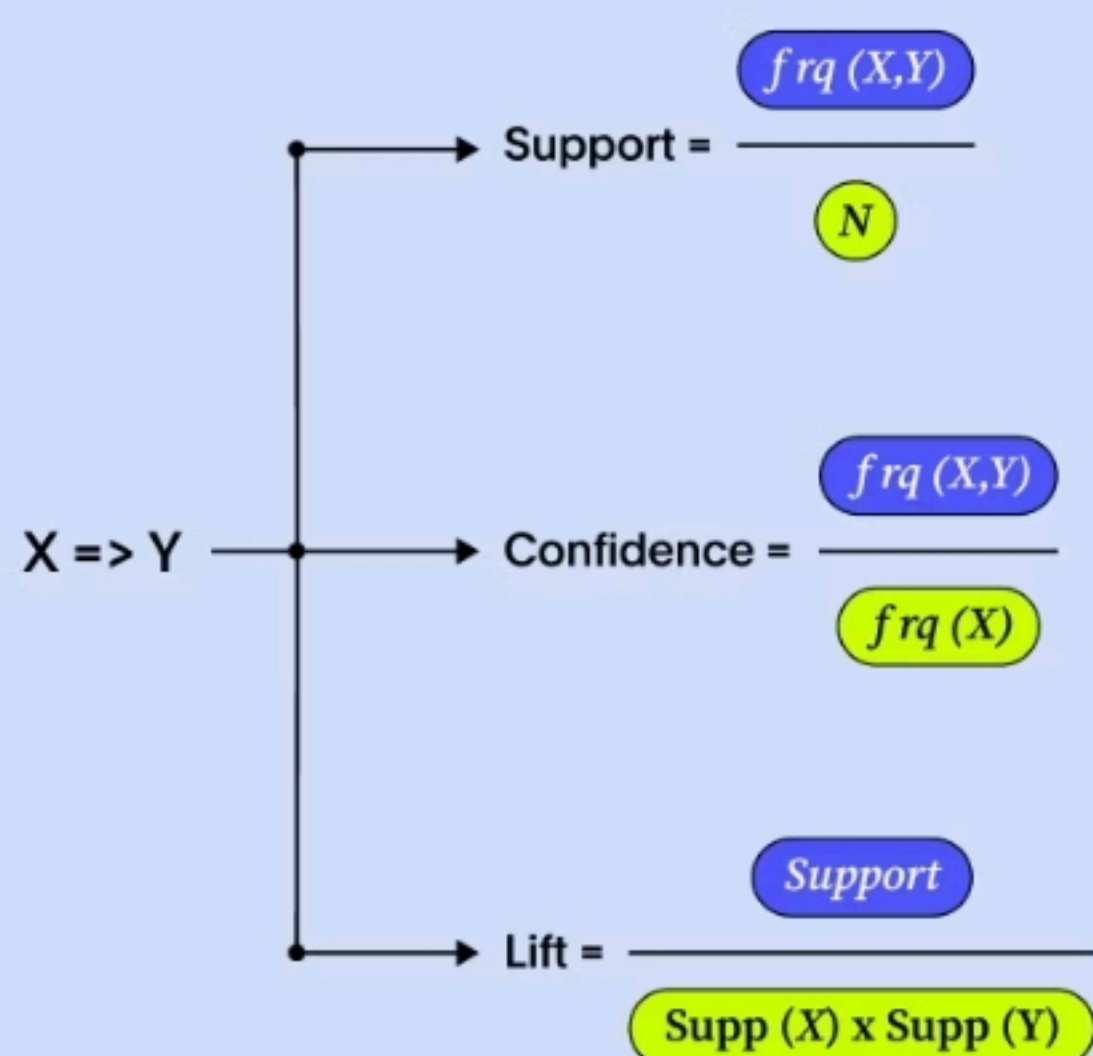
Key concepts in market basket analysis

There are three main concepts you need to know in order to successfully understand market basket analysis.

$$X => Y \quad\begin{cases} \text{Support} = \dfrac{frq\,(X,Y)}{N} \\[2em] \text{Confidence} = \dfrac{frq\,(X,Y)}{frq\,(X)} \\[2em] \text{Lift} = \dfrac{Support}{Supp\,(X) \times Supp\,(Y)} \end{cases}$$

Support

Support refers to the frequency or occurrence of a specific combination of items in the dataset. It indicates how often a particular itemset appears in the transactions being analyzed. Support is calculated by dividing the number of transactions containing the itemset by the total number of transactions. It helps identify the popularity and significance of a specific association rule.

Confidence

Confidence measures the reliability or strength of an association rule. It determines the likelihood that if a customer purchases one item, they will also purchase another item. Confidence is calculated by dividing the support of the combined items by the support of the antecedent item. A high confidence value indicates a strong relationship between the items.

Lift

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Lift is a metric that evaluates the strength and importance of an association rule. It measures the increase in the likelihood of purchasing the consequent item when the antecedent item is purchased, compared to the expected probability of purchasing the consequent item. Lift values greater than 1 indicate a positive correlation between the items, suggesting that the items are more likely to be purchased together.

Benefits of market basket analysis

Identifying product associations

Market basket analysis helps businesses uncover hidden relationships and associations between products. By understanding which items are frequently purchased together, companies can optimize their inventory management, identify product bundling opportunities, and improve overall sales.

Cross-selling and upselling opportunities

MBA enables businesses to identify cross-selling and upselling opportunities. By analyzing customer purchase patterns, companies can recommend complementary or higher-value products to customers, thereby increasing average order value and driving additional revenue.

Enhancing customer understanding

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Optimizing product placement

Market basket analysis can assist in optimizing product placement within physical stores or on e-commerce platforms. By identifying frequently associated products, businesses can strategically position items to enhance visibility, encourage cross-category purchases, and increase overall sales.

Personalizing recommendations

Leveraging market basket analysis, businesses can provide personalized recommendations to customers. By recommending products based on a customer's past purchase history or items frequently purchased together, companies can enhance the customer experience, drive repeat purchases, and foster long-term customer relationships.

How does market basket analysis work?

Here's a breakdown of the key stages involved in conducting market basket analysis:

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2. 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.

3. 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.

4. 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

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4. 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.

5. 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.