

PROBLEM DEFINITION:

The problem at hand is to perform market basket analysis on a provided dataset to uncover associations between products by looking for combinations of products that frequently co-occur in transactions. By using this, retailers can optimize their inventory management, marketing strategies, cross-selling tactics, and store layout to improve customer satisfaction. To achieve this, we will employ association rule algorithm- Apriori algorithm, which is a widely-used method for MBA and it helps to find frequent itemsets in transaction and identifies association rules between them. The outcome of this project will be actionable recommendations based on the discovered insights to optimize the retail business.

DESIGN THINKING:

To tackle the problem effectively, we will follow a systematic key stages:

1.Data Source:

The first step in any data analysis project is to select a appropriate dataset. For this MBA project, we will use the data set which is available on the given link-[<https://www.kaggle.com/datasets/aslanahmedov/market-basket-analysis>]. The dataset must contain transactional data and the list of product purchased.

2.Data Preprocessing:

Before proceeding into analysis ,we must ensure that the data is structured, clean and it is in suitable format for associative analysis. Prepares data for further analysis and ensures quality and validity. It involves following steps:

- **Data cleaning:** Removing irrelevant information, handling missing values and any inconsistencies in the data. Missing or incorrect data items are corrected by various method and some data items with no data are replaced with null value.
- **Encoding Data:** Encoding data into binary matrix format where each product is either present or absent in each transaction. Each cell in matrix has value of 1 if the product was purchased and 0 if not. It is crucial step which is essential to discover patterns and relationships among products.

3.Associative Analysis:

With the data which is preprocessed we will step into associative analysis which helps to discover patterns and relationship among products that customer buy. We will apply Apriori algorithm, which is widely used technique for association analysis. Apriori algorithm helps us to identify:

- **Frequent Itemsets:** Groups of items that frequently appear together in transactions.
- **Association Rules:** Rules that describe the relationships between different products based on their co-occurrence in transactions. These rules typically include support, confidence, and lift metrics.

4.Insights Generation

The discovered association rule will be used to interpreted to understand the customer behavior pattern. It includes:

- **Cross-Selling Opportunities:** Suggesting related products to customers there by increasing cross-selling opportunities.
- **Common Product Combinations:** Identifying the products which are often purchased together.
- **Customer Insights:** Gaining deeper understanding of customer preferences and behaviors.
- **Customer Segmentation:** Grouping customers based on their purchasing patterns.

5. Visualization

It is created to view the insights obtained from association analysis in a understandable format. This includes:

- **Bar Charts:** Showing the frequency of co-occurring products.
- **Heatmaps:** Represents strength of association between items in a grid format.
- **Network Diagrams:** Illustrates the associations as a graph with nodes connected by edges

6. Business Recommendations:

Based on insights derived from market basket analysis can lead to actionable strategies that improve sales, customer satisfaction, and overall business performance. These recommendations include:

- **Cross-Selling Recommendations:** Suggest complementary products to customer based on frequent item associations.
- **Promotional Strategies:** Providing promotions and discounts around frequently co-purchased items in order to boost sales.
- **Product Placement and Store Layout:** In Stores, rearrange the product to group frequently co-purchased items together. This could lead to increased in-store purchases.

By following this approach, we will be able to uncover valuable insights into customer behavior and provide the retail business with concrete strategies to optimize their operations and increase profitability. This process of data analysis and insights generation will enable data-driven decision-making and continuous improvement in the retail business's performance.