**MARKET BASKET INSIGHTS**

Market basket analysis, also known as association analysis. The market basket analysis is a data mining technique with considerable usability, it is by no means an infallible study of consumer behavior.

Firstly, even if an association between products shows promising evaluation metrics, it can not directly prove the causality between the products. After all, correlation is not equal to causation.

Secondly, like any data mining technique, the market basket analysis is prone to errors. It can falsely omit significant associations or falsely include insignificant associations.

**CUSTOMER BEHAVIOUR ANALYSIS:**

Consumer behavior is a consumer activity in deciding to purchase, use, as well as consume the purchased goods and services including in the customer factors which can give a rise to their decisions whether to purchase and use products. Every customers have different needs and inclinations as well as have different behaviors in fulfilling those things. However, in the event of different behaviors to fulfill their needs, they still share some similarities, one of them is desiring to maximize their satisfactions in consuming a necessary product or service. Of that consumption activity, that can be inferred as to the behavior, pattern, or habit that the customers do in fulfilling their needs and desires. That behavior can be identified by way of the logging carried out by the intermediary provider of consumer needs (supermarket). The logging Is brought off in view of the requisite of documentation and history data identification over the carrying out of transaction activity

**ASSOCIATION RULES:**

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.

**ASSOCIATION RULES GENERATION:**

→ From the frequent itemsets, generate association rules. These rules express the relationships between products in terms of support, confidence, and lift.

→ Support measures how frequently an itemset occurs.

→ Confidence measures the probability that if one product is bought, another will be bought as well.

→ Lift indicates the strength of association between two products.

**CROSS SELLING OPPORTUNITIES:**

By identifying strong associations, you can suggest complementary products to customers. This can boost sales and customer satisfaction. For instance, if customers buy pasta, recommending pasta sauce and cheese can be a cross-selling opportunity.

**INVENTIONARY MANAGEMENT:**

Understanding product associations can assist in inventory management. If two products are often bought together, you can ensure they are stocked together to optimize shelf space and reduce stocking costs.

**CUSTOMER SEGMENTATION:**

You can segment customers based on their purchase patterns. This allows you to tailor marketing strategies to different customer groups and offer personalized recommendations.

**SEASONAL TRENDS:**

Market basket analysis can reveal seasonal or time-based trends. For example, you might find that customers tend to buy sunscreen and beach towels together during the summer.

**PROMOTION EFFECTIVENESS :**

You can assess the impact of promotions on customer behavior. Do certain discounts or promotions lead to increased cross-purchases.

**DATA PREPARATION:**

→ Ensure your dataset is structured properly with each row representing a transaction and each column representing a product.

→ Convert the data into a binary format where each cell indicates whether a product was purchased in a transaction (1 for purchased, 0 for not purchased).

**FREQUENT ITEMSET MINING:**

→ Use an algorithm like Apriori or FP-Growth to identify frequent itemsets. These are combinations of products that frequently appear together in transactions.

**FILTERING AND INTERPRETATION:**

→ Filter the association rules based on support, confidence, and lift thresholds to focus on meaningful associations.

→ Interpret the rules to understand which products tend to be purchased together and the strength of these associations.

**Visualization and Reporting:**

→ Create visualizations such as scatter plots, heatmaps, or network graphs to represent the discovered associations.

→ Prepare a report or presentation to share insights and cross-selling opportunities with the retail business.

**IMPLEMENTATION:**

→ Implement the insights gained from the analysis into the retail business strategy. This might involve bundling products, creating promotions, or optimizing product placement.

→ the success of market basket analysis depends on the quality of your data and the choice of appropriate thresholds for support, confidence, and lift. Experiment with different parameter settings to uncover the most valuable associations.