

Problem Statement for Market Basket Analysis

**This is made for the Artificial Intelligence Course by Naan Mudhalvan in collaboration with IBM*

Artificial Intelligence Course – Phase 1

- **Given Problem Statement**

“The problem is to perform market basket analysis on a provided dataset to unveil hidden patterns and associations between products. The goal is to understand customer purchasing behavior and identify potential cross-selling opportunities for a retail business. This project involves using association analysis techniques, such as Apriori algorithm, to find frequently co-occurring products and generate insights for business optimization.”

- **Problem Analysis and Inference**

From analyzing the given problem, the task is to perform market basket analysis with the given dataset to find hidden patterns and relations between products if they exist. This is to understand the purchasing behavior of customers and check for potential cross-selling opportunities for retailers. This problem requires the usage of association analysis techniques, to generate insights for business improvements.

- **Dataset Details**

- **This is the link to the dataset:** <https://www.kaggle.com/datasets/aslanahmedov/market-basket-analysis>
- The dataset contains transactional data from a retail store over a specified time period.
- Each row represents a unique transaction, listing the items purchased by a customer.
- The dataset includes information such as transaction ID, customer ID, and a list of purchased products.
- Product details include product names or IDs, categories, and prices.
- It also contains additional metadata such as country of purchase, date, time and other information.

- **Key Objectives of the Problem**

- Discover frequent itemsets: Apply the Apriori algorithm to identify which products are frequently purchased together in customer transactions.
- Calculate association rules: Establish association rules, including support, confidence, and lift, to quantify the relationships between products.
- Uncover cross-selling opportunities: Identify product pairs or sets that exhibit strong associations, enabling the retail business to strategically promote and bundle related products.
- Understand customer purchasing behavior: Gain insights into customer preferences and behaviors based on the discovered patterns.

- Optimize business strategies: Utilize the analysis findings to enhance product placement, marketing campaigns, and overall business operations.
- **Expected Results**
 - A comprehensive report summarizing the results of the market basket analysis, highlighting significant patterns and associations among products.
 - Visualizations, including charts and graphs, to illustrate the frequent itemsets, association rules, and other relevant insights.
 - Recommendations for the retail business to improve its product offerings, enhance customer experience, and boost revenue based on the analysis results.
- **Constraints of the Problem**
 - Address missing or noisy data in the dataset during preprocessing.
 - Ensure the scalability and efficiency of the analysis, particularly for larger datasets.
 - Adhere to ethical and privacy considerations when handling customer transaction data.