

Market Basket Insights

PHASE 1 Document Submission

Abstract:

Market Basket Analysis (MBA) is a widely adopted technique used to discover the relationships between products by analyzing the purchasing patterns of customers. It enables businesses to unearth hidden associations among products, facilitating improved product placements, promotions, and cross-selling opportunities. This paper delves into the intricacies of MBA and proposes an integrated framework for extracting actionable market basket insights.

Phase 1: Problem Definition and Design Thinking

1. Data Source

A Dataset market basket insights should be containing transaction data, including lists of purchased products.

Dataset Link: <https://www.kaggle.com/datasets/aslanahmedov/market-basket-analysis>

2.Data Pre-processing:

Prepare the raw transaction data for analysis.

Data sourcing, Data cleansing, Transaction encoding, and Data normalization.

- Data cleaning: Remove duplicates, handle missing values, and correct any data inconsistencies.
- Data transformation: Convert the data into a suitable format for association analysis, such as a transaction-item matrix where rows represent transactions, and columns represent products.
- Data encoding: Use one-hot encoding or similar techniques to convert categorical data (e.g., product names) into binary values.
- Data aggregation: Aggregate data by customer if needed to analyze customer-level

3.Association Analysis:

Identify frequent itemsets and derive association rules from the data.

Algorithm selection (e.g., Apriori, FP-Growth), Support & confidence threshold setting, and Rule extraction.

- Utilize the Apriori algorithm or other suitable association mining techniques to identify frequent itemsets and generate association rules.
- Set appropriate thresholds for support and confidence levels to filter meaningful associations.
- Consider using more advanced techniques like FPgrowth if dealing with large datasets for improved efficiency.

4.Insights Generations:

- Interpret the association rules to understand customer purchasing behavior.

This involves:

- Identifying frequently co-purchased products (antecedents and consequents).
- Analyzing lift and other association rule metrics to prioritize meaningful associations.
- Identifying patterns related to product combinations, customer segments, and transaction frequency.
- Identifying cross-selling and up-selling opportunities based on the rules.

5. Visualization:

Represent the derived rules in a visually appealing and informative manner.

Heatmaps, Network diagrams, and Rule plots.

- Create visualizations to present the discovered associations and insights in an easily understandable format. Visualizations may include:
 - Scatter plots or network graphs to display item associations.
 - Heatmaps to show item co-occurrence patterns
 - Bar charts or pie charts to represent crossselling opportunities
 - Customer segmentation plots to identify distinct customer groups.

6.Business Recommendation :

Utilize the insights for enhancing recommendation systems.

Provide actionable recommendations based on the insights gained from the association analysis. These recommendations may include:

- Product bundling suggestions: Recommend product combinations that are frequently purchased together to create bundled offerings.
- Targeted marketing strategies: Develop personalized marketing campaigns based on customer segments and their purchasing behavior.
- Inventory management: Optimize stock levels for frequently co-purchased items.
- Pricing strategies: Adjust pricing based on associations between products to encourage cross-selling.
- Store layout and placement: Use insights to optimize product placement in physical stores or on e-commerce websites.

Conclusion:

By dissecting the MBA process into modular components, this framework provides a systematic approach for businesses to glean actionable insights from their transaction data. Implementing such insights can lead to enhanced sales, improved customer satisfaction, and optimized store layouts.