How to Generate the Synthetic Market Basket From the Data?

The Part 1 Python code simulates customer shopping baskets based on product categories and purchasing probabilities. It leverages real supermarket data, assigns product categories, and generates 10,000 simulated baskets with varying sizes and shopping themes. The final output consists of an Excel file containing basket data, along with statistical summaries and sample basket insights.

1. **Product Category Assignment** The script extracts product names from two supermarkets and maps them to their respective categories. A dictionary (product_categories) stores category association, while a frequency-based probability distribution (product_probs) helps weight product selection.

2. **Basket Generation**
   o Each customer's basket size is generated using a normal distribution (average of 5 items, min 1, max 25).
   o There is a 20% chance that a customer selects a themed basket, drawing products from predefined category groups (e.g., breakfast, cleaning, snacks).
   o If no themed products are available, the basket selection reverts to general probability-weighted choices.

3. **Saving and Output**
   o The script compiles all baskets into a DataFrame and saves the data as an Excel file (customer_baskets.xlsx).
   o If an error occurs during Excel export, it automatically falls back to saving as a CSV (customer_baskets.csv).
   o Summary statistics, including basket count, average size, min/max basket sizes, and common items, are displayed for analysis.
   o Sample baskets and the most frequently purchased items across all customers are printed.

Interpretation
This simulation effectively models consumer purchasing behaviors using probability-weighted random selection. The presence of shopping themes introduces behavioral patterns, reflecting how customers might group purchases in real-world scenarios. The output data enables further analysis of price distributions, category preferences, and potential basket optimization strategies in retail environments.

Top 5 Most Meaningful Association Rules:

Rule Analysis and Business Recommendations:

Rule 1:
If İçim Yarım Yağlı Üçgen Peynir 100 G (dairy_products)
Then Pınar Protein Kakaolu Süt 500 Ml (dairy_products)
Support: 0.06%
Confidence: 10.91%
Lift: 16.04

Business Recommendations:
1. Cross-Promotion Strategy:
  - Place İçim Yarım Yağlı Üçgen Peynir 100 G and Pınar Protein Kakaolu Süt 500 Ml in close proximity
  - Create bundle offers combining these products
2. Pricing Strategy:
  - Consider dynamic pricing for İçim Yarım Yağlı Üçgen Peynir 100 G to increase sales of Pınar Protein Kakaolu Süt 500 Ml
  - Use İçim Yarım Yağlı Üçgen Peynir 100 G as loss leaders to drive sales of Pınar Protein Kakaolu Süt 500 Ml
3. Marketing Strategy:
  - Target customers who buy İçim Yarım Yağlı Üçgen Peynir 100 G with promotions for Pınar Protein Kakaolu Süt 500 Ml
  - Create email campaigns highlighting the complementary nature of these products
4. Inventory Management:
  - Ensure Pınar Protein Kakaolu Süt 500 Ml are well-stocked when İçim Yarım Yağlı Üçgen Peynir 100 G are on promotion
  - Monitor stock levels of both products to prevent out-of-stock situations

Rule 2:
If Pınar Protein Kakaolu Süt 500 Ml (dairy_products)
Then İçim Yarım Yağlı Üçgen Peynir 100 G (dairy_products)
Support: 0.06%
Confidence: 8.82%
Lift: 16.04

Business Recommendations:
1. Cross-Promotion Strategy:
  - Place Pınar Protein Kakaolu Süt 500 Ml and İçim Yarım Yağlı Üçgen Peynir 100 G in close proximity
  - Create bundle offers combining these products
2. Pricing Strategy:
  - Consider dynamic pricing for Pınar Protein Kakaolu Süt 500 Ml to increase sales of İçim Yarım Yağlı Üçgen Peynir 100 G
  - Use Pınar Protein Kakaolu Süt 500 Ml as loss leaders to drive sales of İçim Yarım Yağlı Üçgen Peynir 100 G
3. Marketing Strategy:
  - Target customers who buy Pınar Protein Kakaolu Süt 500 Ml with promotions for İçim Yarım Yağlı Üçgen Peynir 100 G
  - Create email campaigns highlighting the complementary nature of these products
4. Inventory Management:
  - Ensure İçim Yarım Yağlı Üçgen Peynir 100 G are well-stocked when Pınar Protein Kakaolu Süt 500 Ml are on promotion
  - Monitor stock levels of both products to prevent out-of-stock situations

Rule 3:
If Balparmak Yayla Çiçek Balı 850 G (breakfast_products)
Then Sek Çiftlik Kaymaksız Yoğurt 450 G (dairy_products)
Support: 0.05%
Confidence: 11.36%
Lift: 14.76

Business Recommendations:
1. Cross-Promotion Strategy:
  - Place Balparmak Yayla Çiçek Balı 850 G and Sek Çiftlik Kaymaksız Yoğurt 450 G in close proximity
  - Create bundle offers combining these products
2. Pricing Strategy:
  - Consider dynamic pricing for Balparmak Yayla Çiçek Balı 850 G to increase sales of Sek Çiftlik Kaymaksız Yoğurt 450 G
  - Use Balparmak Yayla Çiçek Balı 850 G as loss leaders to drive sales of Sek Çiftlik Kaymaksız Yoğurt 450 G
3. Marketing Strategy:

- Target customers who buy Balparmak Yayla Çiçek Balı 850 G with promotions for Sek Çiftlik Kaymaksız Yoğurt 450 G
- Create email campaigns highlighting the complementary nature of these products
4. Inventory Management:
- Ensure Sek Çiftlik Kaymaksız Yoğurt 450 G are well-stocked when Balparmak Yayla Çiçek Balı 850 G are on promotion
- Monitor stock levels of both products to prevent out-of-stock situations

Rule 4:
If Sek Çiftlik Kaymaksız Yoğurt 450 G (dairy_products)
Then Balparmak Yayla Çiçek Balı 850 G (breakfast_products)
Support: 0.05%
Confidence: 6.49%
Lift: 14.76

Business Recommendations:
1. Cross-Promotion Strategy:
- Place Sek Çiftlik Kaymaksız Yoğurt 450 G and Balparmak Yayla Çiçek Balı 850 G in close proximity
- Create bundle offers combining these products
2. Pricing Strategy:
- Consider dynamic pricing for Sek Çiftlik Kaymaksız Yoğurt 450 G to increase sales of Balparmak Yayla Çiçek Balı 850 G
- Use Sek Çiftlik Kaymaksız Yoğurt 450 G as loss leaders to drive sales of Balparmak Yayla Çiçek Balı 850 G
3. Marketing Strategy:
- Target customers who buy Sek Çiftlik Kaymaksız Yoğurt 450 G with promotions for Balparmak Yayla Çiçek Balı 850 G
- Create email campaigns highlighting the complementary nature of these products
4. Inventory Management:
- Ensure Balparmak Yayla Çiçek Balı 850 G are well-stocked when Sek Çiftlik Kaymaksız Yoğurt 450 G are on promotion
- Monitor stock levels of both products to prevent out-of-stock situations

Rule 5:
If Eti Canga Gold 45 g (snacks)
Then Eti Karam 45 Kakaolu Antep FıstıklıÇilekli Bitter Çikolata 60 g (snacks)
Support: 0.05%
Confidence: 5.81%
Lift: 13.84

Business Recommendations:
1. Cross-Promotion Strategy:
- Place Eti Canga Gold 45 g and Eti Karam 45 Kakaolu Antep FıstıklıÇilekli Bitter Çikolata 60 g in close proximity
- Create bundle offers combining these products
2. Pricing Strategy:
- Consider dynamic pricing for Eti Canga Gold 45 g to increase sales of Eti Karam 45 Kakaolu Antep FıstıklıÇilekli Bitter Çikolata 60 g
- Use Eti Canga Gold 45 g as loss leaders to drive sales of Eti Karam 45 Kakaolu Antep FıstıklıÇilekli Bitter Çikolata 60 g
3. Marketing Strategy:
- Target customers who buy Eti Canga Gold 45 g with promotions for Eti Karam 45 Kakaolu Antep FıstıklıÇilekli Bitter Çikolata 60 g
- Create email campaigns highlighting the complementary nature of these products
4. Inventory Management:
- Ensure Eti Karam 45 Kakaolu Antep FıstıklıÇilekli Bitter Çikolata 60 g are well-stocked when Eti Canga Gold 45 g are on promotion
- Monitor stock levels of both products to prevent out-of-stock situations