

Retail Market Basket Analytics Dashboard

Froject Overview

This project leverages **Association Rule Mining** to uncover frequently co-purchased product combinations using real-world transaction data.

We use the open-source **Groceries dataset** from the <u>MLxtend library</u>, which contains **9,835 market basket transactions** collected from a German retailer.



Goal

Help businesses improve product placement, bundling, and promotions by identifying high-affinity product combinations based on real purchasing patterns.

Tech Stack

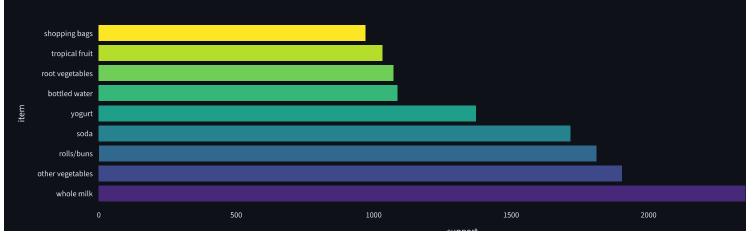
- Q Python for data processing
- **B** Pandas for preprocessing
- MLxtend for Apriori & rule mining
- **Plotly** for interactive visualizations
- \$\mathref{\text{B}}\$ Streamlit for dashboard deployment

📌 Dashboard Enables You To:

- **©** Visualize top-selling items
- Soldentify product pairings with strong associations
- **II** Filter product rules using lift and confidence

Top 10 Most Frequently Bought Items

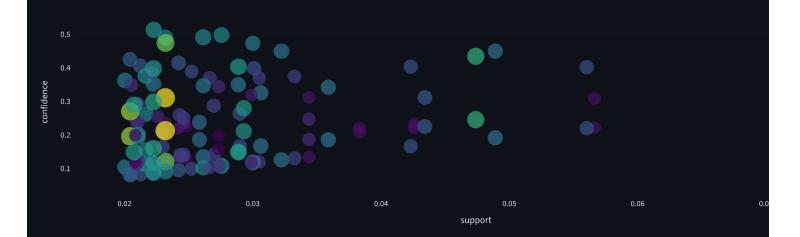
Most Frequently Purchased Products



🔍 Insight: Products like Whole Milk, Other Vegetables, and Yogurt top the charts, suggesting wide and frequent usage across customers.

Confidence vs Support (Bubble Size = Lift)

Strength of Association Rules



🔍 Insight: Rules with high confidence and lift indicate strong product affinity — ideal for bundling or promotions.

Explore Product Rules with Filters

Use the sliders below to filter association rules:

- Confidence: How often items on the left lead to the ones on the right E.g. $0.7 \rightarrow 70\%$ of people who buy item A also buy item B
- **6 Lift**: Measures the strength of the rule over random chance Lift > 1 → meaningful rule, Lift > 2 → very strong rule

Minimum Confidence	0.30	3
0.00		1.00
Minimum Lift		3
	2.00	
1.00		5.00

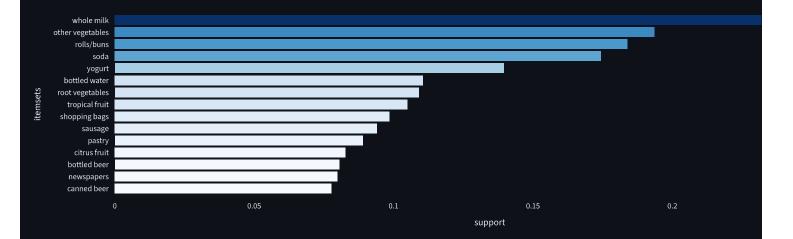
Showing rules with Confidence ≥ 0.30 and Lift ≥ 2.00

	antecedents	consequents	support	confidence
115	other vegetables, whole milk	root vegetables	0.0232	
116	whole milk, root vegetables	other vegetables	0.0232	
51	root vegetables	other vegetables	0.0474	
59	whipped/sour cream	other vegetables	0.0289	
122	yogurt, whole milk	other vegetables	0.0223	
121	yogurt, other vegetables	whole milk	0.0223	

Tip: Try setting Lift > 2 and Confidence > 0.4 to find tightly linked product pairs.

Frequent Itemsets (Support ≥ 3%)

Frequently Bought Itemsets



🥄 Insight: Combinations like 'Whole Milk & Other Vegetables' occur frequently, suggesting key anchor products.

Summary & Business Insights

- Whole milk acts as a top driver and occurs in multiple rules.
- Strong lifts suggest customers often buy these items together more than by chance.

The Data Analytics Concepts Used:

- Apriori Algorithm (Frequent Pattern Mining)
- Association Rule Metrics: Support, Confidence, Lift
- Interactive Filtering via Streamlit
- Business Interpretation of Item Affinities
- Visual Analytics with Plotly
- **Olick here to view the detailed analytics notebook**
- Project by Sahil Vachher | Dataset: Groceries MLxtend | Built with Streamlit + Plotly