# Association Rule Metrics: Confidence and Lift

## 1. Confidence

What It Measures:  
The likelihood that item(s) in the consequent are bought, given that the antecedent item(s) were bought.

Formula:  
Confidence(A → B) = Support(A ∪ B) / Support(A)

Interpretation:  
If Confidence = 0.6, it means: '60% of the transactions that include A also include B.'

Example:  
If 100 people bought yogurt, and 13 of them also bought whole milk:  
Confidence = 13 / 100 = 0.13

Why It's Useful:  
Confidence helps you measure how strongly items co-occur — it’s directional (A → B).

## 2. Lift

What It Measures:  
How much more likely the consequent is to occur with the antecedent compared to by random chance.

Formula:  
Lift(A → B) = Confidence(A → B) / Support(B)

Interpretation:  
- Lift = 1 → A and B are independent (no association).  
- Lift > 1 → A and B are positively associated.  
- Lift < 1 → A and B are negatively associated (buying A reduces chance of buying B).

Example:  
If Confidence = 0.13 and Support of whole milk = 0.16:  
Lift = 0.13 / 0.16 = 0.8125 → slight negative association

## How These Are Used in Code

When using association\_rules():  
association\_rules(frequent\_itemsets, metric="confidence", min\_threshold=0.1)  
  
This means: Only generate rules where confidence ≥ 10%.  
  
association\_rules(frequent\_itemsets, metric="lift", min\_threshold=1.5)  
  
This means: Only return rules with lift ≥ 1.5 (strong positive associations).