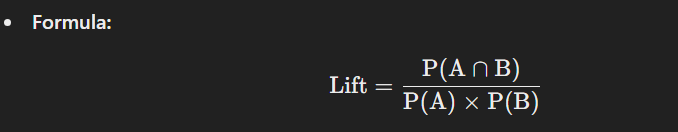
**1. What is Lift and Why is it Important in Association Rules?**

In association rule mining, lift is a metric used to assess a rule's strength. It measures the degree to which two items ( or itemsets ) occur together more frequently than would be predicted if they were separate.



Where:

P(A ∩ B) The probability of A and B occurring together.

P(A): The probability of A occurring.

P(B): The probability of B occurring.

**Interpretation:**

Lift = 1: A and B are independent.

Lift > 1: A and B are positively correlated (more likely to occur together).

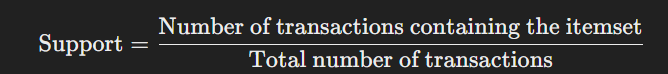
Lift < 1: A and B are negatively correlated (less likely to occur together).

**Importance:**

It facilitates the discovery of intriguing and complex links. Lift is more robust in assessing actual relationships than support and confidence since it accounts for the baseline probabilities of individual elements.

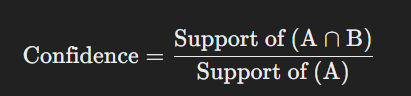
**What is Support and Confidence? How Do You Calculate Them?**

**Support: Support measures how frequently an itemset appears in the dataset.**

**Formula:** 

**Importance**: A higher support indicates that the itemset is common and hence potentially more useful in a practical context.

**Confidence**: Confidence evaluates the reliability of a rule A→ B by measuring the proportion of transactions containing A that also contain B.

**Formula: **

**Importance**: A higher confidence indicates that B is likely to occur when A occurs.

**What Are Some Limitations or Challenges of Association Rule Mining?**

**Scalability:**  
The number of potential itemset increases exponentially with dataset size and item count, making computation resource-intensive.

**Redundancy:**  
The algorithm frequently produces a lot of rules, many of which are unnecessary or boring.

**Low Support Problem:**  
Patterns that are uncommon but could be important might be missed because they don't fulfill the minimal support requirement.

**Subjectivity of Thresholds:**

Setting appropriate thresholds for support, confidence, and lift can be challenging and often requires domain expertise.

**Interpretability:**

Large sets of rules can be difficult to analyse and interpret, especially in high-dimensional datasets.

Handling Continuous

**Handling Continuous Data:**

Association rule mining typically works with categorical data. Continuous data requires preprocessing, such as discretization, which can lose some granularity.

**Bias Toward Frequent Items:**

The algorithms may Favor rules involving frequent items while neglecting less frequent but important associations**.**

**Context Ignorance:**

Association rules don't consider the temporal or contextual sequence of events, limiting their application in dynamic scenarios.