Experiment 12: Frequent Patterns and Association Rules Using FP-Growth Algorithm

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Aim:

To apply the **FP-Growth algorithm** on the Retail Transactions dataset to find **frequent patterns** and generate **association rules**.

Theory:

- **FP-Growth** is an **efficient algorithm** for mining **frequent itemsets** without candidate generation.
- Generates **association rules** using **support** and **confidence** thresholds.
- Useful for **market basket analysis** and identifying **co-purchased items**.

Dataset (retail_transactions.arff)

@relation retail_transactions

@attribute Rice {Yes, No}

@attribute Wheat {Yes, No}

@attribute Oil {Yes, No}

@attribute Sugar {Yes, No}

@attribute Salt {Yes, No}

@data

Yes,Yes,No,Yes,No

Yes,No,Yes,No,Yes

No,Yes,Yes,Yes,No

Yes,Yes,Yes,No,No

No,No,Yes,Yes,Yes

Yes,Yes,No,No,Yes

...

Procedure (Using WEKA):

1. Open **WEKA → Explorer**.

2. Click **Open File** → select **retail_transactions.arff**.
3. Go to **Associate tab**.
4. Choose **Associate → FPGrowth**.
5. Set parameters:
    - Minimum **support** (e.g., 0.2)
    - Minimum **confidence** (e.g., 0.7)
6. Click **Start** → WEKA finds **frequent patterns** and **association rules**.
7. Observe the **patterns** and **generated rules**.

Result (Sample / Expected):

Frequent Patterns:

- {Rice, Wheat}
- {Oil, Sugar}

Strong Association Rules:

1. Rice → Wheat (Support: 0.4, Confidence: 0.85)
2. Sugar → Oil (Support: 0.3, Confidence: 0.75)

Conclusion:

- FP-Growth efficiently finds **frequent patterns** and generates **strong rules**.
- Helps in **market analysis, product placement, and promotions**.
- WEKA provides **fast computation** compared to Apriori for large datasets.