

Exercise 1 - A Priori Method for Association Rules

The following contains a list of transactions in a shop.

| | Barley | Corn | Gram | Millet | Rice | Wheat |
|----|--------|------|------|--------|------|-------|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | | 1 | | 1 | 1 | 1 |
| 3 | 1 | | 1 | | 1 | 1 |
| 4 | | 1 | 1 | | 1 | 1 |
| 5 | 1 | | 1 | 1 | 1 | |
| 6 | | | 1 | | 1 | 1 |
| 7 | 1 | | | 1 | 1 | 1 |
| 8 | | | | 1 | 1 | 1 |
| 9 | 1 | 1 | 1 | 1 | | |
| 10 | 1 | 1 | 1 | | 1 | 1 |
| 11 | | 1 | | 1 | 1 | 1 |
| 12 | 1 | 1 | | 1 | 1 | 1 |

- Use the apriori algorithm to find the three-item association rules (with one item in the consequent) for the data in the table that meet the requirement of a minimum of 33% support and 66% confidence.
- Calculate the lift for each of the rules and comment on the calculated values.

Exercise 2 - A Priori Method for Association Rules

An association rule has been extracted from the data table below:

If Exhaustion = None AND
Stuffy nose = Severe
THEN Diagnosis = cold

| Patient ID | Fever | Headaches | General Aches | Weakness | Exhaustion | Stuffy Nose | Sneezing | Sore Throat | Chest Discomfort | Diagnosis |
|------------|--------|-----------|---------------|----------|------------|-------------|----------|-------------|------------------|-----------|
| 1326 | None | Mild | None | None | None | Mild | Severe | Severe | Mild | Cold |
| 398 | Severe | Severe | Severe | Severe | Severe | None | None | Severe | Severe | Flu |
| 6377 | Severe | Severe | Mild | Severe | Severe | Severe | None | Severe | Severe | Flu |
| 1234 | None | None | None | Mild | None | Severe | None | Mild | Mild | Cold |
| 2662 | Severe | Severe | Mild | Severe | Severe | Severe | None | Severe | Severe | Flu |
| 9477 | None | None | None | Mild | None | Severe | Severe | Severe | None | Cold |
| 7286 | Severe | Severe | Severe | Severe | Severe | None | None | None | Severe | Flu |
| 1732 | None | None | None | None | None | Severe | Severe | None | Mild | Cold |
| 1082 | None | Mild | Mild | None | None | Severe | Severe | Severe | Severe | Cold |
| 1429 | Severe | Severe | Severe | Mild | Mild | None | Severe | None | Severe | Flu |
| 14455 | None | None | None | Mild | None | Severe | Mild | Severe | None | Cold |
| 524 | Severe | Mild | Severe | Mild | Severe | None | Severe | None | Mild | Flu |
| 1542 | None | None | Mild | Mild | None | Severe | Severe | Severe | None | Cold |
| 8775 | Severe | Severe | Severe | Severe | Mild | None | Severe | Severe | Severe | Flu |
| 1615 | Mild | None | None | Mild | None | Severe | None | Severe | Mild | Cold |
| 1132 | None | None | None | None | None | Severe | Severe | Severe | Severe | Cold |
| 4522 | Severe | Mild | Severe | Mild | Mild | None | None | None | Severe | Flu |

Calculate the support, confidence, and lift for this rule.

Exercise 3 - A Priori Method for Association Rules

The table below lists twelve supermarket transactions, each consisting of 2 to 4 grocery items.

| | Transactions List | | | |
|----|--------------------------|---------|---------|---------|
| 1 | Milk | Egg | Bread | Butter |
| 2 | Milk | Butter | Egg | Ketchup |
| 3 | Bread | Butter | Ketchup | |
| 4 | Milk | Bread | Butter | |
| 5 | Bread | Butter | Cookies | |
| 6 | Milk | Bread | Butter | Cookies |
| 7 | Milk | Cookies | | |
| 8 | Milk | Bread | Butter | |
| 9 | Bread | Butter | Egg | Cookies |
| 10 | Milk | Butter | Bread | |
| 11 | Milk | Bread | Butter | |
| 12 | Milk | Bread | Cookies | Ketchup |

Source: “Data Analytics Made Accessible” by Anil Maheshwari, KDP eBook, 2016)

- If the minimal required support level is 33% and the minimal required confidence level 50% for a rule to be considered 'interesting', use the Apriori algorithm to find three-item interesting rules.
- Calculate the lift for the valid three-item association rules and comment on the results.