**502571-3 2nd Trimester 2022/2023 HW#4**

# Topics: ARM Sections: 2233 & 3827

# Due Date: Monday 13/02/2023 – 2:00 pm

# \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Exercise 1:**

We want to use the ARM on the following Database representing seven transactions of many items: F, M B, E, O, A, H, S, D

|  |  |
| --- | --- |
| **Transaction number** | **items** |
| 1 | {F, M, B, E} |
| 2 | {O, F, E} |
| 3 | {O, A, H, S} |
| 4 | {D, B, F, E} |
| 5 | {D, A, H, S} |
| 6 | {O, M, E} |
| 7 | {O, A, D, H, S} |

1. Without calculation, could you list an association rule with a confidence equal to 100%. Justify your answer.
2. Apply the A-Priori algorithm to determine the important association rules with an assumption that the minsup = 0.4 and the minconf = 0.9

Step 1:

C1 L1

After calculating check for support row and discarding any low minsup = 0.4



|  |  |
| --- | --- |
| ITEMSET | SUPPORT |
| {F} | 3/7=0.43 |
| {M} | 2/7=0.29 |
| {B} | 2/7=0.29 |
| {E} | 4/7=0.57 |
| {O} | 4/7=0.57 |
| {A} | 3/8=0.43 |
| {H} | 3/8=0.43 |
| {S} | 3/8=0.43 |
| {D} | 3/8=0.43 |

|  |  |
| --- | --- |
| ITEMSET | SUPPORT |
| {F} | 3/7=0.43 |
| {E} | 4/7=0.57 |
| {O} | 4/7=0.57 |
| {A} | 3/8=0.43 |
| {H} | 3/8=0.43 |
| {S} | 3/8=0.43 |
| {D} | 3/8=0.43 |

I calculated prune step because I ignored two items, and the result all items exist in L1 table.

C2

|  |  |
| --- | --- |
| ITEMSET | SUPPORT |
| {F, E} | 3/7=0.43 |
| {F, O} | 1/7 = 0.14 |
| {F, A} | 0/7 = 0 |
| {F, H} | 0/7 = 0 |
| {F, S} | 0/7 = 0 |
| {F, D} | 1/7 = 0.14 |
| {E, O} | 2/7=0.29 |
| {E, A} | 0/7 = 0 |
| {E, H} | 0/7 = 0 |
| {E, S} | 0/7 = 0 |
| {E, D} | 1/7 = 0.14 |
| {O, A} | 2/7=0.29 |
| {O, H} | 2/7=0.29 |
| {O, S} | 2/7=0.29 |
| {O, D} | 1/7 = 0.14 |
| {A, H} | 3/7=0.43 |
| {A, S} | 3/7=0.43 |
| {A, D} | 2/7=0.29 |
| {H, S} | 3/7=0.43 |
| {H, D} | 2/7=0.29 |
| {S, D} | 1/7 = 0.14 |

L2

|  |  |
| --- | --- |
| ITEMSET | SUPPORT |
| {F, E} | 3/7=0.43 |
| {A, H} | 3/7=0.43 |
| {A, S} | 3/7=0.43 |
| {H, S} | 3/7=0.43 |

Prune step

{F, E, A} = {F, E} {F, A} {E, A}

{F, E, H} = {F, E} {F, H} {E, H}

{F, A, H} = {F, A} {F, H} {A, H}

{F, E, S} = {F, E} {F, S} {E, S}

{F, A, S} = {F, A} {F, S} {A, S}

{F, E, H} = {F, E} {F, H} {E, H}

{F, H, S} = {F, H} {F, S} {H, S}

C4 = ϕ

LAST STEP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RULE L → R | COUNT (L U R) | COUNT(L) | CONFIDENCE (L→R) | SATSIFY |
| F→E | 3 | 3 | 1 | YES |
| E→F | 3 | 4 | 0.75 | NO |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RULE L -> R | COUNT (L U R) | COUNT(L) | CONFIDENCE (L->R) | SATSIFY |
| A → H | 3 | 3 | 1 | YES |
| H → A | 3 | 3 | 1 | YES |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RULE L -> R | COUNT (L U R) | COUNT(L) | CONFIDENCE (L->R) | SATSIFY |
| A → S | 3 | 3 | 1 | YES |
| S → A | 3 | 3 | 1 | YES |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RULE L -> R | COUNT (L U R) | COUNT(L) | CONFIDENCE (L->R) | SATSIFY |
| H → S | 3 | 3 | 1 | YES |
| S → H | 3 | 3 | 1 | YES |

Supported association rules:

F→E

A→H

H→A

A→S

H→S

S→H