6.30 pm

Recommendations

- Association Rules
  - Affinity Analysis
    - Things that go together
    - 'Market Basket Analysis'
- Recommender Systems
  - Content Based
  - Collaborative filtering

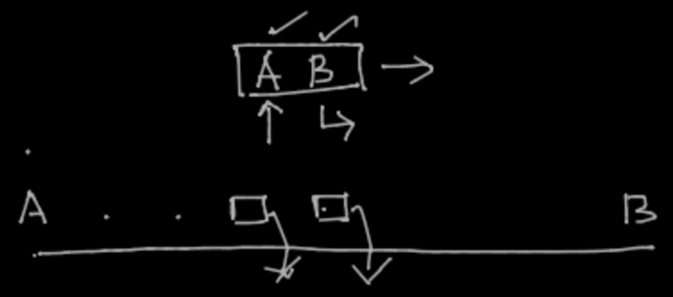
Walmart
'Diapers also buy Beer'
'Apriori Algorithm'

Input

1 Bread, Biscuit, Soap, Shampoo
2 Rice, Flour, Notebook, Pen, Pencil
3 .
. . . . . .
.
.
.
500

Association Rule
If Bread ⇒ then Butter

'Actionable Rules'



'Apriori Algorithm

Association Rule:

If { Antecedent } ⇒ then { Consequent }
A C

if Bread then Butter
(A) (C)

'Apriori principal'

"If an itemset is frequent then all its subsets should also be frequent"

Talking: Geethika

Itemset : 1-item itemset
{ Butter }
2-item Itemsets
{ Bread, Butter }
.
{ Bread, Butter, Jam }
{ Br, But } { Br }
{ Br, Jm } { Bu }
{ But, Jm } { Jam }

Frequent itemset ? → Support
✓ Confidence
✓ Lift.

Frequent item ⇒ support > (Min-support) → 60%

→ { Bread, Butter } = (B, B / 100)

{ Bread } → 40%.
{ Butter } → (80/100) ✓

70/100 ✓

'Frequency'

(1) Support (S) = $\frac{\#(A, C)}{\#\text{transactions}}$ ✓

$S = \frac{70}{100} = 70\%$

Min_Support = 40%.

(2) Confidence (C) = $\frac{\#(A, C)}{\#(A)}$ ✓

(3) Lift = $\frac{\text{Confidence}}{\text{Benchmark Confidence}}$

Benchmark = $\frac{\#C}{\text{Total trans}} = \frac{80}{84} = 0.95$

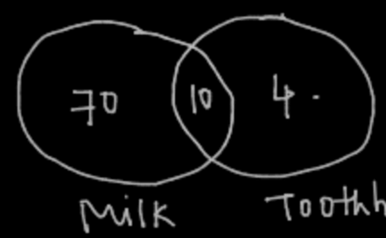
Lift = $\frac{0.71}{0.95} = 0.74$

If {antecedent} ⇒ then {Consequent}
A C

If {Bread} then {Butter}
A ✓ C

Talking: Geethika

> 2 ✓



If {Toothbrush} = {Milk}
C

Confidence = $\frac{\#(T, B)}{\#(T)}$

$C = \frac{10}{14} = 71\%$

Lift < 1 → reject the rule

Atleast 1 → .

TrsId	Items
1	$I_1\ I_2\ I_5$
2	$I_2\ I_4$
3	$I_2\ I_3$
4	$I_1\ I_2\ I_4$
5	$I_1\ I_3$
6	$I_2\ I_3$
7	$I_1\ I_3$
8	$I_1\ I_2\ I_3\ I_5$
9	$I_1\ I_2\ I_3$

All possible 1-Item itemsets.

$\{I_1\}$ — 6 ✓
$\{I_2\}$ — 7 ✓
$\{I_3\}$ — 6 ✓
$\{I_4\}$ — 2.
$\{I_5\}$ — 2

All possible 2 item-1 itemsets

$\{I_1 I_2\}$ — 4
$\{I_1 I_3\}$ — 4
$\{I_1 I_4\}$ — 1
$\{I_1 I_5\}$ — 2 ✓
$\{I_2 I_3\}$ — 4 ✓
$\{I_2 I_4\}$ — 2
$\{I_2 I_5\}$ — 2
$\{I_3 I_4\}$ — 0
$\{I_3 I_5\}$ — 1
$\{I_4 I_5\}$ — 0

Freq 2-Item itemsets

$I_1 I_2$
$I_1 I_3$
$I_1 I_5$
$I_2 I_3$
$I_2 I_4$
$I_2 I_5$

Min-support = 2

Talking: Geethika

Fryuent Itemsets

3 - Item Itemsets.

$I_1 I_2 I_3$ — 2 ✓
$I_1 I_2 I_5$ — 2
$I_1 I_2 I_4$ — 1
$I_1 I_3 I_5$ — 1
$I_1 I_3 I_4$ — 0
$I_1 I_4 I_5$ — 0

Freq. 3 Item

$I_1 I_2 I_3$ ✓
$I_1 I_2 I_5$ ✓

Fmr Item

$I_1 I_2 I_3 I_5$ — 1 X.

Minimum Confidence = 100% ✓

$I_1 I_2 I_3$

A C

$I_1 - I_2 I_3 = 2/6 = 33.33\%$

$I_2 - I_1 I_3 = 2/7 = 29\%$

$I_3 - I_1 I_2 = 2/6 = 33.33\%$

$I_2 I_3 - I_1 = 2/4 = 50\%$

$I_1 I_3 - I_2 = 2/4 = 50\%$

$I_1 I_2 - I_3 = 2/4 = 50\%$

$I_1 I_2 I_5$

$I_1 = I_2 I_5 = 2/6 = 33\%$

$I_2 = I_1 I_5 = 2/7 = 29\%$

$I_5 = I_1 I_2 = 2/2 = 100\%$

$I_2 I_5 = I_1 = 2/2 = 100\%$

$I_1 I_5 = I_2 = 2/2 = 100\%$

$I_1 I_2 = I_5 = 2/4 = 50\%$

Talking:

$\begin{cases} I_5 \Rightarrow I_1 I_2 \\ I_2 I_5 \Rightarrow I_1 \\ I_1 I_5 \Rightarrow I_2 \end{cases}$

	Confidin	lift	Leverage
	.	2 ✓	.
		2 ✓	
		1.5	
		.	
		.	
		.	