

9531060 - عاطفی ملکی - میرزا علی شریعتی

Apriori algorithm database ① : Apriori algorithm

\leftarrow Choisir K+1 objets dans (Step Item Set) \leftarrow K objets (\leq FP (S)) \circlearrowright . puis les

→ Frequent pattern (Itemset)

• Discovering frequent patterns & using them to infer rules (K)

$L_1 = \{\text{frequent items}\}$; : Apriori, pruned

for (k=1 ; L_k != \emptyset ; k++) do begin

Kinderwelt e. S. G.

کیمیا و کارهای ایجادی

KJL الاطفال FP نجوم ← Lk

C_{k+1} = candidates generated from L_k ;

for each transaction t in database do

increment the count of all candidates in C_{k+1} that are contained in T .

L_{k+1} = candidates in C_{k+1} with min-support

end

return $\bigcup_{k=1}^n L_k$;

FP-Growth پریمی جنم

• اسکنر و فاکس FP یا طلب database ①

رایج ترین موارد از این محتویات فرم Frequent Items ۴

• fil (gl FP Cis) transaction will be part of initial database ④

abril, 2019, 13:15:03 Conditional FP-Tree by frequent Itemset: 2019-04-04

الآن نعود إلى الـ Conditional FP-Tree ونرى كيف يمكن إنشاؤه.

• in path (جگہ پر)

دسته بندی داده های غیر مرتب:

Apriori \leftarrow از حسنه و حاوی اول سطح استخراج می شود که باید اینها را توکید آنچه داشتند
میتوان این داده ها را باز استخراج کرد اما اینها نباید زیاد باشند.

(Apriori \leftarrow از حسنه و حاوی اول استخراج می شود، که باید اینها را به طور صریح و مستقیم (مثل FP-Growth) تولید نمایند. این داده ها اینجا ایجاد نمی شوند و از این داده ها ایجاد فرآیندی بزرگ با ارزش انتشاری تولید می شوند اما نعم این داده ها را توکید نمی کنند.

Local FP
نماینده این روش \leftarrow جمع اسنان نمایندگان از دسترسی برخورداریم - (روش Divide & conquer ایجاد می شوند) که باید این داده ها را باز استخراج کرد اما این داده ها را توکید نمی کنند - پس از این داده ها را باز استخراج کرد این داده ها را توکید نمی کنند.

T₁: A, C, D

Apriori ρ_{min} (الحد الأدنى) P_{min}

P_{min}

T₂: A, B, C, E

$$sup_{min} = P \quad conf_{min} = \rho/V$$

T₃: E, B, C

| Item | count |
|------|-------|
| A | P |
| B | F |
| C | F |
| D | I X |
| E | P |
| F | I X |

| Item | count |
|------|-------|
| B | F |
| C | F |
| A | P |
| E | P |

(Select 6 items)
W₁, G₂,
P₁, C

T₄: A, F, B, C

| Item | count |
|------|-------|
| BC | P |
| BA | P |
| BE | P |
| CA | P |
| CE | P |
| AE | I X |

| Item | count |
|------|-------|
| BC | P |
| BE | P |
| CA | P |
| CE | P |
| AB | P |

→ *select best*
use w1
prune

| Item | Count |
|------|-----------------------------------|
| BCE | P ✓ |
| BCA | P ✓ |
| ABE | X ↳ P ₁ A _E |
| ACE | X ↳ P ₁ A _E |

↓
候補 FP: {B,C} {B,E} {C,A} {C,E} {A,B}

↓候補 FP: {B,C,E} {B,C,A}

: (نهاية تفاصيل المعرفة)

① B → C

$$conf = \frac{P(B \cup C)}{P(B)} = \frac{P/B}{F/D} = \frac{P}{F} = \rho/V > min_conf$$

$$lift = \frac{P(B \cup C)}{P(B)P(C)} = \frac{P/B}{F/D \times F/C} = 10/4 < 1 \rightarrow \begin{array}{l} \text{strong rule} \\ \text{negatively correlated} \end{array}$$

② C → B

$$conf = \frac{P(B \cup C)}{P(C)} = \frac{P/B}{F/C} = \frac{P}{F} > min_conf \rightarrow \text{strong rule}$$

$$lift = \frac{P(B \cup C)}{P(B)P(C)} = \frac{10}{17} < 1 \rightarrow \text{negatively Correlated}$$

④ B → E $\text{conf} = \frac{P(B|E)}{P(B)} = \frac{r/\alpha}{r/\alpha} = \frac{r}{r/\alpha} = r > \text{min_conf}$ \rightarrow
 lift = $\frac{P(B|E)}{P(B)P(E)} = \frac{r/\alpha}{r/\alpha \times r/\alpha} = \frac{1}{\alpha} > 1 \rightarrow \text{positively correlated}$ strong rule

⑤ E → B $\text{conf} = \frac{P(B|E)}{P(E)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min_conf} \rightarrow \text{strong rule}$

lift = $\frac{P(B|E)}{P(B)P(E)} = \frac{\alpha}{r/\alpha} > 1 \rightarrow \text{positively correlated}$

⑥ C → A $\text{conf} = \frac{P(A|C)}{P(C)} = \frac{r/\alpha}{r/\alpha} = \frac{r}{r/\alpha} = r > \text{min_conf} \rightarrow \text{strong rule}$

lift = $\frac{P(A|C)}{P(A)P(C)} = \frac{r/\alpha}{r/\alpha \times r/\alpha} = \frac{1}{\alpha} > 1 \Rightarrow \text{positively correlated}$

⑦ A → C $\text{conf} = \frac{P(A|C)}{P(A)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min_conf} \rightarrow \text{strong rule}$

lift = $\frac{\alpha}{r} > 1 \rightarrow \text{positively correlated}$

⑧ C → E $\text{conf} = \frac{P(E|C)}{P(C)} = \frac{r/\alpha}{r/\alpha} = r/\alpha < 1 \vee$

Lift \neq Lift new B \approx 0.5 \approx min Strong C \approx 0.5 \leftarrow

⑨ E → C $\text{conf} = \frac{P(C|E)}{P(E)} = \frac{r/\alpha}{r/\alpha} = r < \text{min_conf}$ \rightarrow
 min Strong C \approx 0.5

⑩ A → B $\text{conf} = \frac{P(B|A)}{P(A)} = \frac{r/\alpha}{r/\alpha} = r < \text{min_conf}$ \rightarrow
 min Strong C \approx 0.5

① $B \rightarrow A$

$$\text{conf} = \frac{P(A \cup B)}{P(B)} = \frac{P(A)}{P(A)} = 1.0 \leftarrow \text{min_conf}$$

↑
this rule isn't strong
and strong قانون این

$$\textcircled{11} \quad B \rightarrow C, E \quad \text{conf} = \frac{P(B \cup C \cup E)}{P(B)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \quad \boxed{\text{not strong}}$$

min strong \Leftrightarrow $r > \alpha$

$$\textcircled{12} \quad C, E \rightarrow B \quad \text{conf} = \frac{P(B \cup C \cup E)}{P(C \cup E)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min_conf} \rightarrow \text{strong rule}$$

lift = $\alpha/r > 1 \rightarrow$ positively correlated

$$\textcircled{13} \quad C \rightarrow B, E \quad \text{conf} = \frac{P(B \cup C \cup E)}{P(C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \quad \rightarrow$$

lift = $\frac{P(B \cup C \cup E)}{P(C)P(B, E)} = \frac{\alpha}{4} < 1 \rightarrow$ negatively correlated this rule isn't strong

$$\textcircled{14} \quad B, E \rightarrow C \quad \text{conf} = \frac{P(B \cup C \cup E)}{P(B, E)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \quad \rightarrow$$

lift = $\alpha/r < 1 \rightarrow$ negatively correlated this rule isn't strong

$$\textcircled{15} \quad E \rightarrow B, C \quad \text{conf} = \frac{P(E \cup B \cup C)}{P(E)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf.}$$

lift $\alpha/r < 1 \rightarrow$ min strong $\Leftrightarrow r > \alpha$

$$\textcircled{16} \quad B, C \rightarrow E \quad \text{conf} = \frac{P(E \cup B \cup C)}{P(B, C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \rightarrow \text{min strong} \quad \Leftrightarrow r > \alpha$$

lift $\alpha/r < 1 \rightarrow$ min strong

$$\textcircled{17} \quad A \rightarrow B, C \quad \text{conf} = \frac{P(A \cup B \cup C)}{P(A)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \quad \rightarrow$$

min strong

$$\textcircled{18} \quad B, C \rightarrow A \quad \text{conf} = \frac{P(A \cup B \cup C)}{P(B, C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \quad \rightarrow$$

min strong

④ $B \rightarrow A, C$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(B)} = \frac{r/\omega}{r/\omega} = \frac{r}{r} < \text{min_conf} \rightarrow \text{is not strong}$

إذن غير قوية

⑤ $A, C \rightarrow B$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(A, C)} = \frac{r/\omega}{r/\omega} = \frac{r}{r} < \text{min_conf} \rightarrow \text{is not strong}$

إذن غير قوية

⑥ $C \rightarrow A, B$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(C)} = \frac{r/\omega}{r/\omega} = \frac{r}{r} < \text{min_conf} \rightarrow \text{is not strong}$

إذن غير قوية

⑦ $A, B \rightarrow C$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(A, B)} = \frac{r/\omega}{r/\omega} = \frac{r}{r} > \text{min_conf} \rightarrow \text{strong}$

$\text{lift} = \frac{P(A \cup B \cup C)}{P(A) P(B)} = \frac{r/\omega}{r/\omega \times \frac{r}{\omega}} = \frac{r/\omega}{r/\omega \times r/\omega} = \frac{r}{r} = 1 \rightarrow \text{positively correlated}$

Item | count

| | |
|---|---|
| A | μ |
| B | μ |
| C | μ |
| D | 1 |
| E | μ |
| F | 1 |

Item | count

| | |
|---|---|
| B | μ |
| C | μ |
| A | μ |
| E | μ |

Sort →

FP Growth Tree Construction

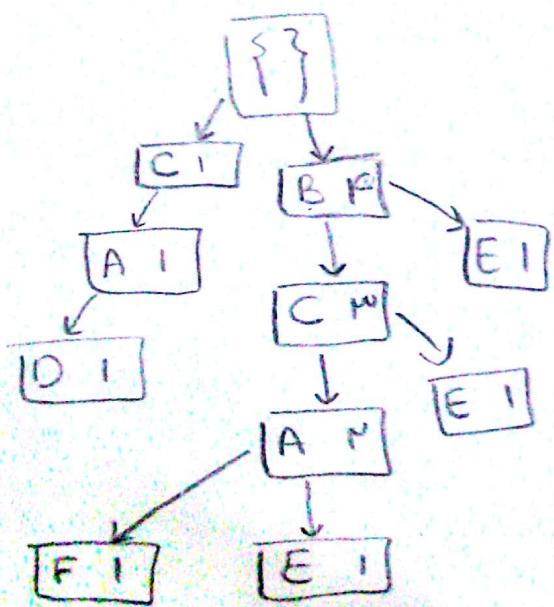
T₁: C, A, D

T_P: B, C, A, E

T_P: B, C, E

T_K: B, E

T_D: B, C, A, F

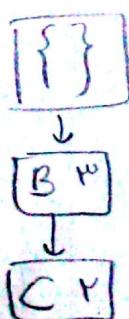


DB | E

| | |
|---------|---|
| B, C, A | 1 |
| B | 1 |
| B, C | 1 |

Item | count

| | |
|---|-----|
| B | μ |
| C | μ |
| A | 1 X |



PB | A

| | |
|------|---|
| C | 1 |
| B, C | μ |

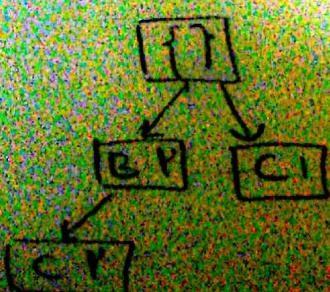
Item | count

| | |
|---|---|
| C | μ |
| B | μ |

{A, C} : μ

{A, B} : μ

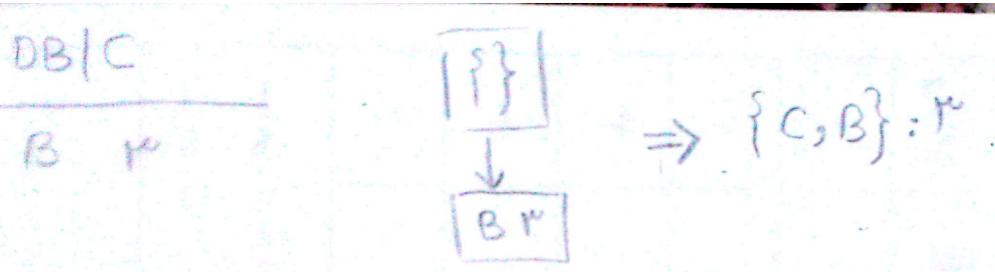
{A, B, C} : μ



⇒ {E, B} : μ

{E, C} : μ

{E, B, C} : μ



~ FP-growth will give us just the frequent pattern

Using $\Gamma = \{E, B\} \{E, C\} \{A, C\} \{A, B\} \{C, B\}$: *we can now proceed*

$$\text{Succ}^P = \{E, B, C\} \{A, B, C\}$$

حالات انتشار و روش FP قوانین (راهنمهای) (از روی) Apriori

: ((b) (i) (ii) (iii) (iv))

① $B \rightarrow C$

$$\text{conf} = \frac{P(B \cup C)}{P(B)} = \frac{P/\omega}{F/\omega} = \frac{\mu}{F} = 0.15 > \text{min-conf}$$

$$\text{lft} = \frac{P(B \cup C)}{P(B)P(C)} = \frac{P/\omega}{F/\omega \times F/\omega} = 10/14 < 1 \rightarrow \begin{array}{l} \text{strong rule} \\ \text{negatively correlated} \end{array}$$

② $C \rightarrow B$

$$\text{conf} = \frac{P(B \cup C)}{P(C)} = \frac{P/\omega}{F/\omega} = \frac{\mu}{F} > \text{min-conf} \rightarrow \text{strong rule}$$

$$\text{lft} = \frac{P(B \cup C)}{P(B)P(C)} = \frac{10}{17} < 1 \rightarrow \text{negatively Correlated}$$

$$\text{Conf} = \frac{P(B|E)}{P(B)} = \frac{r/\alpha}{r/\alpha} = \frac{P}{F} = 0.7 > \text{min_conf} \rightarrow$$

$\text{lifit} = \frac{P(B|E)}{P(B)P(E)} = \frac{r/\alpha}{r/\alpha \times r/\alpha} = \frac{1/\alpha}{\lambda} > 1 \rightarrow \text{positively correlated}$

④ $E \rightarrow B \quad \text{conf} = \frac{P(B|E)}{P(E)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min_conf} \Rightarrow \text{strong rule}$

$\text{lifit} = \frac{P(B|E)}{P(B)P(E)} = \frac{\alpha}{F} > 1 \rightarrow \text{positively correlated}$

⑤ $C \rightarrow A \quad \text{conf} = \frac{P(A|C)}{P(C)} = \frac{r/\alpha}{r/\alpha} = \frac{r}{F} > \text{min_conf} \rightarrow \text{strong rule}$

$\text{lifit} = \frac{P(A|C)}{P(A)P(C)} = \frac{r/\alpha}{r/\alpha \times r/\alpha} = \frac{\alpha}{F} > 1 \Rightarrow \text{positively correlated}$

⑥ $A \rightarrow C \quad \text{conf} = \frac{P(A|C)}{P(A)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min_conf} \rightarrow \text{strong rule}$

$\text{lifit} = \frac{\alpha}{F} > 1 \rightarrow \text{positively correlated}$

⑦ $C \rightarrow E \quad \text{conf} = \frac{P(E|C)}{P(C)} = \frac{r/\alpha}{r/\alpha} = 0.7 < 1 \vee$

لأن Lift number less than 1 \rightarrow strong rule

⑧ $E \rightarrow C \quad \text{conf} = \frac{P(C|E)}{P(E)} = \frac{r/\alpha}{r/\alpha} = \frac{r}{F} < \text{min_conf}$

لأن conf less than min conf

⑨ $A \rightarrow B \quad \text{conf} = \frac{P(B|A)}{P(A)} = \frac{r/\alpha}{r/\alpha} = \frac{r}{F} < \text{min_conf}$

لأن conf less than min conf

④ $B \rightarrow A$

$$\text{conf} = \frac{P(A \cup B)}{P(B)} = \frac{P(A)}{P(A)} = 1 < \text{min_conf} \rightarrow$$

this rule isn't strong
وهي قوية جداً ←

$$\text{conf} = \frac{P(B \cup C \cup E)}{P(B)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min-conf} \rightarrow$$

min strong rule

(13) $C, E \rightarrow B$ $\text{conf} = \frac{P(B \cup C \cup E)}{P(C, E)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min-conf} \rightarrow$ strong rule

lift = $\alpha/r > 1 \rightarrow$ positively correlated

(14) $C \rightarrow B, E$ $\text{conf} = \frac{P(B \cup C \cup E)}{P(C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min-conf} \rightarrow$
 lift = $\frac{P(B \cup C \cup E)}{P(C)P(B, E)} = \frac{\alpha}{4} < 1 \rightarrow$ negatively correlated this rule isn't strong

(15) $B, E \rightarrow C$ $\text{conf} = \frac{P(B \cup C \cup E)}{P(B, E)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min-conf} \rightarrow$
 lift = $\alpha/4 < 1 \rightarrow$ negatively correlated this rule isn't strong

(16) $E \rightarrow B, C$ $\text{conf} = \frac{P(E \cup C \cup B)}{P(E)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min-conf}$

min lift shows low value min strong rule

(17) $B, C \rightarrow E$ $\text{conf} = \frac{P(E \cup C \cup B)}{P(B, C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min-conf} \rightarrow$ strong rule
min lift shows high value

(18) $A \rightarrow B, C$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(A)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min-conf} \rightarrow$

min strong

(19) $B, C \rightarrow A$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(B, C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min-conf} \rightarrow$

min strong

(K) $B \rightarrow A, C$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(B)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \rightarrow \text{is not strong}$

is not strong (弱)

(L) $A, C \rightarrow B$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(A, C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \rightarrow B \text{ not strong}$

is not strong (弱)

(M) $C \rightarrow A, B$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(C)} = \frac{r/\alpha}{r/\alpha} = 1 < \text{min_conf} \rightarrow \text{is not strong}$

is not strong (弱)

(N) $A, B \rightarrow C$ $\text{conf} = \frac{P(A \cup B \cup C)}{P(A, B)} = \frac{r/\alpha}{r/\alpha} = 1 > \text{min_conf} \rightarrow \text{strong}$

$\text{lift} = \frac{P(A \cup B \cup C)}{P(A, B) P(C)} = \frac{r/\alpha}{r/\alpha \times E/\alpha} = Q/f \rightarrow \text{positively correlated}$