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APRIORI

Q1. (a) minsupport = 3

L_1 =>

Itemset	sup
A	6
B	4
C	3
D	8
E	9
F	~~5~~

Duplicate F not counted

=> C_2

~~A, B~~	1
~~A, C~~	1
~~A, D~~	2
A, E	4
~~A, F~~	1
~~B, C~~	0
B, D	3
~~B, E~~	1
~~B, F~~	1
~~C, D~~	2
~~C, E~~	2
~~C, F~~	1
D, E	4
D, F	3
E, F	3

=> L_2

A, E	4
B, D	3
D, E	4
D, F	3
E, F	3

C_3

~~A B D~~	1
~~A B E~~	0
~~A B F~~	0
~~C D E~~	2
~~D E F~~	1
~~A E F~~	1
~~A D E~~	1
~~B D F~~	1
~~D B F~~	1

=> L_3 => None Qualify

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FP- Growth

Item	frequency	head
E	9	
D	8	
A	6	
F	5	
B	4	
C	3	

F-list

E-D-A-F-B-C

TID	ordered
1	D B
2	D A B
3	A C
4	E F
5	E D F C
6	E B
7	E A
8	E A F
9	E D A
10	E A
11	D F B
12	E D
13	D F F
14	E D C

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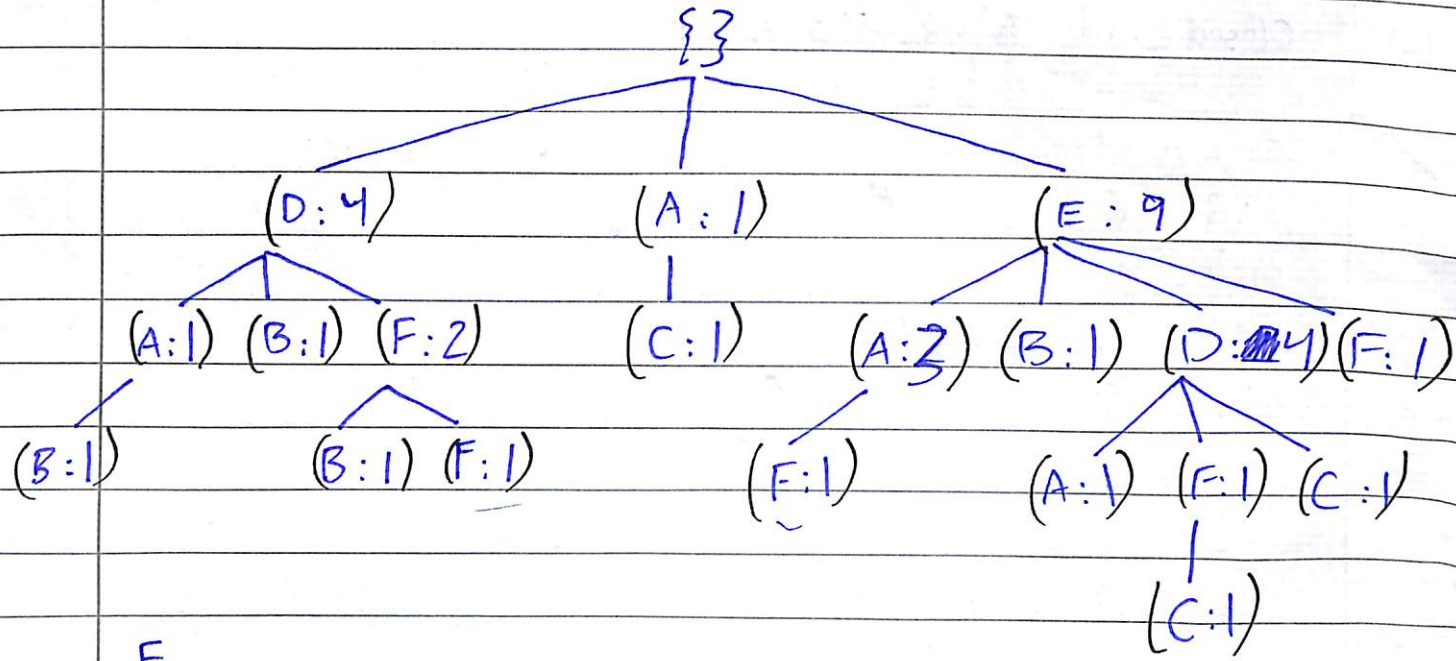
FP-tree



E

D E:4

A D:1, E:3, DE:1

F E:1, D:2, AE:1, DE:1

B FD:1, D:1, AD:1, E:1

C A:1, DE:1, FDE:1

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Min support = 3

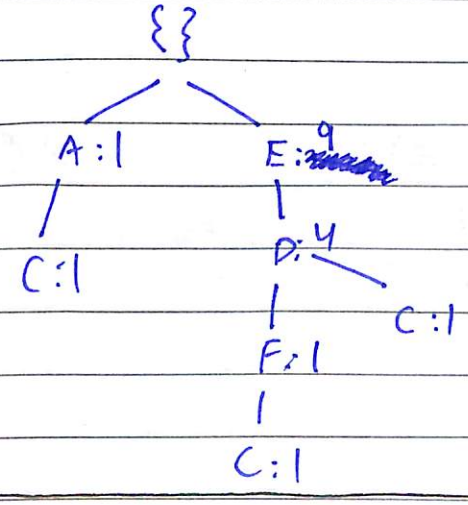
F-list: E(9) - D(8) - A(6) - F(5) - B(4) - C(3)

←

Conditional pattern base for C:

A:1 , ED:1 , EDF:1

1) Conditional FP-tree for C:



(A:1, C:1)

(E:9, D:4, F:1, C:1)

(E:9, D:4, C:1)

Conditional pattern Base

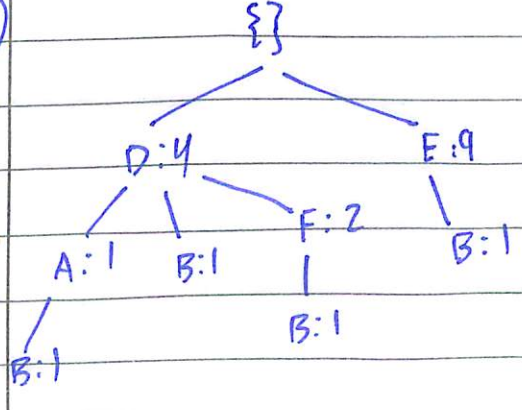
(A:1)

(E:9, D:4, F:1)

(E:9, D:4)

None fulfill min support

2)



(D:4, A:1, B:1)

(D:4, B:1)

(D:4, F:2, B:1)

(E:9, B:1)

Frequent Patterns so far:
(D:3, DB:3)

Conditional Pattern Base

(D:1, A:1), (D:1, F:1) => (D:3)
(D:1) , (E:1)

recursive: (D: 2) (D: 1, F: 1) => (D: 3)

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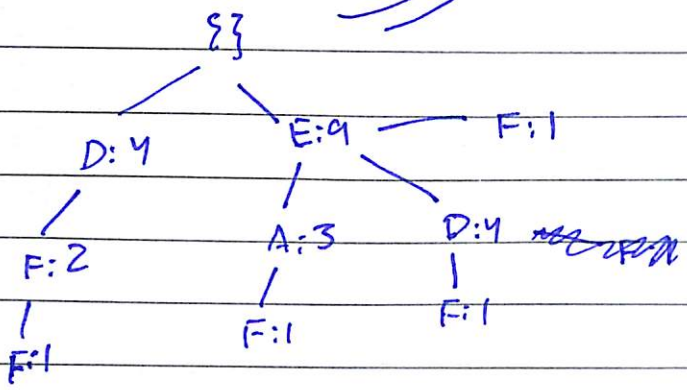
Freq. Patterns
D: 3, DF: 3

3) Conditional FP-tree for F:



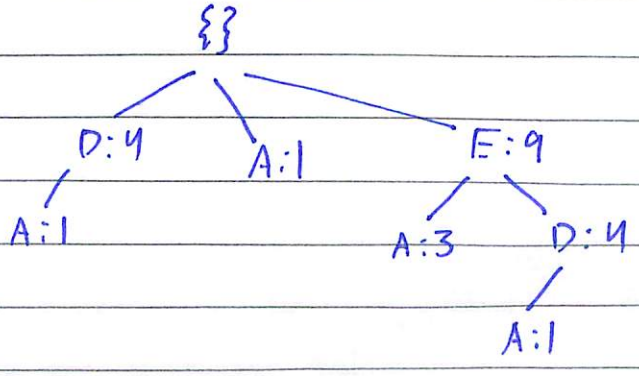
Conditional Pattern Base

~~(D: 1, F: 1)~~
(E: 1, A: 1)
(E: 1)
(E: 1, D: 1)

=> (E: 3)

Frequent Patterns so far:
(E: 3, EF: 3)

4) Conditional FP-tree for A:



~~(D: 1)~~
~~(E: 3)~~
(E: 1, D: 1)
=> ~~(E: 4)~~

Freq. Patterns:
~~(E: 4, EA: 3)~~ (E: 4, EA: 4)

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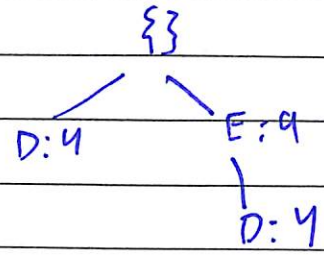
5) Conditional FP tree for D



(E:4)

=>(E:4)

Freq. Patterns

(E:4, DE:4)

Q1. (d) (B) E A $\frac{sup(E \cup A)}{sup(E)} = \frac{4}{9} = 44.4\%$

$\frac{sup(A \cup E)}{sup(A)} = \frac{4}{6} = 66.6\%$ Strong

(4) DE $\frac{sup(D \cup E)}{sup(D)} = \frac{4}{8} = 50\%$

$\frac{sup(E \cup D)}{sup(E)} = \frac{4}{9} = 44.4\%$

(5) DF $\frac{sup(D \cup F)}{sup(D)} = \frac{3}{8} = 37.5\%$

$\frac{sup(F \cup D)}{sup(F)} = \frac{3}{5} = 60\%$ Strong

F taken as 5

Not strong if F = 6

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(c) Closed and Max Itemsets:

Closed Itemsets	~~Max Itemsets~~
{A} = 6	
{B} = 4	
{C} = 3 => Max	
{D} = 8	
{E} = 9	
{F} = 5	
{DB} = 3 => Max	
{EF} = 3 => Max	
{EA} = 4 => Max	
{DE} = 4 => Max	
{DF} = 3 => Max	

(d) Min confidence = 60 %

1) {DB} : $\{D\} \rightarrow \{B\} = \frac{sup(D \cup B)}{sup(D)} = \frac{3}{8} = 37.5\%$

$\{B\} \rightarrow \{D\} = \frac{sup(B \cup D)}{sup(B)} = \frac{3}{4} = 75\%$ Strong

~~{EF} : {E} → {F} = sup~~

2) EF

$\frac{sup(E \cup F)}{sup(E)} = \frac{3}{9} = 33.3\%$

$\frac{sup(F \cup E)}{sup(F)} = \frac{3}{5} = 60\%$ Strong

F takes as 5
Not strong if F = 6

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Q6.14 (a) support = $\frac{2000}{5000}$ = 0.4 = 40% > 25%

confidence = $\frac{2000}{3000}$ = 0.67 = 66.7% > 50%

Hence, association rule is strong.

(b) Correlation: Lift coefficient = $\frac{P(A \cup B)}{P(A)P(B)}$

lift (hotdog, hamburger) = $\frac{P(\text{hotdog} \cup \text{hamburger})}{P(\text{hotdog}) \times P(\text{hamburger})}$

$= \frac{0.4}{0.5 \times 0.6}$

$= 1.33 > 1.00$

$P(\text{hotdog}) = \frac{2500}{5000} = 0.5$

$P(\text{hamburger}) = 0.6$

Hence, the correlation is positive and purchase of hotdogs is not independent of purchase of hamburgers.