ASSOCIATION RULES

ALGORITMA

Tentukan k, misal K = 3

Transaksi	Barang yang dibeli
1	C,E,D
2	A,F,D
3	D,G,B,F
4	E,D,G,B
5	B,A,C
6	F,A,B,G
7	G,D
8	C,G,E
9	F,A,B
10	B,D

Barang yang dibeli
C,E,D
A,F,D
D,G,B,F
E,D,G,B
B,A,C
F,A,B,G
G,D
C,G,E
F,A,B
B,D

Transaksi	A	B	C	D	E	F	G
1	0	0	1	1	1	0	0
2	1	0	0	1	0	1	0
3	0	1	0	1	0	1	1
4	0	1	0	1	1	0	1
5	1	1	1	0	0	0	0
6	1	1	0	0	0	1	1
7	0	0	0	1	0	0	1
8	0	0	1	0	1	0	1
9	1	1	0	0	0	1	0
10	0	1	0	1	0	0	0

Transaksi	A	B	C	D	E	F	G
1	0	0	1	1	1	0	0
2	1	0	0	1	0	1	0
3	0	1	0	1	0	1	1
4	0						
5	1						
6	1						
7	0						
8	0						
9	1						
10	0						

Transaksi	A	B	C	D	E	F	G
1	0	0	1	1	1	0	0
2	1	0	0	1	0	1	0
3	0	1	0	1	0	1	1
4	0	1	0	1	1	0	1
5	1	1	1	0	0	0	0
6	1	1	0	0	0	1	1
7	0	0	0	1	0	0	1
8	0	0	1	0	1	0	1
9	1	1	0	0	0	1	0
10	0	1	0	1	0	0	0
∑	4	6	3	6	3	4	5

Transaksi	A	B	C	D	E	F	G
1	0	0	1	1	1	0	0
2	1	0	0	1	0	1	0
3	0	1	0	1	0	1	1
4	0	1	0	1	1	0	1
5	1	1	1	0	0	0	0
6	1	1	0	0	0	1	1
7	0	0	0	1	0	0	1
8	0	0	1	0	1	0	1
9	1	1	0	0	0	1	0
10	0	1	0	1	0	0	0
∑	4	6	3	6	3	4	5

Dengan K = 3, maka
F_1 himpunan yang terbentuk adalah {A}, {B},{C},{D},{E},{F},{G}

Transaksi	A	B	C	D	E	F	G
1	0	0	1	1	1	0	0
2	1	0	0	1	0	1	0
3	0	1	0	1	0	1	1
4	0	1	0	1	1	0	1
5	1	1	1	0	0	0	0
6	1	1	0	0	0	1	1
7	0	0	0	1	0	0	1
8	0	0	1	0	1	0	1
9	1	1	0	0	0	1	0
10	0	1	0	1	0	0	0
∑	4	6	3	6	3	4	5

Untuk k=3,

himpunan yang mungkin terbentuk adalah

F_2 = {A,B}, {A,C},{A,D},{A,E},{A,F},{A,G}, {B,C}, {B,D}, {B,E},{B,F},{B,G}
{C,D}, {C,E},{C,F},{C,G},{D,E},{D,F},{D,G},{E,F},{E,G},{F,G}

T	A	B	f
1	0	0	S
2	1	0	S
3	0	1	S
4	0	1	S
5	1	1	P
6	1	1	P
7	0	0	S
8	0	0	S
9	1	1	P
10	0	1	S
		∑	3

T	A	C	f
1	0	1	S
2	1	0	S
3	0	0	S
4	0	0	S
5	1	1	P
6	1	0	S
7	0	0	S
8	0	1	S
9	1	0	S
10	0	0	S
		∑	1

T	A	D	f
1	0	1	S
2	1	0	S
3	0	1	S
4	0	1	S
5	1	0	S
6	1	0	S
7	0	1	S
8	0	0	S
9	1	0	S
10	0	1	S
		∑	0

T	A	E	f
1	0	1	S
2	1	0	S
3	0	0	S
4	0	1	S
5	1	0	S
6	1	0	S
7	0	0	S
8	0	1	S
9	1	0	S
10	0	0	S
		∑	0

T	A	F	f
1	0	0	S
2	1	1	P
3	0	1	S
4	0	0	S
5	1	0	S
6	1	1	P
7	0	0	S
8	0	0	S
9	1	1	P
10	0	0	S
		∑	3

T	A	G	f
1	0	0	S
2	1	0	S
3	0	1	S
4	0	1	S
5	1	0	S
6	1	1	P
7	0	1	S
8	0	1	S
9	1	0	S
10	0	0	S
		∑	1

T	B	C	f
1	0	1	S
2	0	0	S
3	1	0	S
4	1	0	S
5	1	1	P
6	1	0	S
7	0	0	S
8	0	1	S
9	1	0	S
10	1	0	S
		∑	1

T	B	D	f
1	0	1	S
2	0	0	S
3	1	1	P
4	1	1	P
5	1	0	S
6	1	0	S
7	0	1	S
8	0	0	S
9	1	0	S
10	1	1	P
		∑	3

T	B	E	f
1	0	0	S
2	0	0	S
3	1	0	S
4	1	1	P
5	1	0	S
6	1	0	S
7	0	0	S
8	0	1	S
9	1	0	S
10	1	0	S
		∑	1

T	B	F	f
1	0	0	S
2	0	1	S
3	1	1	P
4	1	0	S
5	1	0	S
6	1	1	P
7	0	0	S
8	0	0	S
9	1	1	P
10	1	0	S
		∑	3

T	B	G	f
1	0	0	S
2	0	0	S
3	1	1	P
4	1	1	P
5	1	0	S
6	1	1	P
7	0	1	S
8	0	1	S
9	1	0	S
10	1	0	S
		∑	3

T	C	D	f
1	1	1	P
2	0	0	S
3	0	1	S
4	0	1	S
5	1	0	S
6	0	0	S
7	0	1	S
8	1	0	S
9	0	0	S
10	0	1	S
		∑	1

T	C	E	f
1	1	0	S
2	0	0	S
3	0	0	S
4	0	1	S
5	1	0	S
6	0	0	S
7	0	0	S
8	1	1	P
9	0	0	S
10	0	0	S
		∑	1

T	C	F	f
1	1	0	S
2	0	1	S
3	0	1	S
4	0	0	S
5	1	0	S
6	0	1	S
7	0	0	S
8	1	0	S
9	0	1	S
10	0	0	S
		∑	0

T	C	G	f
1	1	0	S
2	0	0	S
3	0	1	S
4	0	1	S
5	1	0	S
6	0	1	S
7	0	1	S
8	1	1	P
9	0	0	S
10	0	0	S
		∑	1

T	D	E	f
1	1	0	S
2	0	0	S
3	1	0	S
4	1	1	P
5	0	0	S
6	0	0	S
7	1	0	S
8	0	1	S
9	0	0	S
10	1	0	S
		∑	1

T	D	F	f
1	1	0	S
2	0	1	S
3	1	1	P
4	1	0	S
5	0	0	S
6	0	1	S
7	1	0	S
8	0	0	S
9	0	1	S
10	1	0	S
		∑	1

T	D	G	f
1	1	0	S
2	0	0	S
3	1	1	P
4	1	1	P
5	0	0	S
6	0	1	S
7	1	1	P
8	0	1	S
9	0	0	S
10	1	0	S
		∑	3

T	E	F	f
1	0	0	S
2	0	1	S
3	0	1	S
4	1	0	S
5	0	0	S
6	0	1	S
7	0	0	S
8	1	0	S
9	0	1	S
10	0	0	S
		∑	0

T	E	G	f
1	0	0	S
2	0	0	S
3	0	1	S
4	1	1	P
5	0	0	S
6	0	1	S
7	0	1	S
8	1	1	P
9	0	0	S
10	0	0	S
		∑	2

T	F	G	f
1	0	0	S
2	1	0	S
3	1	1	P
4	0	1	S
5	0	0	S
6	1	1	P
7	0	1	S
8	0	1	S
9	1	0	S
10	0	0	S
		∑	2

Untuk k=3,

Himpunan yang ∑ >= 3, adalah,

{A,B}, {A,F}, {B,D}, {B,F}, {B,G}, {D,G}

Transaksi	A	B	C	D	E	F	G
1	0	0	1	1	0	0	0
2	1	0	0	0	0	1	0
3	0	1	0	1	0	1	1
4	0	1	0	1	1	0	1
5	1	1	1	0	0	0	0
6	1	1	0	0	0	1	1
7	0	0	0	1	0	0	1
8	0	0	1	0	1	0	1
9	1	1	0	0	0	1	0
10	0	1	0	1	0	0	0
∑	4	6	1	5	2	4	5

{A,B,C,D}, {A,B,C,E}, {A,B,C,F}
{A,B,C,G}, {A,B,D,E}, {A,B,D,F}
{A,B,D,G}, {A,B,E,F}, {A,B,E,G}
{A,B,F,G}, {A,C,D,E}, {A,C,D,F}
{A,C,D,G}, {A,D,E,F}, {A,D,E,G}
{A,E,F,G}

Untuk k=3,
himpunan yang mungkin terbentuk adalah

F_3 = {A,B,C}, {A,B,D},{A,B,E},{A,B,F},{A,B,G},{A,C,D},{A,C,E}, {A,C,F},
{A,C,G},{A,D,E},{A,D,F},{A,D,G},{A,E,F},{A,E,G},{A,F,G}, {B,C,D},
{B,C,E}, {B,C,F}, {B,C,G}, {C,D,E}, {C,D,F}, {C,D,G}, {D,E,F}, {D,F,G}
{E,F,G}

T	A	B	C	f
1	0	0	1	S
2	1	0	0	S
3	0	1	0	S
4	0	1	0	S
5	1	1	1	P
6	1	1	0	S
7	0	0	0	S
8	0	0	1	S
9	1	1	0	S
10	0	1	0	S
			∑	1

T	A	B	D	f
1	0	0	1	S
2	1	0	0	S
3	0	1	1	S
4	0	1	1	S
5	1	1	0	S
6	1	1	0	S
7	0	0	1	S
8	0	0	0	S
9	1	1	0	S
10	0	1	1	S
			∑	0

T	A	B	E	f
1	0	0	0	S
2	1	0	0	S
3	0	1	0	S
4	0	1	1	S
5	1	1	0	S
6	1	1	0	S
7	0	0	0	S
8	0	0	1	S
9	1	1	0	S
10	0	1	0	S
			∑	0

T	A	B	F	f
1	0	0	0	S
2	1	0	1	S
3	0	1	1	S
4	0	1	0	S
5	1	1	0	S
6	1	1	1	P
7	0	0	0	S
8	0	0	0	S
9	1	1	1	P
10	0	1	0	S
			∑	2

T	A	B	G	f
1	0	0	0	S
2	1	0	0	S
3	0	1	1	S
4	0	1	1	S
5	1	1	0	S
6	1	1	1	P
7	0	0	1	S
8	0	0	1	S
9	1	1	0	S
10	0	1	0	S
			∑	1

T	A	C	D	f
1	0	1	1	S
2	1	0	0	S
3	0	0	1	S
4	0	0	1	S
5	1	1	0	S
6	1	0	0	S
7	0	0	1	S
8	0	1	0	S
9	1	0	0	S
10	0	0	1	S
			∑	0

T	A	C	E	f
1	0	1	0	S
2	1	0	0	S
3	0	0	0	S
4	0	0	1	S
5	1	1	0	S
6	1	0	0	S
7	0	0	0	S
8	0	1	1	S
9	1	0	0	S
10	0	0	0	S
			∑	0

T	A	C	F	f
1	0	1	0	S
2	1	0	1	S
3	0	0	1	S
4	0	0	0	S
5	1	1	0	S
6	1	0	1	S
7	0	0	0	S
8	0	1	0	S
9	1	0	1	S
10	0	0	0	S
			∑	0

T	A	C	G	f
1	0	1	0	S
2	1	0	0	S
3	0	0	1	S
4	0	0	1	S
5	1	1	0	S
6	1	0	1	S
7	0	0	1	S
8	0	1	1	S
9	1	0	0	S
10	0	0	0	S
			∑	0

T	A	D	E	f
1	0	1	0	S
2	1	0	0	S
3	0	1	0	S
4	0	1	1	S
5	1	0	0	S
6	1	0	0	S
7	0	1	0	S
8	0	0	1	S
9	1	0	0	S
10	0	1	0	S
			∑	0

T	A	D	F	f
1	0	1	0	S
2	1	0	1	S
3	0	1	1	S
4	0	1	0	S
5	1	0	0	S
6	1	0	1	S
7	0	1	0	S
8	0	0	0	S
9	1	0	1	S
10	0	1	0	S
			∑	0

T	A	D	G	f
1	0	1	0	S
2	1	0	0	S
3	0	1	1	S
4	0	1	1	S
5	1	0	0	S
6	1	0	1	S
7	0	1	1	S
8	0	0	1	S
9	1	0	0	S
10	0	1	0	S
			∑	0

T	A	E	F	f
1	0	0	0	S
2	1	0	1	S
3	0	0	1	S
4	0	1	0	S
5	1	0	0	S
6	1	0	1	S
7	0	0	0	S
8	0	1	0	S
9	1	0	1	S
10	0	0	0	S
∑				0

T	A	E	G	f
1	0	0	0	S
2	1	0	0	S
3	0	0	1	S
4	0	1	1	S
5	1	0	0	S
6	1	0	1	S
7	0	0	1	S
8	0	1	1	S
9	1	0	0	S
10	0	0	0	S
∑				0

T	A	F	G	f
1	0	0	0	S
2	1	1	0	S
3	0	1	1	S
4	0	0	1	S
5	1	0	0	S
6	1	1	1	P
7	0	0	1	S
8	0	0	1	S
9	1	1	0	S
10	0	0	0	S
∑				1

Himpunan yang terjadi adalah

{A,B}, {A,F}, {B,D}, {B,F}, {B,G}, {D,G}

Untuk {A,B}

Maka rule yang terbentuk,

If Buy A Then Buy B
If Buy B Then Buy A

Untuk {A,F}

Maka rule yang terbentuk,

If Buy A Then Buy F
If Buy F Then Buy A

Untuk {B,D}

Maka rule yang terbentuk,

If Buy B Then Buy D
If Buy D Then Buy B

Untuk {B,F}

Maka rule yang terbentuk,

If Buy B Then Buy F
If Buy F Then Buy B

Untuk {B,G}

Maka rule yang terbentuk,

If Buy B Then Buy G
If Buy G Then Buy B

Untuk {D,G}

Maka rule yang terbentuk,

If Buy D Then Buy G
If Buy G Then Buy D

Rule yang didapat,

If Antecedent Then Concequent
If Buy A Then Buy B
If Buy B Then Buy A
If Buy A Then Buy F
If Buy F Then Buy A
If Buy B Then Buy D
If Buy D Then Buy B
If Buy B Then Buy F
If Buy F Then Buy B
If Buy B Then Buy G
If Buy G Then Buy B
If Buy D Then Buy G
If Buy G Then Buy D

$$\text{Support} = \frac{\sum \text{item yang dibeli sekaligus}}{\sum \text{seluruh transaksi}} \times 100\%$$

$$\text{Confidence} = \frac{\sum \text{item yang dibeli sekaligus}}{\sum \text{transaksi antacendent}} \times 100\%$$

Confidence yang akan diambil?

If Antecedent Then Concequent	Support	Confidence
If Buy A Then Buy B	(3/10) * 100% = 33,33%	(3 / 4) * 100% = 75%
If Buy B Then Buy A	(3/10) * 100% = 33,33%	(3 / 6) * 100% = 50%
If Buy A Then Buy F	(3/10) * 100% = 33,33%	(3 / 4) * 100% = 75%
If Buy F Then Buy A	(3/10) * 100% = 33,33%	(3 / 4) * 100% = 75%
If Buy B Then Buy D	(3/10) * 100% = 33,33%	(3 / 6) * 100% = 50%
If Buy D Then Buy B	(3/10) * 100% = 33,33%	(3 / 5) * 100% = 60%
If Buy B Then Buy F	(3/10) * 100% = 33,33%	(3 / 6) * 100% = 50%
If Buy F Then Buy B	(3/10) * 100% = 33,33%	(3 / 4) * 100% = 75%
If Buy B Then Buy G	(3/10) * 100% = 33,33%	(3 / 6) * 100% = 50%
If Buy G Then Buy B	(3/10) * 100% = 33,33%	(3 / 6) * 100% = 50%
If Buy D Then Buy G	(3/10) * 100% = 33,33%	(3 / 5) * 100% = 60%
If Buy G Then Buy D	(3/10) * 100% = 33,33%	(3 / 6) * 100% = 50%

Confidence > 70%

If Antecedent Then Concequent	Support	Confidence	Support vs Confidence
If Buy A Then Buy B	33,33%	75%	0.2475
If Buy A Then Buy F	33,33%	75%	0.2475
If Buy F Then Buy A	33,33%	75%	0.2475
If Buy F Then Buy B	33,33%	75%	0.2475
If Buy E Then Buy G	50%	100%	0.5

Hasil paling besar dari perkalian Support dan Confidence merupakan rule yang di pakai.

Jika ada yang membeli barang E maka membeli barang G.
Jika ada yang membeli barang G maka membeli barang E.

Dengan tingkat keyakinan sebesar 100%.

REFERENCES

- Discovering Knowledge in Data (Introduction to Data Mining), Chapter 10, Daniel T. Larose, Wiley, 2004