Apriori

Association Rule Learning

People who bought also bought ...

People who bought also bought …

Examples of association rules

- Burgers → French Fries
- Burgers, French Fries → Coke

Summary

- How the Apriori algorithm works step-by-step
- How to interpret it
- How to build it

Summary

- How the Apriori algorithm works step-by-step
- How to interpret it
- How to build it

Dataset

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

Algorithm

Step 1: Set a minimum support, confidence and lift

Step 2: Take all the subsets in transactions having higher support than minimum support

Step 3: Take all the rules of these subsets having higher confidence than minimum confidence

Step 4: Take all the rules of these subsets having higher lift than minimum lift

Algorithm

Step 1: Set a minimum support, confidence and lift

Step 2: Take all the subsets in transactions having higher support than minimum support

Step 3: Take all the rules of these subsets having higher confidence than minimum confidence

Step 4: Take all the rules of these subsets having higher lift than minimum lift

Step 1

- Minimum support = 2/5
- Minimum confidence = 3/5
- Minimum lift = 1.1

Algorithm

Step 1: Set a minimum support, confidence and lift

Step 2: Take all the subsets in transactions having higher support than minimum support

Step 3: Take all the rules of these subsets having higher confidence than minimum confidence

Step 4: Take all the rules of these subsets having higher lift than minimum lift

Calculating Support for subsets of size 1

T1	1	3	4	
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T3	1	2	3	5
T4	2	5		
T5	1	3	5	

Calculating Support for subsets of size 1

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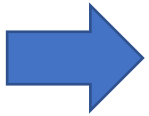

Itemset	Support

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 1

T1	1	3	4	
T2	2	3	5	
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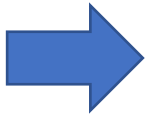

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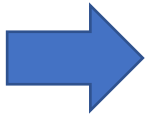

Itemset	Support
{1}	
{2}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 1

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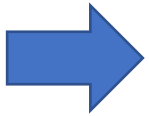
T4	2	5		
T5	1	3	5	



Itemset	Support
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{2}	
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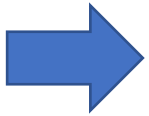

Itemset	Support
{1}	
{2}	
{3}	
{4}	
{5}	

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$$\text{Support}(\{1\}) = \frac{\#\ transcations\ containing\ \{1\}}{\#\ transcations}$$

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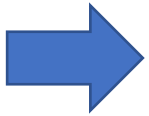

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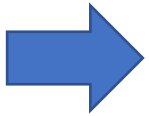

Itemset	Support
{1}	
{2}	
{3}	
{4}	
{5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

$$\text{Support}(\{1\}) = \frac{3}{5}$$

Calculating Support for subsets of size 1

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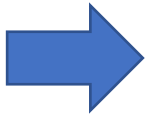
T4	2	5		
T5	1	3	5	



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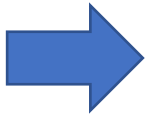

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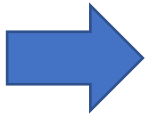

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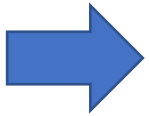

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Remember: Minimum support = 2/5

Calculating Support for subsets of size 1

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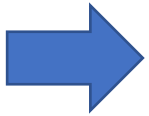

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
~~{4}~~	~~1/5~~
{5}	4/5

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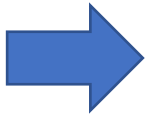

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
~~{4}~~	~~1/5~~
{5}	4/5

Excluded Itemset
{4}

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Remember: Minimum support = 2/5

Calculating Support for subsets of size 1

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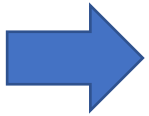
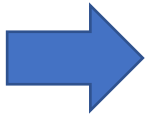


Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

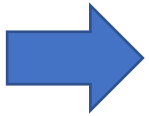


Itemset	Support

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

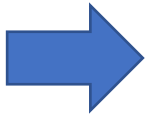


Itemset	Support
{1,2}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

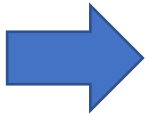


Itemset	Support
{1,2}	
{1,3}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

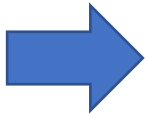


Itemset	Support
{1,2}	
{1,3}	
{1,4}	
{1,5}	
{2,3}	
{2,4}	
{2,5}	
{3,4}	
{3,5}	
{4,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 2

Excluded Itemset
{4}



Itemset	Support
{1,2}	
{1,3}	
{1,4}	
{1,5}	
{2,3}	
{2,4}	
{2,5}	
{3,4}	
{3,5}	
{4,5}	

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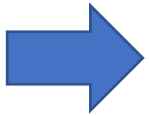
Calculating Support for subsets of size 2

Excluded Itemset
{4}



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{1,2}	
{1,3}	
{1,4}	
{1,5}	
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{2,4}	
{2,5}	
{3,4}	
{3,5}	
{4,5}	

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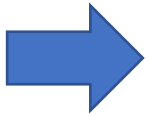
Calculating Support for subsets of size 2

Excluded Itemset
{4}



Itemset	Support
{1,2}	
{1,3}	
~~{1,4}~~	
{1,5}	
{2,3}	
~~{2,4}~~	
{2,5}	
~~{3,4}~~	
{3,5}	
~~{4,5}~~	

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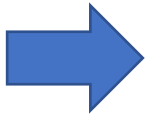
Calculating Support for subsets of size 2

Excluded Itemset
{4}



Itemset	Support
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{1,3}	
{1,5}	
{2,3}	
{2,5}	
{3,5}	

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Calculating Support for subsets of size 2

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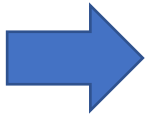

Itemset	Support
{1,2}	
{1,3}	
{1,5}	
{2,3}	
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Calculating Support for subsets of size 2

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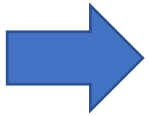

Itemset	Support
{1,2}	
{1,3}	
{1,5}	
{2,3}	
{2,5}	
{3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

$$\text{Support}(\{1,2\}) = \frac{\#\ transcations\ containing\ \{1,2\}}{\#\ transcations}$$

Calculating Support for subsets of size 2

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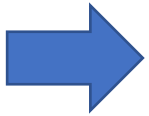

Itemset	Support
{1,2}	
{1,3}	
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{2,3}	
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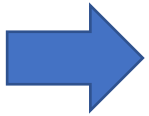

Itemset	Support
{1,2}	
{1,3}	
{1,5}	
{2,3}	
{2,5}	
{3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

$$\text{Support}(\{1,2\}) = \frac{1}{5}$$

Calculating Support for subsets of size 2

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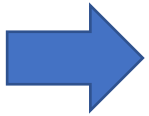

Itemset	Support
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{1,3}	
{1,5}	
{2,3}	
{2,5}	
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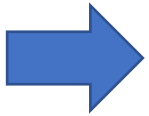

Itemset	Support
{1,2}	1/5
{1,3}	3/5
{1,5}	
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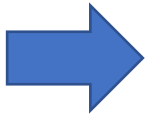
Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

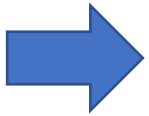


Itemset	Support
{1,2}	1/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



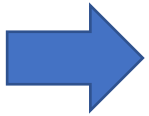
Itemset	Support
{1,2}	1/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Remember: Minimum support = 2/5

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



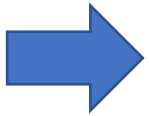
Itemset	Support
~~{1,2}~~	~~1/5~~
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Remember: Minimum support = 2/5

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



Itemset	Support
~~{1,2}~~	~~1/5~~
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5

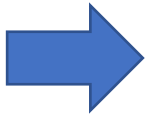
Excluded Itemset
{4}
{1,2}

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Remember: Minimum support = 2/5

Calculating Support for subsets of size 2

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

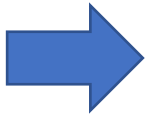


Itemset	Support
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

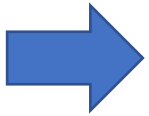


Itemset	Support
{1,2,3}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

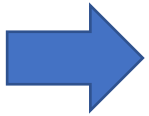


Itemset	Support
{1,2,3}	
{1,2,4}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

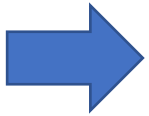


Itemset	Support
{1,2,3}	
{1,2,4}	
{1,2,5}	
{1,3,4}	
{1,3,5}	
{1,4,5}	
{2,3,4}	
{2,3,5}	
{2,4,5}	
{3,4,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

Excluded Itemset
{4}
{1,2}

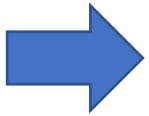


Itemset	Support
{1,2,3}	
{1,2,4}	
{1,2,5}	
{1,3,4}	
{1,3,5}	
{1,4,5}	
{2,3,4}	
{2,3,5}	
{2,4,5}	
{3,4,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

Excluded Itemset
{4}
{1,2}

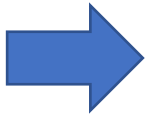


Itemset	Support
{1,2,3}	
{1,2,4}	
{1,2,5}	
{1,3,4}	
{1,3,5}	
{1,4,5}	
{2,3,4}	
{2,3,5}	
{2,4,5}	
{3,4,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

Excluded Itemset
{4}
{1,2}

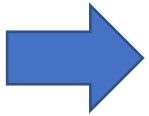


Itemset	Support
{1,2,3}	
~~{1,2,4}~~	
{1,2,5}	
~~{1,3,4}~~	
{1,3,5}	
~~{1,4,5}~~	
~~{2,3,4}~~	
{2,3,5}	
~~{2,4,5}~~	
~~{3,4,5}~~	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

Excluded Itemset
{4}
{1,2}

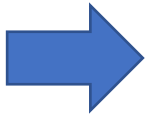


Itemset	Support
{1,2,3}	
{1,2,5}	
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

Excluded Itemset
{4}
{1,2}

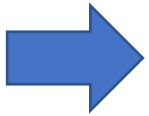


Itemset	Support
{1,2,3}	
{1,2,5}	
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

Excluded Itemset
{4}
{1,2}

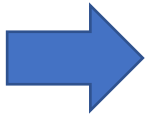


Itemset	Support
~~{1,2,3}~~	
~~{1,2,5}~~	
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

Excluded Itemset
{4}
{1,2}

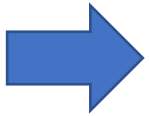


Itemset	Support
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

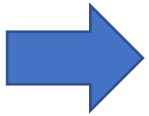


Itemset	Support
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



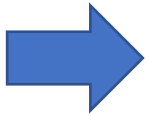
Itemset	Support
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

$$\text{Support}(\{1,3,5\}) = \frac{\#\ transcations\ containing\ \{1,3,5\}}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



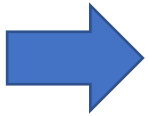
Itemset	Support
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

$$\text{Support}(\{1,3,5\}) = \frac{\#\ transcations\ containing\ \{1,3,5\}}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



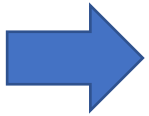
Itemset	Support
{1,3,5}	
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

$$\text{Support}(\{1,3,5\}) = \frac{2}{5}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

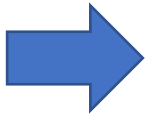


Itemset	Support
{1,3,5}	2/5
{2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

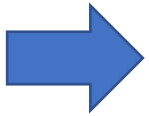


Itemset	Support
{1,3,5}	2/5
{2,3,5}	2/5

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



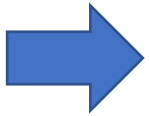
Itemset	Support
{1,3,5}	2/5
{2,3,5}	2/5

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Remember: Minimum support = 2/5

Calculating Support for subsets of size 3

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	



Itemset	Support
{1,3,5}	2/5
{2,3,5}	2/5

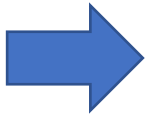
Excluded Itemset
{4}
{1,2}

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Remember: Minimum support = 2/5

Calculating Support for subsets of size 4

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

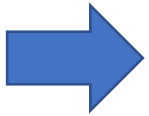


Itemset	Support
{1,2,3,4}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

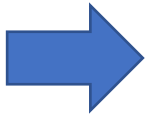


Itemset	Support
{1,2,3,4}	
{1,2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

T1	1	3	4	
T2	2	3	5	
T3	1	2	3	5
T4	2	5		
T5	1	3	5	

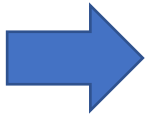


Itemset	Support
{1,2,3,4}	
{1,2,3,5}	
{1,2,4,5}	
{1,3,4,5}	
{2,3,4,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

Excluded Itemset
{4}
{1,2}

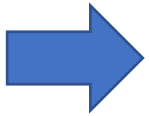


Itemset	Support
{1,2,3,4}	
{1,2,3,5}	
{1,2,4,5}	
{1,3,4,5}	
{2,3,4,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

Excluded Itemset
{4}
{1,2}

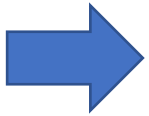


Itemset	Support
{1,2,3,4}	
{1,2,3,5}	
{1,2,4,5}	
{1,3,4,5}	
{2,3,4,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

Excluded Itemset
{4}
{1,2}

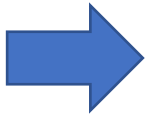


Itemset	Support
~~{1,2,3,4}~~	
{1,2,3,5}	
~~{1,2,4,5}~~	
~~{1,3,4,5}~~	
~~{2,3,4,5}~~	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

Excluded Itemset
{4}
{1,2}

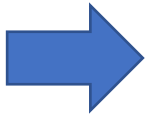


Itemset	Support
{1,2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

Excluded Itemset
{4}
{1,2}

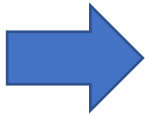


Itemset	Support
{1,2,3,5}	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

Excluded Itemset
{4}
{1,2}

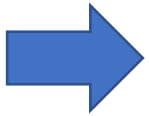


Itemset	Support
~~{1,2,3,5}~~	

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Calculating Support for subsets of size 4

Excluded Itemset
{4}
{1,2}



Itemset	Support

$$\text{Support(I)} = \frac{\#\ transcations\ containing\ I}{\#\ transcations}$$

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

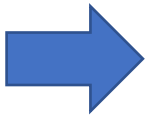
$S \rightarrow (I - S)$

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



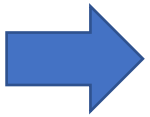
I	S	(I – S)	Rule

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



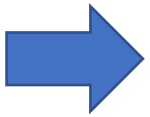
I	S	(I – S)	Rule

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



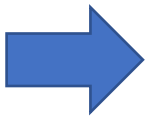
I	S	(I – S)	Rule
{1}			

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



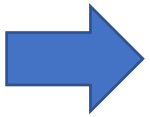
I	S	(I – S)	Rule
{1}	{}		

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



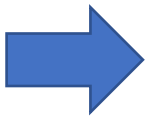
I	S	(I – S)	Rule
{1}	{}	{1} – {}	

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



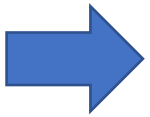
I	S	(I – S)	Rule
{1}	{}	{1}	

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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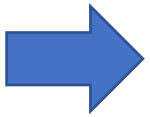
Rule: $S \rightarrow (I - S)$



I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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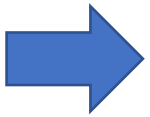

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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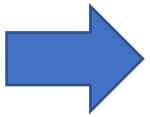

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}			

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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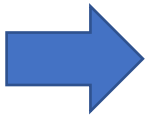

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}		

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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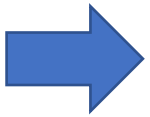

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2} – {}	

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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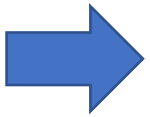

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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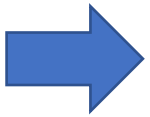

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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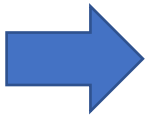

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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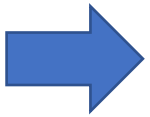

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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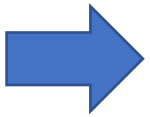

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

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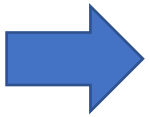
Rule: $S \rightarrow (I - S)$



I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}			

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

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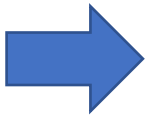


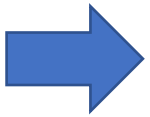
I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}	{1,5}		

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



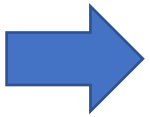
I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}	{1,5}	{3}	

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



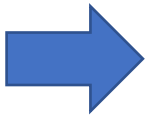
I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}	{1,5}	{3}	{1,5} → {3}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



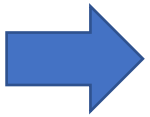
I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}	{1,5}	{3}	{1,5} → {3}

Creating rules

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



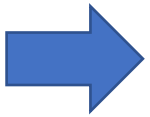
I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}	{1,5}	{3}	{1,5} → {3}
{1,3,5}	{3,5}	{1}	{3,5} → {1}
{2,3,5}	{2,3}	{5}	{2,3} → {5}
{2,3,5}	{2,5}	{3}	{2,5} → {3}
{2,3,5}	{3,5}	{5}	{3,5} → {5}

There was a mistake here, we forgot some subsets

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{5}	4/5
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5
{1,3,5}	2/5
{2,3,5}	2/5

For every subset S of itemset I:

Rule: $S \rightarrow (I - S)$



I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}	{1,5}	{3}	{1,5} → {3}
{1,3,5}	{3,5}	{1}	{3,5} → {1}
{2,3,5}	{2,3}	{5}	{2,3} → {5}
{2,3,5}	{2,5}	{3}	{2,5} → {3}
{2,3,5}	{3,5}	{5}	{3,5} → {5}

I	S	(I – S)	Rule
{1}	{}	{1}	{} → {1}
{2}	{}	{2}	{} → {2}
{3}	{}	{3}	{} → {3}
{5}	{}	{5}	{} → {5}
{1,3}	{1}	{3}	{1} → {3}
{1,3}	{3}	{1}	{3} → {1}
{1,5}	{1}	{5}	{1} → {5}
{1,5}	{5}	{1}	{5} → {1}
{2,3}	{2}	{3}	{2} → {3}
{2,3}	{3}	{2}	{3} → {2}
{2,5}	{2}	{5}	{2} → {5}
{2,5}	{5}	{2}	{5} → {2}
{3,5}	{3}	{5}	{3} → {5}
{3,5}	{5}	{3}	{5} → {3}
{1,3,5}	{1,3}	{5}	{1,3} → {5}
{1,3,5}	{1,5}	{3}	{1,5} → {3}
{1,3,5}	{3,5}	{1}	{3,5} → {1}
{2,3,5}	{2,3}	{5}	{2,3} → {5}
{2,3,5}	{2,5}	{3}	{2,5} → {3}
{2,3,5}	{3,5}	{5}	{3,5} → {5}

These are the missing subsets

I	S	(I – S)	Rule
{1,3,5}	{1}	{3,5}	{1} → {3,5}
{1,3,5}	{3}	{1,5}	{1} → {1,5}
{1,3,5}	{5}	{1,3}	{5} → {1,3}
{2,3,5}	{2}	{3,5}	{2} → {2,5}
{2,3,5}	{3}	{2,5}	{3} → {2,5}
{2,3,5}	{5}	{2,3}	{5} → {2,3}

Algorithm

Step 1: Set a minimum support, confidence and lift

Step 2: Take all the subsets in transactions having higher support than minimum support

Step 3: Take all the rules of these subsets having higher confidence than minimum confidence

Step 4: Take all the rules of these subsets having higher lift than minimum lift

Calculating Confidence

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}			
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}			
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}			
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{4}	1/5
{5}	4/5

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}			
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{4}	1/5
{5}	4/5

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	3/5		
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{4}	1/5
{5}	4/5

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6		
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Itemset	Support
{1}	3/5
{2}	3/5
{3}	4/5
{4}	1/5
{5}	4/5

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6		
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\text{I} - \text{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\text{I} - \text{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6/1.0
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}			
{3}	{}	{3}	{} → {3}			
{5}	{}	{5}	{} → {5}			
{1,3}	{1}	{3}	{1} → {3}			
{1,3}	{3}	{1}	{3} → {1}			
{1,5}	{1}	{5}	{1} → {5}			
{1,5}	{5}	{1}	{5} → {1}			
{2,3}	{2}	{3}	{2} → {3}			
{2,3}	{3}	{2}	{3} → {2}			
{2,5}	{2}	{5}	{2} → {5}			
{2,5}	{5}	{2}	{5} → {2}			
{3,5}	{3}	{5}	{3} → {5}			
{3,5}	{5}	{3}	{5} → {3}			
{1,3,5}	{1,3}	{5}	{1,3} → {5}			
{1,3,5}	{1,5}	{3}	{1,5} → {3}			
{1,3,5}	{3,5}	{1}	{3,5} → {1}			
{2,3,5}	{2,3}	{5}	{2,3} → {5}			
{2,3,5}	{2,5}	{3}	{2,5} → {3}			
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}			

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67

Calculating Confidence

$$\text{Confidence } (S \rightarrow (\text{I} - \text{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4		

Itemset	Support
{1,3,5}	2/5
{2,3,5}	2/5

Calculating Confidence

$$\text{Confidence } (S \rightarrow (\text{I} - \text{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	

Itemset	Support
{1,3}	3/5
{1,5}	2/5
{2,3}	2/5
{2,5}	3/5
{3,5}	3/5

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.4/0.6

Calculating Confidence

$$\text{Confidence}\ (S \rightarrow (\mathrm{I} - \mathrm{S})) = \frac{support\ I}{support\ S}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67

Calculating Confidence

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67

Remember: Minimum confidence = 3/5 = 0.6

Calculating Confidence

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{1,5}	{5}	{1}	{5} → {1}	0.4	0.8	0.5
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,3}	{3}	{2}	{3} → {2}	0.4	0.8	0.5
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67

Remember: Minimum confidence = 3/5 = 0.6

Calculating Confidence

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
~~{1,5}~~	~~{5}~~	~~{1}~~	~~{5} → {1}~~	~~0.4~~	~~0.8~~	~~0.5~~
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
~~{2,3}~~	~~{3}~~	~~{2}~~	~~{3} → {2}~~	~~0.4~~	~~0.8~~	~~0.5~~
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67

Remember: Minimum confidence = 3/5 = 0.6

Calculating Confidence

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67

Algorithm

Step 1: Set a minimum support, confidence and lift

Step 2: Take all the subsets in transactions having higher support than minimum support

Step 3: Take all the rules of these subsets having higher confidence than minimum confidence

Step 4: Take all the rules of these subsets having higher lift than minimum lift

Calculating Lift

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	

Calculating Lift

$$\text{Lift}\ (S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	

Calculating Lift

$$\text{Lift}\,(S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	0.6/
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	

Calculating Lift

$$\text{Lift}\,(S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	0.6/0.6
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	

Calculating Lift

$$\text{Lift}\ (S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	

Calculating Lift

$$\text{Lift}\ (S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	1.0
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	0.83
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	0.83
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	0.94
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	0.94
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	0.83
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	0.83
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	

Calculating Lift

$$\text{Lift}\,(S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	1.0
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	0.83
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	0.83
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	0.94
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	0.94
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	0.83
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	0.83
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	0.67/

Calculating Lift

$$\text{Lift}\,(S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	1.0
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	0.83
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	0.83
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	0.94
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	0.94
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	0.83
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	0.83
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	0.67/0.6

Calculating Lift

$$\text{Lift}\ (S \rightarrow (\text{I} - \text{S})) = \frac{confidence\ S \rightarrow (I-S)}{support\ (I-S)}$$

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	1.0
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	0.83
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	0.83
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	0.94
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	0.94
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	0.83
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	0.83
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

Calculating Lift

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	1.0
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	0.83
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	0.83
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	0.94
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	0.94
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	0.83
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	0.83
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

Calculating Lift

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	1.0
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	0.83
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	0.83
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	0.94
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	0.94
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	0.83
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	0.83
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

Remember: Minimum lift = 1.1

Calculating Lift

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1}	{}	{1}	{} → {1}	0.6	1.0	0.6	1.0
{2}	{}	{2}	{} → {2}	0.6	1.0	0.6	1.0
{3}	{}	{3}	{} → {3}	0.8	0.8	1.0	1.0
{5}	{}	{5}	{} → {5}	0.8	0.8	1.0	1.0
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{1,5}	{1}	{5}	{1} → {5}	0.4	0.6	0.67	0.83
{2,3}	{2}	{3}	{2} → {3}	0.4	0.6	0.67	0.83
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{3,5}	{3}	{5}	{3} → {5}	0.6	0.8	0.75	0.94
{3,5}	{5}	{3}	{5} → {3}	0.6	0.8	0.75	0.94
{1,3,5}	{1,3}	{5}	{1,3} → {5}	0.4	0.6	0.67	0.83
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{2,5}	{3}	{2,5} → {3}	0.4	0.6	0.67	0.83
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

Remember: Minimum lift = 1.1

Calculating Lift

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
~~{1}~~	~~{}~~	~~{1}~~	~~{} → {1}~~	~~0.6~~	~~1.0~~	~~0.6~~	~~1.0~~
~~{2}~~	~~{}~~	~~{2}~~	~~{} → {2}~~	~~0.6~~	~~1.0~~	~~0.6~~	~~1.0~~
~~{3}~~	~~{}~~	~~{3}~~	~~{} → {3}~~	~~0.8~~	~~0.8~~	~~1.0~~	~~1.0~~
~~{5}~~	~~{}~~	~~{5}~~	~~{} → {5}~~	~~0.8~~	~~0.8~~	~~1.0~~	~~1.0~~
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
~~{1,5}~~	~~{1}~~	~~{5}~~	~~{1} → {5}~~	~~0.4~~	~~0.6~~	~~0.67~~	~~0.83~~
~~{2,3}~~	~~{2}~~	~~{3}~~	~~{2} → {3}~~	~~0.4~~	~~0.6~~	~~0.67~~	~~0.83~~
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
~~{3,5}~~	~~{3}~~	~~{5}~~	~~{3} → {5}~~	~~0.6~~	~~0.8~~	~~0.75~~	~~0.94~~
~~{3,5}~~	~~{5}~~	~~{3}~~	~~{5} → {3}~~	~~0.6~~	~~0.8~~	~~0.75~~	~~0.94~~
~~{1,3,5}~~	~~{1,3}~~	~~{5}~~	~~{1,3} → {5}~~	~~0.4~~	~~0.6~~	~~0.67~~	~~0.83~~
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
~~{2,3,5}~~	~~{2,5}~~	~~{3}~~	~~{2,5} → {3}~~	~~0.4~~	~~0.6~~	~~0.67~~	~~0.83~~
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

Remember: Minimum lift = 1.1

Calculating Lift

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

Algorithm

Step 1: Set a minimum support, confidence and lift

Step 2: Take all the subsets in transactions having higher support than minimum support

Step 3: Take all the rules of these subsets having higher confidence than minimum confidence

Step 4: Take all the rules of these subsets having higher lift than minimum lift

Organizing the results

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

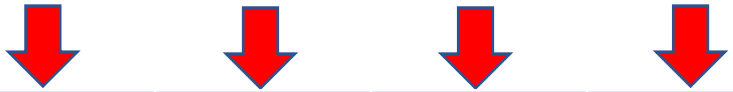
Organizing the results

I	S	(I – S)	Rule	Support (I)	Support (S)	Confidence	Lift
{1,3}	{1}	{3}	{1} → {3}	0.6	0.6	1.0	1.25
{1,3}	{3}	{1}	{3} → {1}	0.6	0.8	0.75	1.25
{2,5}	{2}	{5}	{2} → {5}	0.6	0.6	1.0	1.25
{2,5}	{5}	{2}	{5} → {2}	0.6	0.8	0.75	1.25
{1,3,5}	{1,5}	{3}	{1,5} → {3}	0.4	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	{3,5} → {1}	0.4	0.6	0.67	1.11
{2,3,5}	{2,3}	{5}	{2,3} → {5}	0.4	0.4	1.0	1.25
{2,3,5}	{3,5}	{2}	{3,5} → {2}	0.4	0.6	0.67	1.11

Organizing the results

I	S	(I – S)	Support (I)	Confidence	Lift
{1,3}	{1}	{3}	0.6	1.0	1.25
{1,3}	{3}	{1}	0.6	0.75	1.25
{2,5}	{2}	{5}	0.6	1.0	1.25
{2,5}	{5}	{2}	0.6	0.75	1.25
{1,3,5}	{1,5}	{3}	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	0.4	0.67	1.11
{2,3,5}	{2,3}	{5}	0.4	1.0	1.25
{2,3,5}	{3,5}	{2}	0.4	0.67	1.11

Organizing the results



I	S	(I – S)	Support (I)	Confidence	Lift
{1,3}	{1}	{3}	0.6	1.0	1.25
{1,3}	{3}	{1}	0.6	0.75	1.25
{2,5}	{2}	{5}	0.6	1.0	1.25
{2,5}	{5}	{2}	0.6	0.75	1.25
{1,3,5}	{1,5}	{3}	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	0.4	0.67	1.11
{2,3,5}	{2,3}	{5}	0.4	1.0	1.25
{2,3,5}	{3,5}	{2}	0.4	0.67	1.11

Organizing the results

Item Set	Left Hand Side	Right Hand Side	Support	Confidence	Lift
{1,3}	{1}	{3}	0.6	1.0	1.25
{1,3}	{3}	{1}	0.6	0.75	1.25
{2,5}	{2}	{5}	0.6	1.0	1.25
{2,5}	{5}	{2}	0.6	0.75	1.25
{1,3,5}	{1,5}	{3}	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	0.4	0.67	1.11
{2,3,5}	{2,3}	{5}	0.4	1.0	1.25
{2,3,5}	{3,5}	{2}	0.4	0.67	1.11

Final results

Item Set	Left Hand Side	Right Hand Side	Support	Confidence	Lift
{1,3}	{1}	{3}	0.6	1.0	1.25
{1,3}	{3}	{1}	0.6	0.75	1.25
{2,5}	{2}	{5}	0.6	1.0	1.25
{2,5}	{5}	{2}	0.6	0.75	1.25
{1,3,5}	{1,5}	{3}	0.4	1.0	1.25
{1,3,5}	{3,5}	{1}	0.4	0.67	1.11
{2,3,5}	{2,3}	{5}	0.4	1.0	1.25
{2,3,5}	{3,5}	{2}	0.4	0.67	1.11

Summary

- How the Apriori algorithm works step-by-step
- How to interpret it
- How to build it

Summary

- How the Apriori algorithm works step-by-step
- How to interpret it
- How to build it

Following slides reference:
Machine Learning A-Z™ from Udemy

People who bought also bought …

Examples of association rules

- Burgers → French Fries
- Burgers, French Fries → Coke

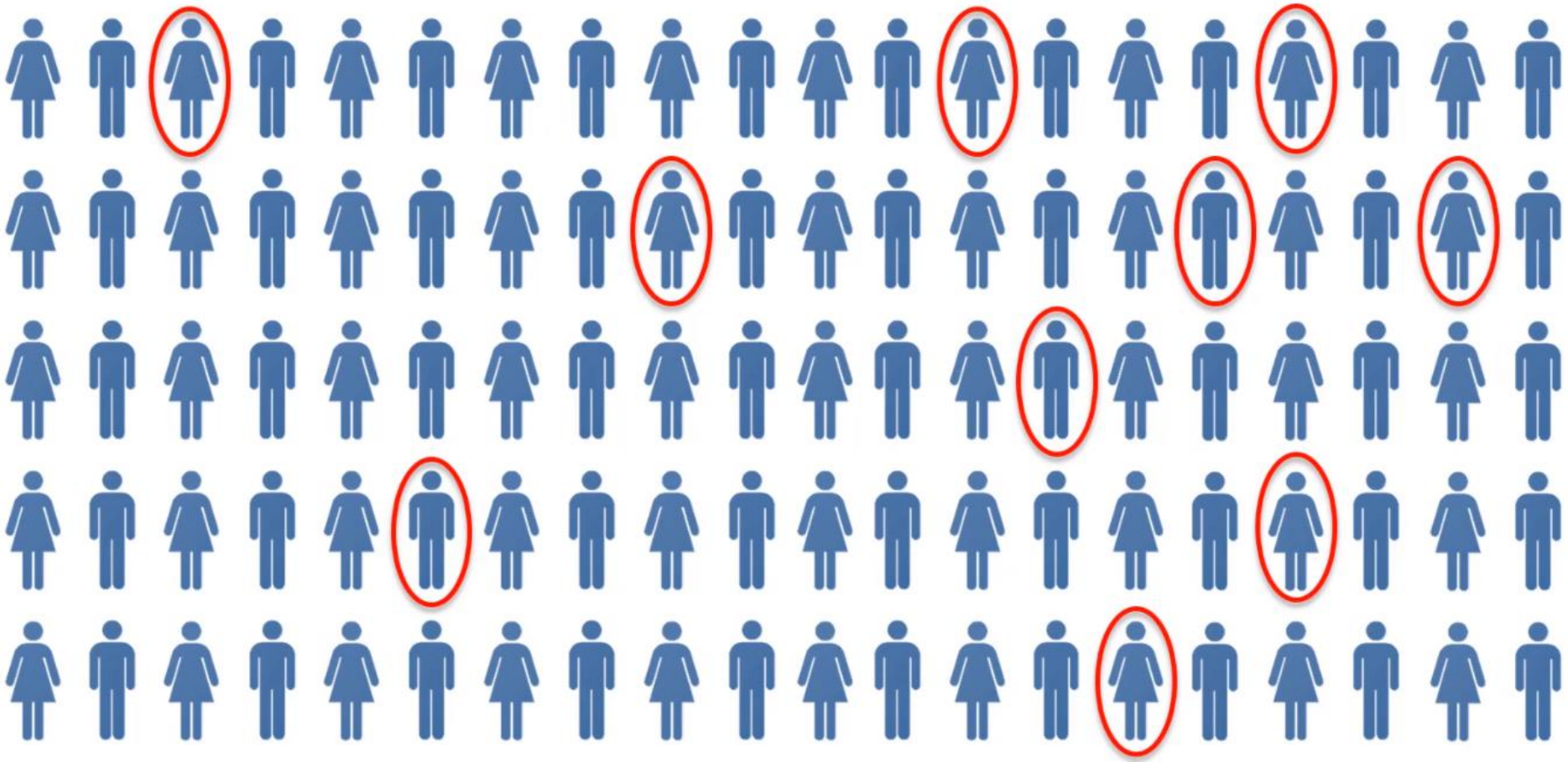
People who bought also bought …

Examples of association rules

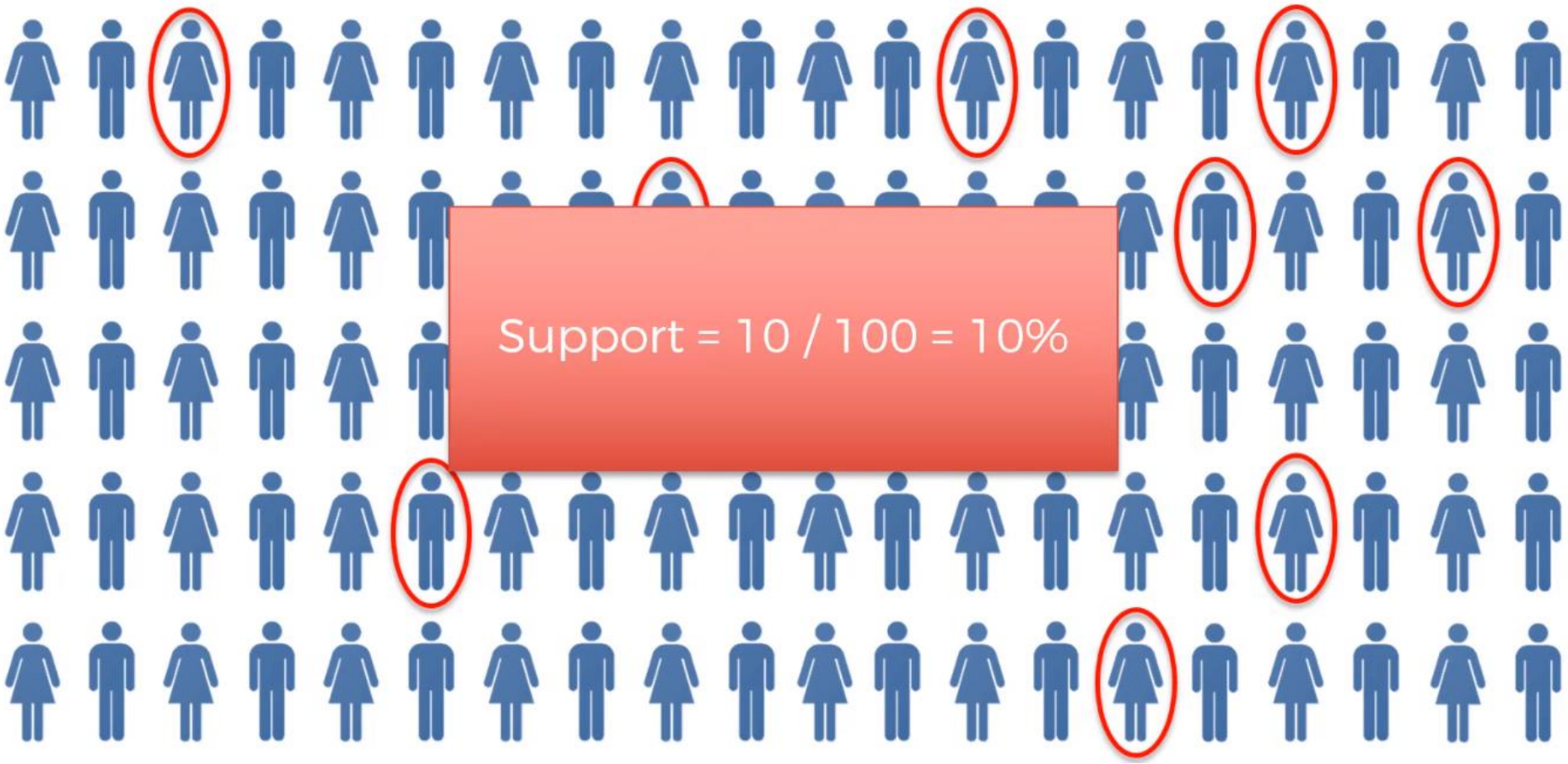
- Burgers → French Fries
- Burgers, French Fries → Coke

Support

Support

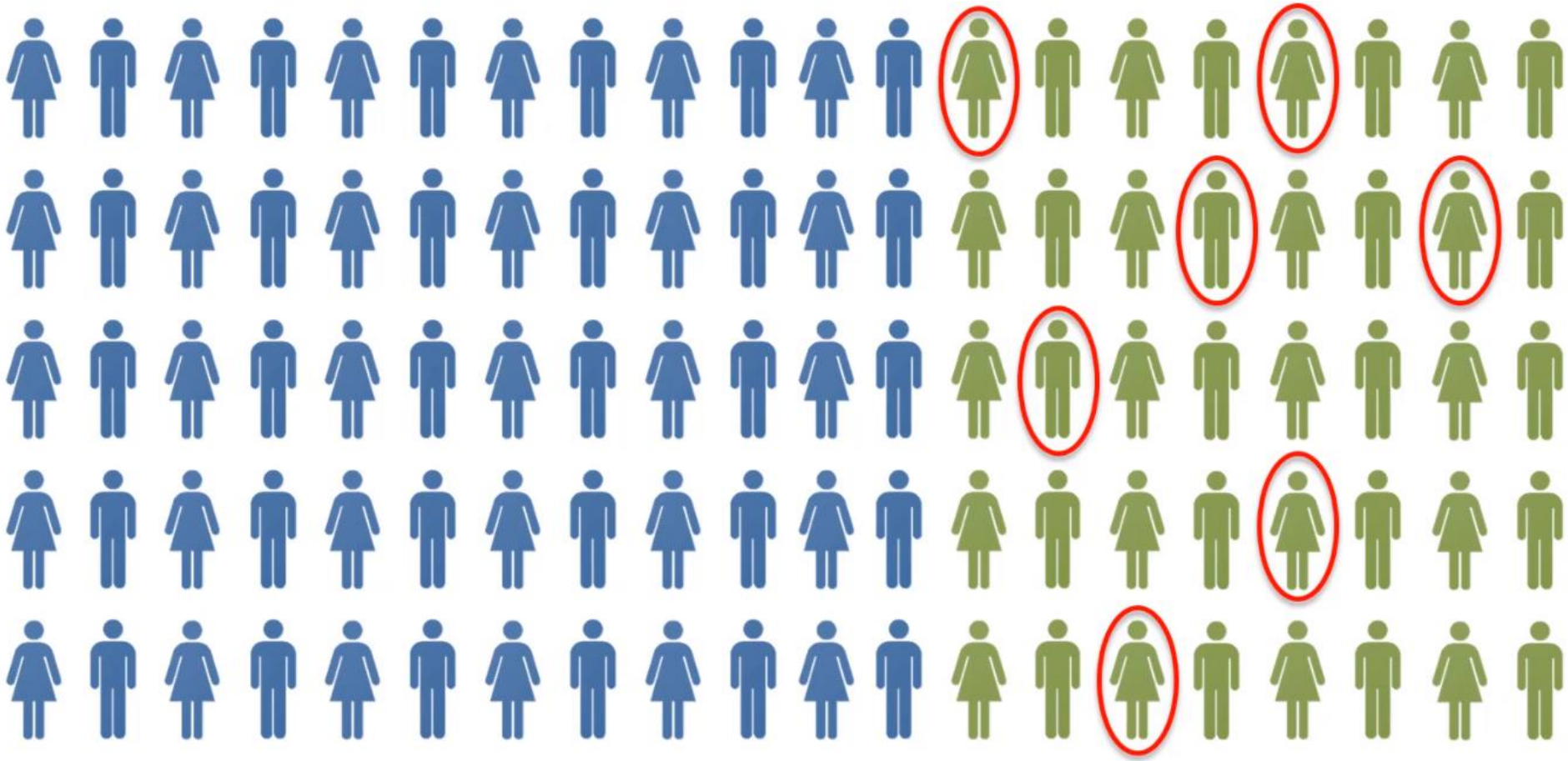


Support



Confidence

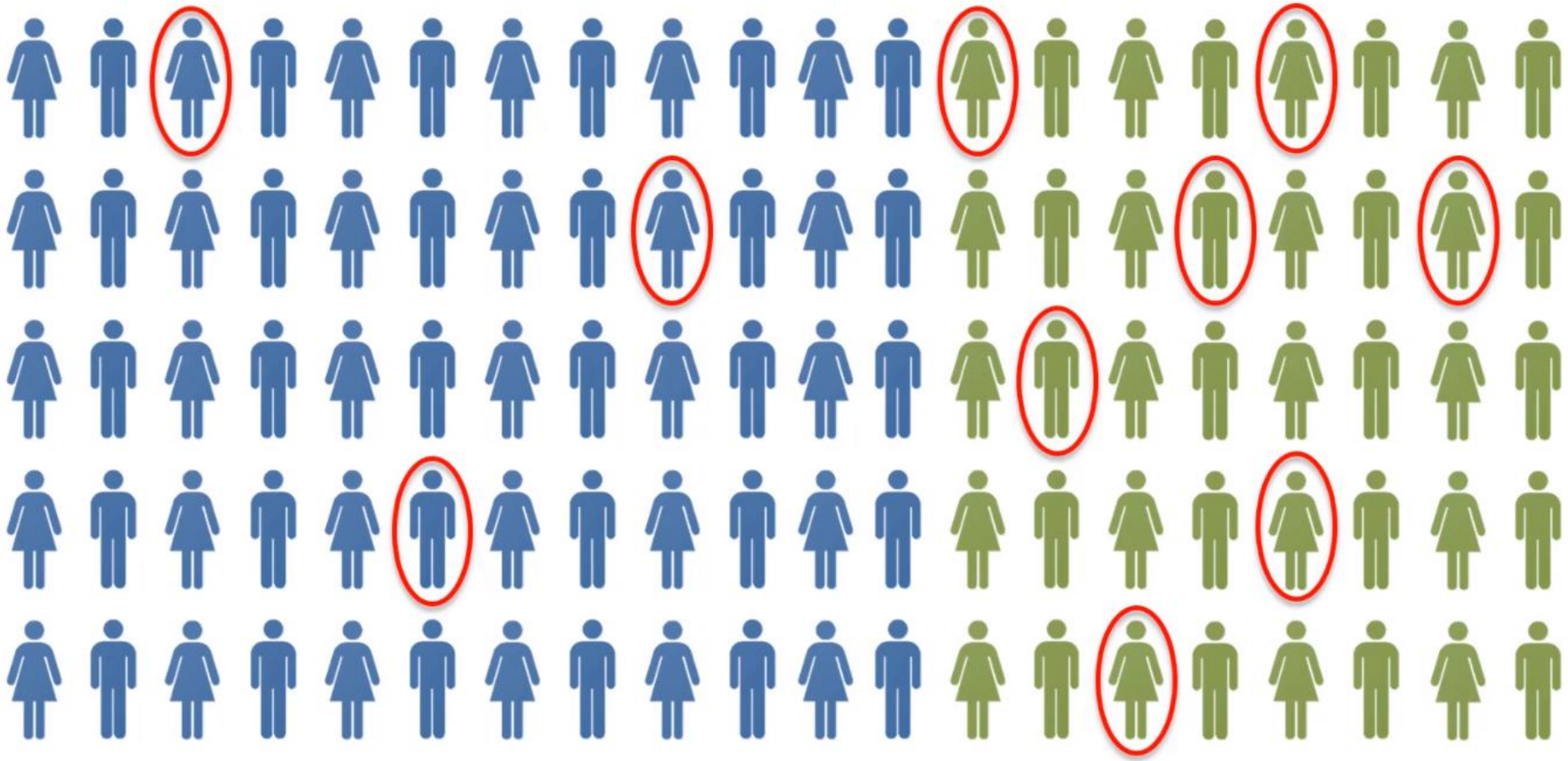
Confidence



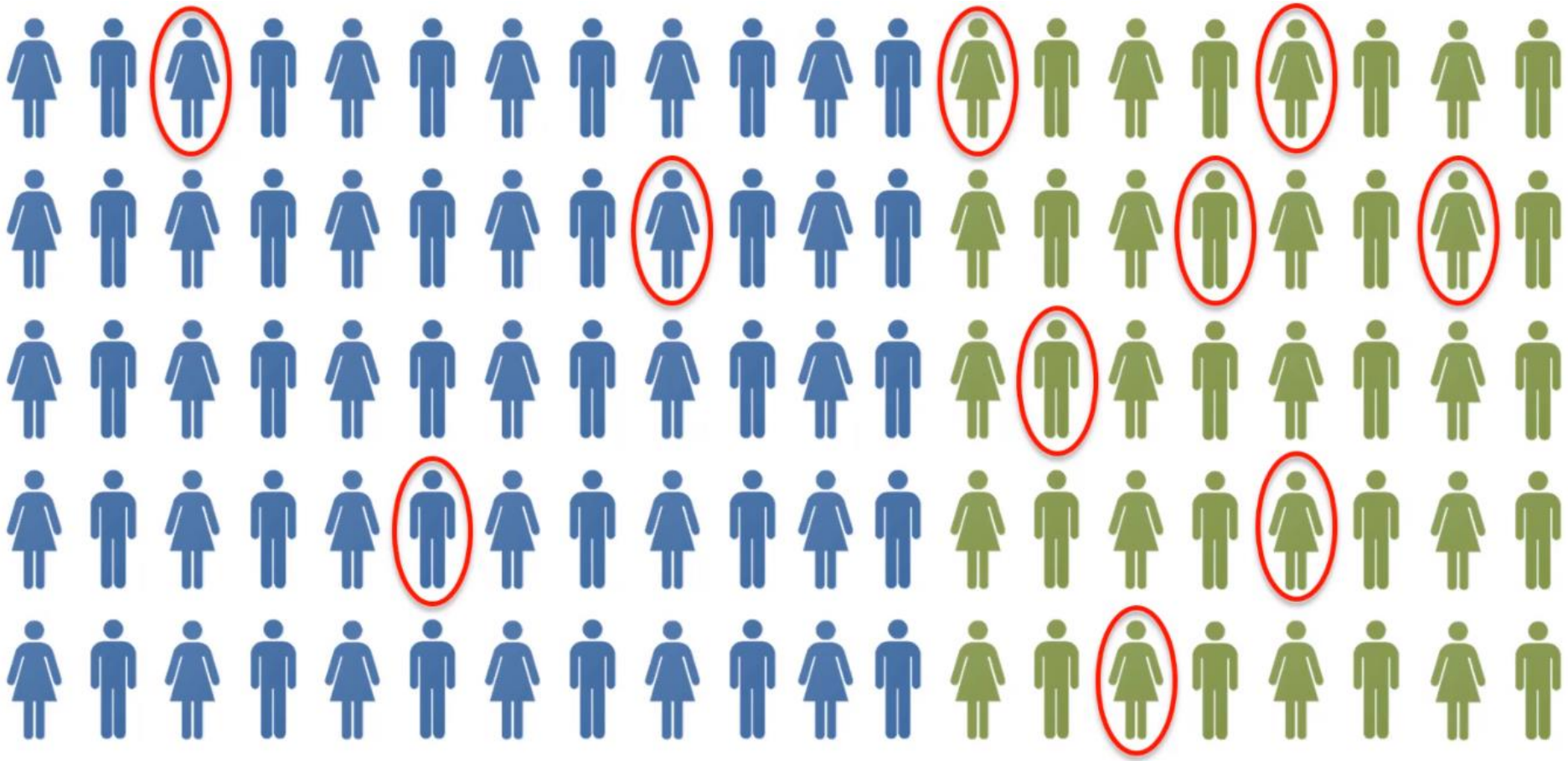
Confidence

Lift

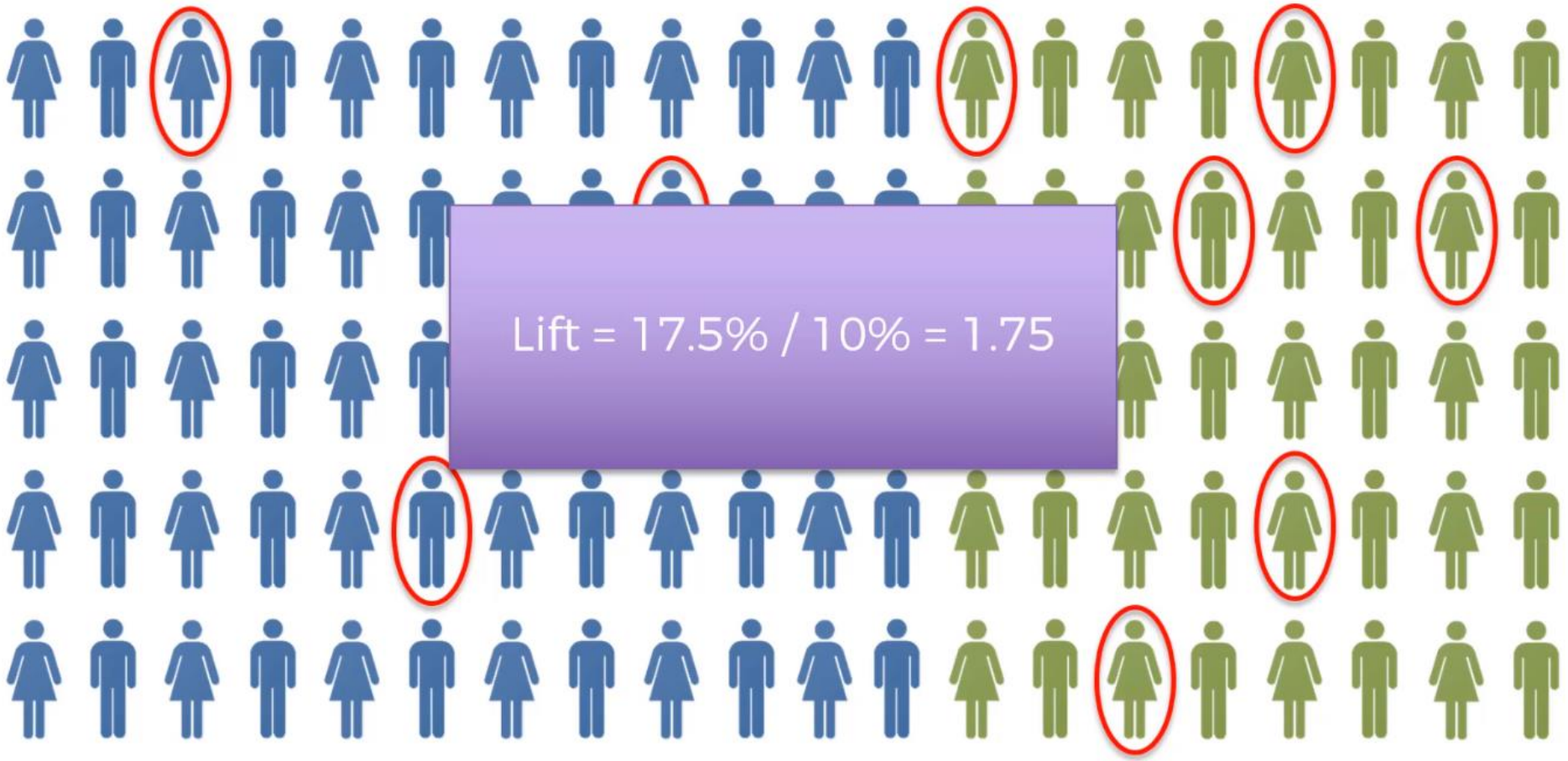
Lift



Lift



Lift



Summary

- How the Apriori algorithm works step-by-step
- How to interpret it
- How to build it

Notes

- Burgers → French Fries
- Support:
  - Used to build a rule
  - Answers: “How many people have bought burgers?”
    - 10 people out of 100 have bought Burgers
- Confidence:
  - Used to test a rule (hypothesis)
  - Answers: “From those who have bought French fries, how many have bought burgers?”
    - 7 people have bought burgers out of 40 people that have bought French fries
- Lift:
  - Used to get the strength of the rule
  - Answers: “How better the rule is compared to pure randomness”
    - 10% is pure random and 17.5% is when using prior knowledge (if we know that the person bought French fries). Therefore, it’s 1.75 times better than random