**Exercise – 1:**



Minsup=0.1

{Bread, Milk, Diaper} 🡪 3-itemset 🡪 frequent itemsets.

2-itemsets: {Bread, Milk} – 3/5 = 0.6;   
{Bread, Diaper} – 3/5 = 0.6;   
{Milk, Diaper} – 3/5 = 0.6

1-itemsets: {Bread} – 4/5 = 0.8;   
{Milk} – 4/5 =0.8;  
{Diaper} – 4/5 = 0.8

All the frequent itemsets will be candidate itemsets but not all candidate itemsets will be not be frequent itemsets.

|  |  |
| --- | --- |
| Transaction 1 | **Apple, beer, rice, chicken** |
| Transaction 2 | **Apple, beer, rice** |
| Transaction 3 | **Apple, beer** |
| Transaction 4 | **Milk, beer, rice, chicken** |
| Transaction 5 | **Milk, beer, rice** |
| Transaction 6 | **Milk, beer** |

Exercise-1:

Minsup=0.2

Unique items: Apple, Beer, Rice, Chicken, Milk

Green highlight – frequent itemsets; Red highlight – only a candidate itemsets not frequent.

1-itemset:

{Apple}-3/6 = 0.5  
{Beer}-6/6 = 1.0  
{Rice}-4/6 = 0.67  
{Chicken}-2/6 = 0.34  
{Milk}-3/6 = 0.5

2-itemset

{Apple, Beer} –3/6 = 0.5   
{Apple, Rice} – 2/6 = 0.34  
{Apple, Chicken} – 1/6 = 0.16  
{Apple, Milk} -- 0  
{Beer, Rice} – 4/6 = 0.67  
{Beer, Chicken} – 2/6 = 0.34  
{Beer, Milk} – 3/6 = 0.5  
{Rice, Chicken} – 2/6 = 0.34  
{Rice, Milk} – 2/6 = 0.34  
{Chicken, Milk} – 1/6 = 0.16

3-itemsets:

{Apple, Rice, Beer} – 2/6 = 0.34  
{Apple, Beer, Chicken} --   
{Apple, Beer, Milk} --   
{Rice, Chicken, Milk} --   
{Beer, Milk, Rice} – 2/6 = 0.34  
{Apple, Rice, Milk} --   
{Apple, Rice, Chicken} --   
{Beer, Chicken, Rice} – 2/6 = 0.34

4-itemsets:

{Apple, Rice, Beer, Milk} =   
{Beer, Milk, Chicken, Rice} =   
{Apple, Beer, Rice, Chicken} =

Frequently occurring itemsets – 15

**Exercise – 2**

|  |  |
| --- | --- |
| Transaction 1 | **a, b, e** |
| Transaction 2 | **b, d** |
| Transaction 3 | **b, c** |
| Transaction 4 | **a, b, d** |
| Transaction 5 | **a, c** |
| Transaction 6 | **b, c** |
| Transaction 7 | **a, c** |
| Transaction 8 | **a, b, c, e** |
| Transaction 9 | **a, b, c** |

Minsup =0.2

Unique items: a, b, c, d, e

**1-itemsets**

{a}= 6/9 =0.67  
{b}=7/9 = 0.77  
{c}=6/9 =0.67  
{d}=2/9 = 0.22  
{e}=2/9 = 0.22

**2-itemsets**

{a,b}=0.44  
{a,c}=0.44  
{a,d}=0.11  
{a,e}=0.22  
{b,c}=0.44  
{b,d}=0.22  
{b,e}=0.22  
{c,d}=0  
{c,e}=0.11  
{d,e}=0

**3-itemsets**

{a,b,c}=2/9 =0.22  
{a,b,e}=2/9=0.22

**{a}=> {b,c} support; confidence=  
{a,b}=>{c}  
{b}=>{a,c}  
{b,c}=>{a}  
{c}=>{a,b}  
{a,c}=>{b}**

**4-itemsets**

Now computing the support, confidence and lift values for the rules.

|  |  |
| --- | --- |
| **Transaction ID** | **Items** |
| **T1** | **A, B, C** |
| **T2** | **A, C, D** |
| **T3** | **B, C, D** |
| **T4** | **A, D, E** |
| **T5** | **B, C, E** |

C=>A

Support: freq(C,A)/#Transactions = 2/5  
Confidence: freq(C,A)/freq(C) = 2/4 = 0.5  
Lift: support/support(C)\*support(A)   
support = 2/5  
Support(C)\*Support(A) = 4/5 \* 3/5 = 12/25

Lift = 2/5 \* 25/12 = 5/6   
  
A=>C

Support: 2/5   
Confidence: freq(C,A)/freq(A) = 2/3 = 0.67  
Lift: support/support(A)\*support(C) = (2/5)/(3/5)\*(4/5) = 5/6

{B, C} => {D}

Support = 1/5; Confidence = 1/3; Lift = 5/9

Lift = Support/support(B,C)\*support(D)

Support: 1/5

Support(B,C) = 3/5

Support(D) = 3/5

1/5 / (3/5 \* 3/5) = (1/5) / (9/25) = 5/9