Assignment 3 Solutions

2. Consider the data set shown in Table

Customer ID	Transaction ID	Items Bought
1	0001	{a, d, e}
1	0024	{a, b, c, e}
2	0012	{a, b, d, e}
2	0031	{a, c, d, e}
3	0015	{b, c, e}
3	0022	{b, d, e}
4	0029	{c, d}
4	0040	{a, b, c}
5	0033	{a, d, e}
5	0038	{a, b, e}

(a) Compute the support for item sets {e}, {b, d}, and {b, d, e} by treating each transaction ID as a market basket.

- **{e}: support ---> 8/10 = 80%**
- **{b, d}: support ---> 2/10 = 20%**
- **{b, d, e}: support ---> 2/5 = 20%**

(b) Use the results in part (a) to compute the confidence for the association rules {b, d} ---> {e} and {e} ---> {b, d}. Is confidence a symmetric measure?

- **{b, d} ---> {e}: confidence --> 2/2 = 100%**
- **{e} ---> {b, d}: confidence ---> 2/8 = 25%**

Confidence is not a symmetric measurement.

(c) Repeat part (a) by treating each customer ID as a market basket. Each item should be treated as a binary variable (1 if an item appears in at Least one transaction bought by the customer, and 0 otherwise.)

- **{e}: support ---> 4/5 = 80%**
- **{b, d}: support ---> 5/5 = 100%**
- **{b, d, e}: support ---> 4/5 =80%**

(d) Use the results in part (c) to compute the confidence for the association rules {b, d} ---> {e} and {e} ---> {b, d}.

- **{b, d} ---> {e}: confidence ---> 4/5 = 80%**
- **{e} ---> {b, d}: confidence ---> 4/4 = 100%**

3. Consider the market basket transactions shown in Table

Transaction ID	Items Bought
1	{Milk, Beer, Diapers}
2	{Bread, Butter, Milk}
3	{Milk, Diapers, Cookies}
4	{Bread, Butter, Cookies}
5	{Beer, Cookies, Diapers}
6	{Milk, Diapers, Bread, Butter}
7	{Bread, Butter, Diapers}
8	{Beer, Diapers}
9	{Milk, Diapers, Bread, Butter}
10	{Beer, Cookies}

d) Find an itemset (of size 2 or larger) that has the largest support.

{Bread, Butter}

e) Find a pair of items, a and b, such that the rules {a} −-> {b} and {b} −-> {a} have the same confidence.

{Bread, Butter}.

4. Using the data at www.stats202.com/more_stats202_logs.txt and treating each row as a "market basket" compute the support and confidence for the rule ip=65.57.245.11 → "Mozilla/5.0 (X11; U; Linux i686 (x86_64); en-US; rv:1.8.1.3) Gecko/20070309 Firefox/2.0.0.3".

State what the support and confidence values mean in plain English in this context.

Ans: The rule for which we have to find the support and confidence is {65.57.245.11} -> {"Mozilla/5.0 (X11; U; Linux i686 (x86_64); en-US; rv:1.8.1.3) Gecko/20070309 Firefox/2.0.0.3"}

Support for {65.57.245.11} = 5021 / 14803 = 0.33

Support for {"Mozilla/5.0 (X11; U; Linux i686 (x86_64); en-US; rv:1.8.1.3) Gecko/20070309 Firefox/2.0.0.3"} = 1619/14803 = 0.109

Confidence for rule {65.57.245.11} -> {"Mozilla/5.0 (X11; U; Linux i686 (x86_64); en-US; rv:1.8.1.3) Gecko/20070309 Firefox/2.0.0.3"} = support count ({65.57.245.11, "Mozilla/5.0 (X11; U; Linux i686 (x86_64); en-US; rv:1.8.1.3) Gecko/20070309 Firefox/2.0.0.3"}) / support count ({65.57.245.11})

= 1619 / 5021 = 0.322