Data Mining Assignment 3

**1) Read Chapter 6 (only sections 6.1 and 6.7).**

1. **Do Chapter 6 textbook problem #2 (parts a, b, c, d only) on page 404.**

|  |  |  |
| --- | --- | --- |
| **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}** |

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

10 distinct baskets/transactions.

* + - {e}: s = 8

10

= 0.8

* + - {b, d}: s = 2 = 0.2

10

* + - {b, d, e}: s = 2

10

= 0.2

* 1. **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?** Both rules have support 0.2, (support count is 2):
     + {b, d} → {e}: c = 0.2 = 1

0.2

* + - {e} → {b, d}: c = 0.2 = 0.25

0.8

Support is a symmetric measure, but confidence is not symmetric

* 1. **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.)**

Now we have 5 baskets in total.

* + - {e}: s = 4 = 0.8

5

* + - {b, d}: s = 5 = 1

5

* + - {b, d, e}: s = 4 = 0.8

5

* 1. **Use the results in part (c) to compute the confidence for the association**

**rules {b, d} ---> {e} and {e} ---> {b, d}.**

0.8

* {b, d} → {e}: c =

1

= 0.8

* {e} → {b, d}: c = 0.8 = 1

0.8

1. **Do Chapter 6 textbook problem #6 (parts d, e only) on page 406.**

|  |  |
| --- | --- |
| **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}** |

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

|  |  |
| --- | --- |
| Itemset | Support |
| cookies | milk | 1 |
| bread | cookies | 1 |
| milk | 5 |
| beer | cookies | 2 |
| beer | diapers | 3 |
| bread | butter | milk | 3 |
| bread | butter | cookies | 1 |
| beer | milk | 1 |
| butter | cookies | 1 |
| butter | milk | 3 |
| butter | 5 |
| bread | butter | diapers | milk | 2 |
| bread | butter | 5 |
| bread | 5 |
| butter | diapers | milk | 2 |
| bread | diapers | 3 |
| cookies | 4 |
| beer | 4 |
| butter | diapers | 3 |
| diapers | 7 |
| diapers | milk | 4 |
| beer | cookies | diapers | 1 |
| beer | diapers | milk | 1 |
| bread | diapers | milk | 2 |
| bread | butter | diapers | 3 |
| bread | milk | 3 |
| cookies | diapers | milk | 1 |

|  |  |
| --- | --- |
| cookies | diapers | 2 |
| ∅ | 10 |

The table is having all item sets with non-zero support count Ignoring the 1-itemsets (and ∅), the itemset with the largest support is {bread, butter}.

1. **Find a pair of items, a and b, such that the rules {a} → {b} and {b} → {a} have the same confidence.**

Bread and butter have the same support (s = 5). This means that the rules {bread} → {butter} and {butter} → {bread} have the same

confidence (c = 5 = 1). The same can be said with beer and cookies

5

(s = 4, c = 2 = 0.5).

4

1. **Using the data at** [**www.stats202.com/more\_stats202\_logs.txt**](http://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.**

The rule for which we have to find the support and confidence of the given Address 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

The 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