Lab1 Report

Dmitriy Timokhin, Hanson Egbert,Charlie Lou

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Bakery

1. Hyper tuning parameters

We created a function that outputs the frequent item-sets and the associated rules for many different levels of minimum support and a very low value of minimum confidence.

This lead us to find a big change in number of association rules at around a minimum support of .02 with lots of association rules having a confidence > .9. Furthermore, if you go above .02 for minimum support the number of association rules and frequent item sets dramatically decreases.

From these observations we were able to decide that the “best” parameters for each dataset are as follows.

- Bakery1000 -> MinSup = .018, MinConf = .9
- Bakery5000 -> MinSup = .02, minConf = .9
- Bakery20000 -> MinSup = .02, minConf = .9
- Bakery75000 -> MinSup = .02, minConf = .9

2. Seeing Trends

Each of the datasets contained a very similar number of rules and frequent item sets for these parameters. They contained approximately 28 item sets and 35 rules. Some of the ones occurring in each of the four datasets were..

Rule: 33 Support/Confidence: (0.019,1.0) 'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 34 Support/Confidence: (0.019,1.0) 'Raspberry''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Lemonade'
Rule: 35 Support/Confidence: (0.019,1.0) 'Lemon''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Raspberry''Lemonade'

Furthermore, there were many others that appeared in all of the datasets but these three were the ones with the largest number of elements on the left side of the association rule.

It does seem like based on each dataset the association rules with the highest support and confidence change but overall using this data would be very useful for a bakery owner on if they wanted to make a discount for getting certain items together. Using the association rules one could fairly easily make a profit through providing days or hours where the items in the association rule are discounted together to attract those customers more often.

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Bingo

1. Hyper tuning parameters

   Hyper tuning parameters for the bingo dataset was fairly straightforward; We used a similar approach to the bakery dataset and got quite interesting results.

   Bingo Data -> MinSup = .1, MinConf = .9

2. Seeing Trends

   First it is interesting to see what authors are the most closely associated with what readers want to read. For that it would be interesting to set the MinSup fairly high in order to get less item sets but get the ones that would affect the bookstore the most that would apply these findings.

   Parameters(MinSupport = .25)

   Set # 1 Sanderson, Brandon Support: 0.42
   Set # 2 Novik, Naomi Support: 0.263
   Set # 3 Bancroft, Josiah Support: 0.416
   Set # 4 Hobb, Robin / Lindholm, Megan Support: 0.284
   Set # 5 Gaiman, Neil Support: 0.267
   Set # 6 Jemisin, N. K. Support: 0.362
   Set # 7 Pratchett, Terry Support: 0.28
   Set # 8 Eames, Nicholas Support: 0.263
   Set # 9 Mieville, China Support: 0.259
   Set # 10 Brennan, Marie Support: 0.276
   Set # 11 Lawrence, Mark Support: 0.309

   Now it's fairly clear that the book store should focus on getting books from these three authors since they seem to be read in a lot of the reading lists provided. The other authors should be considered as well.

   Now for the interesting part … what about the how frequent these authors are read TOGETHER?

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Parameters(MinSupport = .15)

Set # 23 Lawrence, Mark && Sanderson, Brandon Support: 0.16
Set # 24 Bancroft, Josiah && Sanderson, Brandon Support: 0.206
Set # 25 Gaiman, Neil && Sanderson, Brandon Support: 0.152
Set # 26 Bancroft, Josiah && Lawrence, Mark Support: 0.173
Set # 27 Bancroft, Josiah && Pratchett, Terry Support: 0.165
Set # 28 Jemisin, N. K. && Sanderson, Brandon Support: 0.169

Interestingly enough it appears that when looking at the frequent item-sets created from those authors we mentioned, the largest support set contains both authors we already mentioned. This would mean that the book store can put both of these authors books next to each other in order to give this subset of customers a higher chance of buying both. This can also be said about Set#28

Finally all of the authors we mentioned together!

Parameters(MinSupport = .08)

Set # 137 Bancroft, Josiah && Novik, Naomi && Sanderson, Brandon Support: 0.095
Set # 139 Bancroft, Josiah && Jemisin, N. K. && Sanderson, Brandon Support: 0.091

These are the two frequent item sets of size three that have the highest support out of the ones that were created using a MinSupport of .08. As you can see both of these sets containthe authors we emphasized earlier, thus it would be a pretty good idea to put all of these three authors together and maybe include Naomi Novek as well.

Hope this analysis helps with your booming bookstore business! ☺

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Transcription

1. Hyper tuning parameters

   Hyper tuning the parameters for transcription was quite tricky. Some questions arose ... What would a researcher want to see? What should the minSupport be so that the researchers would get interesting insight?

   Using a similar approach as before, we found that using minSupport of .7 proved to be interesting to consider. Again, this is after we removed all of the transcription factors which appeared in 40 or more of the market baskets.

   Transcription -> MinSup: .7

2. Seeking Trends

   Due to our limited knowledge of how genes work and how transcription factors work we aren't able to provide the best insight but a researcher might want to consider trends such as these.

   1. Multiple baskets with almost all the same items with the same support

Set # 25 ['Tal-1', 'AP-2alpha', 'AP-2alphaB'] Support: 0.717391304347826
Set # 26 ['TEF2', 'AP-2alphaB', 'AP-2gamma'] Support: 0.717391304347826
Set # 27 ['TEF2', 'AP-2alphaA', 'AP-2beta'] Support: 0.717391304347826
Set # 28 ['IUF-1', 'AP-2alpha', 'AP-2beta'] Support: 0.7391304347826086
Set # 29 ['Tal-1', 'AP-2alpha', 'AP-2'] Support: 0.717391304347826

There are many other occurrences of this in our output which is quite interesting. An output of association rules would show that in this case all of the items above are associated with one another.

Set # 1 ['AP-2alpha', 'AP-2gamma', 'AP-2'] Support: 0.8260869565217391
Set # 2 ['AP-2alphaA', 'AP-2gamma', 'AP-2beta'] Support: 0.8260869565217391
Set # 3 ['AP-2alphaA', 'AP-2alphaB', 'AP-2beta'] Support: 0.8260869565217391
Set # 4 ['AP-2alpha', 'AP-2alphaA', 'AP-2gamma'] Support: 0.8260869565217391
Set # 5 ['AP-2alpha', 'AP-2alphaB', 'AP-2'] Support: 0.8260869565217391
Set # 6 ['AP-2alphaA', 'AP-2alphaB', 'AP-2'] Support: 0.8260869565217391

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Set # 7 ['AP-2alphaA', 'AP-2gamma', 'AP-2'] Support: 0.8260869565217391
Set # 8 ['AP-2alpha', 'AP-2alphaB', 'AP-2gamma'] Support: 0.8260869565217391
Set # 9 ['AP-2alpha', 'AP-2beta', 'AP-2'] Support: 0.8260869565217391
Set # 10 ['AP-2alpha', 'AP-2alphaA', 'AP-2beta'] Support: 0.8260869565217391
Set # 11 ['AP-2alpha', 'AP-2alphaB', 'AP-2beta'] Support: 0.8260869565217391
Set # 12 ['AP-2alpha', 'AP-2alphaA', 'AP-2'] Support: 0.8260869565217391
Set # 13 ['AP-2alpha', 'AP-2gamma', 'AP-2beta'] Support: 0.8260869565217391
Set # 14 ['AP-2alphaA', 'AP-2beta', 'AP-2'] Support: 0.8260869565217391
Set # 15 ['AP-2alphaA', 'AP-2alphaB', 'AP-2gamma'] Support: 0.8260869565217391
Set # 16 ['AP-2alpha', 'AP-2alphaA', 'AP-2alphaB'] Support: 0.8260869565217391
Set # 17 ['AP-2alphaB', 'AP-2gamma', 'AP-2beta', 'AP-2'] Support: 0.8260869565217391

This group of transcription factor sets is one group of all exactly the same support. Since all of these are skyline frequent item sets we can highlight all of the unique factors..

'AP-2alpha', 'AP-2alphaA', 'AP-2alphaB', 'AP-2gamma', 'AP-2beta', 'AP-2'

Above we can see that the set of these items doesn't have a Support of over .8 but lets see what that support is.. when I tried to find it, it didn't prove interesting.. but looking at other combinations of transcription factors did prove interesting.

Set # 4909 ['C/EBPbeta', 'STAT1alpha', 'STAT3', 'STAT2', 'STAT1beta', 'STAT4', 'STAT5'] Support: 0.5

Set # 4943 ['FOXD3', 'CBF-A', 'CBF-B', 'NF-Y', 'NF-YB', 'NF-YC', 'CP1A', 'CP1C', 'CBF-C'] Support: 0.6086956521739131

Set # 4911 ['CBF-A', 'CBF-B', 'NF-Y', 'AP-2alphaB', 'AP-2gamma', 'AP-2beta', 'AP-2'] Support: 0.5652173913043478

Researchers could use three datasets and many others when running the algorithm with a support of .5 to see which sets of genes occur more than 50% of the time in the dataset. Certain combinations of genes may imply disease or some other mutation.

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Bakery 1000

```
Dmitriys-MacBook-Pro:csc466 Dima$ python3 lab1Run.py 1000-out1.csv .018 .9 goods.csv Bakery
Set #  1   'Strawberry''Cake'+'Napoleon''Cake' Support: 0.049
Set #  2   'Opera''Cake'+'Apricot''Danish' Support: 0.039
Set #  3   'Cherry''Tart'+'Apricot''Danish' Support: 0.046
Set #  4   'Berry''Tart'+'Bottled''Water' Support: 0.034
Set #  5   'Opera''Cake'+'Cherry''Tart' Support: 0.041
Set #  6   'Lemon''Cake'+'Lemon''Tart' Support: 0.04
Set #  7   'Cheese''Croissant'+'Orange''Juice' Support: 0.038
Set #  8   'Truffle''Cake'+'Gongolais''Cookie' Support: 0.058
Set #  9   'Marzipan''Cookie'+'Tuile''Cookie' Support: 0.053
Set #  10   'Apple''Tart'+'Apple''Croissant'+'Cherry''Soda' Support: 0.031
Set #  11   'Coffee''Eclair'+'Blackberry''Tart'+'Single''Espresso' Support: 0.023
Set #  12   'Apple''Croissant'+'Apple''Danish'+'Cherry''Soda' Support: 0.031
Set #  13   'Lemon''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade' Support: 0.028
Set #  14   'Raspberry''Cookie'+'Lemon''Cookie'+'Lemon''Lemonade' Support: 0.028
Set #  15   'Chocolate''Tart'+'Walnut''Cookie'+'Vanilla''Frappuccino' Support: 0.018
Set #  16   'Coffee''Eclair'+'Apple''Pie'+'Hot''Coffee' Support: 0.024
Set #  17   'Apple''Tart'+'Apple''Croissant'+'Apple''Danish' Support: 0.04
Set #  18   'Raspberry''Cookie'+'Lemon''Cookie'+'Raspberry''Lemonade' Support: 0.029
Set #  19   'Coffee''Eclair'+'Apple''Pie'+'Almond''Twist' Support: 0.027
Set #  20   'Chocolate''Cake'+'Casino''Cake'+'Chocolate''Coffee' Support: 0.038
Set #  21   'Apple''Tart'+'Apple''Danish'+'Cherry''Soda' Support: 0.031
Set #  22   'Blueberry''Tart'+'Apricot''Croissant'+'Hot''Coffee' Support: 0.032
Set #  23   'Lemon''Cookie'+'Lemon''Lemonade'+'Green''Tea' Support: 0.019
Set #  24   'Lemon''Cookie'+'Raspberry''Lemonade'+'Green''Tea' Support: 0.019
Set #  25   'Coffee''Eclair'+'Almond''Twist'+'Hot''Coffee' Support: 0.024
Set #  26   'Raspberry''Cookie'+'Lemon''Cookie'+'Green''Tea' Support: 0.019
Set #  27   'Apple''Pie'+'Almond''Twist'+'Hot''Coffee' Support: 0.024
Set #  28   'Raspberry''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' Support: 0.019
*******************************************
Rule: 0 Support/Confidence:  (0.031,0.9394) 'Cherry''Soda'+'Apple''Croissant' --> 'Apple''Tart'
Rule: 1 Support/Confidence:  (0.023,0.9583) 'Single''Espresso'+'Blackberry''Tart' --> 'Coffee''Eclair'
Rule: 2 Support/Confidence:  (0.023,0.9583) 'Single''Espresso'+'Coffee''Eclair' --> 'Blackberry''Tart'
Rule: 3 Support/Confidence:  (0.031,0.9394) 'Cherry''Soda'+'Apple''Danish' --> 'Apple''Croissant'
Rule: 4 Support/Confidence:  (0.031,0.9394) 'Cherry''Soda'+'Apple''Croissant' --> 'Apple''Danish'
Rule: 5 Support/Confidence:  (0.028,0.9655) 'Lemon''Lemonade'+'Raspberry''Lemonade' -->
'Lemon''Cookie'
Rule: 6 Support/Confidence:  (0.028,0.9333) 'Lemon''Cookie'+'Raspberry''Lemonade' -->
'Lemon''Lemonade'
Rule: 7 Support/Confidence:  (0.028,0.9032) 'Lemon''Cookie'+'Lemon''Lemonade' -->
'Raspberry''Lemonade'
Rule: 8 Support/Confidence:  (0.028,0.9032) 'Lemon''Cookie'+'Lemon''Lemonade' --> 'Raspberry''Cookie'
Rule: 9 Support/Confidence:  (0.028,0.9032) 'Lemon''Lemonade'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 10 Support/Confidence:  (0.018,1.0) 'Walnut''Cookie'+'Vanilla''Frappuccino' --> 'Chocolate''Tart'
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Rule: 11 Support/Confidence: (0.018,1.0) 'Chocolate''Tart'+'Walnut''Cookie' --> 'Vanilla''Frappuccino'
Rule: 12 Support/Confidence: (0.024,0.9231) 'Hot''Coffee'+'Coffee''Eclair' --> 'Apple''Pie'
Rule: 13 Support/Confidence: (0.04,0.9524) 'Apple''Danish'+'Apple''Croissant' --> 'Apple''Tart'
Rule: 14 Support/Confidence: (0.04,0.9756) 'Apple''Tart'+'Apple''Danish' --> 'Apple''Croissant'
Rule: 15 Support/Confidence: (0.04,0.9091) 'Apple''Tart'+'Apple''Croissant' --> 'Apple''Danish'
Rule: 16 Support/Confidence: (0.029,0.9667) 'Lemon''Cookie'+'Raspberry''Lemonade' --> 'Raspberry''Cookie'
Rule: 17 Support/Confidence: (0.029,1.0) 'Raspberry''Lemonade'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 18 Support/Confidence: (0.027,0.931) 'Apple''Pie'+'Almond''Twist' --> 'Coffee''Eclair'
Rule: 19 Support/Confidence: (0.027,0.9) 'Almond''Twist'+'Coffee''Eclair' --> 'Apple''Pie'
Rule: 20 Support/Confidence: (0.038,0.9744) 'Casino''Cake'+'Chocolate''Coffee' --> 'Chocolate''Cake'
Rule: 21 Support/Confidence: (0.038,0.95) 'Chocolate''Cake'+'Casino''Cake' --> 'Chocolate''Coffee'
Rule: 22 Support/Confidence: (0.031,0.9394) 'Cherry''Soda'+'Apple''Danish' --> 'Apple''Tart'
Rule: 23 Support/Confidence: (0.032,1.0) 'Apricot''Croissant'+'Hot''Coffee' --> 'Blueberry''Tart'
Rule: 24 Support/Confidence: (0.032,0.9697) 'Blueberry''Tart'+'Hot''Coffee' --> 'Apricot''Croissant'
Rule: 25 Support/Confidence: (0.019,0.9048) 'Lemon''Lemonade'+'Green''Tea' --> 'Lemon''Cookie'
Rule: 26 Support/Confidence: (0.019,0.95) 'Lemon''Cookie'+'Green''Tea' --> 'Lemon''Lemonade'
Rule: 27 Support/Confidence: (0.019,0.95) 'Lemon''Cookie'+'Green''Tea' --> 'Raspberry''Lemonade'
Rule: 28 Support/Confidence: (0.024,0.96) 'Almond''Twist'+'Hot''Coffee' --> 'Coffee''Eclair'
Rule: 29 Support/Confidence: (0.024,0.9231) 'Hot''Coffee'+'Coffee''Eclair' --> 'Almond''Twist'
Rule: 30 Support/Confidence: (0.019,0.95) 'Lemon''Cookie'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 31 Support/Confidence: (0.019,0.95) 'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 32 Support/Confidence: (0.024,0.96) 'Almond''Twist'+'Hot''Coffee' --> 'Apple''Pie'
Rule: 33 Support/Confidence: (0.019,1.0) 'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 34 Support/Confidence: (0.019,1.0) 'Raspberry''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Lemonade'
Rule: 35 Support/Confidence: (0.019,1.0) 'Lemon''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Raspberry''Lemonade'

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Bakery 5000

```
Dmitriys-MacBook-Pro:csc466 Dima$ python3 lab1Run.py 5000-out1.csv .02 .9 goods.csv Bakery
Set #  1   'Strawberry''Cake'+'Napoleon''Cake' Support: 0.0422
Set #  2   'Opera''Cake'+'Apricot''Danish' Support: 0.0432
Set #  3   'Cherry''Tart'+'Apricot''Danish' Support: 0.0512
Set #  4   'Berry''Tart'+'Bottled''Water' Support: 0.0366
Set #  5   'Opera''Cake'+'Cherry''Tart' Support: 0.0436
Set #  6   'Lemon''Cake'+'Lemon''Tart' Support: 0.0336
Set #  7   'Cheese''Croissant'+'Orange''Juice' Support: 0.043
Set #  8   'Truffle''Cake'+'Gongolais''Cookie' Support: 0.0472
Set #  9   'Marzipan''Cookie'+'Tuile''Cookie' Support: 0.0496
Set #  10   'Apple''Tart'+'Apple''Croissant'+'Cherry''Soda' Support: 0.023
Set #  11   'Coffee''Eclair'+'Blackberry''Tart'+'Single''Espresso' Support: 0.0286
Set #  12   'Apple''Croissant'+'Apple''Danish'+'Cherry''Soda' Support: 0.023
Set #  13   'Lemon''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade' Support: 0.0264
Set #  14   'Raspberry''Cookie'+'Lemon''Cookie'+'Lemon''Lemonade' Support: 0.0264
Set #  15   'Chocolate''Tart'+'Walnut''Cookie'+'Vanilla''Frappuccino' Support: 0.0266
Set #  16   'Coffee''Eclair'+'Apple''Pie'+'Hot''Coffee' Support: 0.0308
Set #  17   'Apple''Tart'+'Apple''Croissant'+'Apple''Danish' Support: 0.0298
Set #  18   'Raspberry''Cookie'+'Lemon''Cookie'+'Raspberry''Lemonade' Support: 0.0262
Set #  19   'Coffee''Eclair'+'Apple''Pie'+'Almond''Twist' Support: 0.0382
Set #  20   'Chocolate''Cake'+'Casino''Cake'+'Chocolate''Coffee' Support: 0.0312
Set #  21   'Apple''Tart'+'Apple''Danish'+'Cherry''Soda' Support: 0.0228
Set #  22   'Blueberry''Tart'+'Apricot''Croissant'+'Hot''Coffee' Support: 0.0328
Set #  23   'Lemon''Cookie'+'Lemon''Lemonade'+'Green''Tea' Support: 0.0214
Set #  24   'Lemon''Cookie'+'Raspberry''Lemonade'+'Green''Tea' Support: 0.0212
Set #  25   'Coffee''Eclair'+'Almond''Twist'+'Hot''Coffee' Support: 0.0308
Set #  26   'Raspberry''Cookie'+'Lemon''Cookie'+'Green''Tea' Support: 0.0214
Set #  27   'Apple''Pie'+'Almond''Twist'+'Hot''Coffee' Support: 0.0308
Set #  28   'Raspberry''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' Support: 0.0212
*****************************************
Rule: 0 Support/Confidence:  (0.023,0.9127) 'Cherry''Soda'+'Apple''Croissant' --> 'Apple''Tart'
Rule: 1 Support/Confidence:  (0.023,0.9055) 'Cherry''Soda'+'Apple''Tart' --> 'Apple''Croissant'
Rule: 2 Support/Confidence:  (0.0286,0.9108) 'Single''Espresso'+'Blackberry''Tart' --> 'Coffee''Eclair'
Rule: 3 Support/Confidence:  (0.0286,0.9662) 'Single''Espresso'+'Coffee''Eclair' --> 'Blackberry''Tart'
Rule: 4 Support/Confidence:  (0.023,0.92) 'Cherry''Soda'+'Apple''Danish' --> 'Apple''Croissant'
Rule: 5 Support/Confidence:  (0.023,0.9127) 'Cherry''Soda'+'Apple''Croissant' --> 'Apple''Danish'
Rule: 6 Support/Confidence:  (0.0264,0.9429) 'Lemon''Lemonade'+'Raspberry''Lemonade' -->
'Lemon''Cookie'
Rule: 7 Support/Confidence:  (0.0264,0.9231) 'Lemon''Cookie'+'Raspberry''Lemonade' -->
'Lemon''Lemonade'
Rule: 8 Support/Confidence:  (0.0264,0.9429) 'Lemon''Cookie'+'Lemon''Lemonade' -->
'Raspberry''Lemonade'
Rule: 9 Support/Confidence:  (0.0264,0.9429) 'Lemon''Cookie'+'Lemon''Lemonade' -->
'Raspberry''Cookie'
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Rule: 10 Support/Confidence: (0.0264,0.9496) 'Lemon''Lemonade'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 11 Support/Confidence: (0.0264,0.9296) 'Lemon''Cookie'+'Raspberry''Cookie' --> 'Lemon''Lemonade'
Rule: 12 Support/Confidence: (0.0266,0.9301) 'Chocolate''Tart'+'Walnut''Cookie' --> 'Vanilla''Frappuccino'
Rule: 13 Support/Confidence: (0.0308,0.9167) 'Apple''Pie'+'Hot''Coffee' --> 'Coffee''Eclair'
Rule: 14 Support/Confidence: (0.0308,0.9112) 'Hot''Coffee'+'Coffee''Eclair' --> 'Apple''Pie'
Rule: 15 Support/Confidence: (0.0298,0.903) 'Apple''Danish'+'Apple''Croissant' --> 'Apple''Tart'
Rule: 16 Support/Confidence: (0.0298,0.9198) 'Apple''Tart'+'Apple''Danish' --> 'Apple''Croissant'
Rule: 17 Support/Confidence: (0.0298,0.943) 'Apple''Tart'+'Apple''Croissant' --> 'Apple''Danish'
Rule: 18 Support/Confidence: (0.0262,0.9161) 'Lemon''Cookie'+'Raspberry''Lemonade' --> 'Raspberry''Cookie'
Rule: 19 Support/Confidence: (0.0262,0.9161) 'Raspberry''Lemonade'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 20 Support/Confidence: (0.0262,0.9225) 'Lemon''Cookie'+'Raspberry''Cookie' --> 'Raspberry''Lemonade'
Rule: 21 Support/Confidence: (0.0382,0.9695) 'Apple''Pie'+'Almond''Twist' --> 'Coffee''Eclair'
Rule: 22 Support/Confidence: (0.0382,0.9272) 'Almond''Twist'+'Coffee''Eclair' --> 'Apple''Pie'
Rule: 23 Support/Confidence: (0.0382,0.9409) 'Apple''Pie'+'Coffee''Eclair' --> 'Almond''Twist'
Rule: 24 Support/Confidence: (0.0312,0.9017) 'Casino''Cake'+'Chocolate''Coffee' --> 'Chocolate''Cake'
Rule: 25 Support/Confidence: (0.0312,0.9123) 'Chocolate''Cake'+'Casino''Cake' --> 'Chocolate''Coffee'
Rule: 26 Support/Confidence: (0.0228,0.912) 'Cherry''Soda'+'Apple''Danish' --> 'Apple''Tart'
Rule: 27 Support/Confidence: (0.0328,0.9425) 'Apricot''Croissant'+'Hot''Coffee' --> 'Blueberry''Tart'
Rule: 28 Support/Confidence: (0.0328,0.9371) 'Blueberry''Tart'+'Hot''Coffee' --> 'Apricot''Croissant'
Rule: 29 Support/Confidence: (0.0214,0.9304) 'Lemon''Lemonade'+'Green''Tea' --> 'Lemon''Cookie'
Rule: 30 Support/Confidence: (0.0308,0.9167) 'Almond''Twist'+'Hot''Coffee' --> 'Coffee''Eclair'
Rule: 31 Support/Confidence: (0.0308,0.9112) 'Hot''Coffee'+'Coffee''Eclair' --> 'Almond''Twist'
Rule: 32 Support/Confidence: (0.0214,0.9224) 'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 33 Support/Confidence: (0.0308,0.9167) 'Almond''Twist'+'Hot''Coffee' --> 'Apple''Pie'
Rule: 34 Support/Confidence: (0.0308,0.9167) 'Apple''Pie'+'Hot''Coffee' --> 'Almond''Twist'
Rule: 35 Support/Confidence: (0.0212,1.0) 'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 36 Support/Confidence: (0.0212,1.0) 'Raspberry''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Lemonade'
Rule: 37 Support/Confidence: (0.0212,1.0) 'Lemon''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Raspberry''Lemonade'

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Bakery 20000

```
Dmitriys-MacBook-Pro:csc466 Dima$ python3 lab1Run.py 20000-out1.csv .02 .9 goods.csv Bakery
Set #  1   'Strawberry''Cake'+'Napoleon''Cake' Support: 0.04455
Set #  2   'Opera''Cake'+'Apricot''Danish' Support: 0.04335
Set #  3   'Cherry''Tart'+'Apricot''Danish' Support: 0.05255
Set #  4   'Berry''Tart'+'Bottled''Water' Support: 0.0357
Set #  5   'Opera''Cake'+'Cherry''Tart' Support: 0.04365
Set #  6   'Lemon''Cake'+'Lemon''Tart' Support: 0.037
Set #  7   'Cheese''Croissant'+'Orange''Juice' Support: 0.0439
Set #  8   'Truffle''Cake'+'Gongolais''Cookie' Support: 0.04335
Set #  9   'Marzipan''Cookie'+'Tuile''Cookie' Support: 0.04855
Set #  10   'Apple''Tart'+'Apple''Croissant'+'Cherry''Soda' Support: 0.02115
Set #  11   'Coffee''Eclair'+'Blackberry''Tart'+'Single''Espresso' Support: 0.02695
Set #  12   'Apple''Croissant'+'Apple''Danish'+'Cherry''Soda' Support: 0.02125
Set #  13   'Lemon''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade' Support: 0.0256
Set #  14   'Raspberry''Cookie'+'Lemon''Cookie'+'Lemon''Lemonade' Support: 0.02555
Set #  15   'Chocolate''Tart'+'Walnut''Cookie'+'Vanilla''Frappuccino' Support: 0.02825
Set #  16   'Coffee''Eclair'+'Apple''Pie'+'Hot''Coffee' Support: 0.0282
Set #  17   'Apple''Tart'+'Apple''Croissant'+'Apple''Danish' Support: 0.026
Set #  18   'Raspberry''Cookie'+'Lemon''Cookie'+'Raspberry''Lemonade' Support: 0.0256
Set #  19   'Coffee''Eclair'+'Apple''Pie'+'Almond''Twist' Support: 0.03415
Set #  20   'Chocolate''Cake'+'Casino''Cake'+'Chocolate''Coffee' Support: 0.0339
Set #  21   'Apple''Tart'+'Apple''Danish'+'Cherry''Soda' Support: 0.0211
Set #  22   'Blueberry''Tart'+'Apricot''Croissant'+'Hot''Coffee' Support: 0.0326
Set #  23   'Lemon''Cookie'+'Lemon''Lemonade'+'Green''Tea' Support: 0.02055
Set #  24   'Lemon''Cookie'+'Raspberry''Lemonade'+'Green''Tea' Support: 0.02055
Set #  25   'Coffee''Eclair'+'Almond''Twist'+'Hot''Coffee' Support: 0.02815
Set #  26   'Raspberry''Cookie'+'Lemon''Cookie'+'Green''Tea' Support: 0.02055
Set #  27   'Apple''Pie'+'Almond''Twist'+'Hot''Coffee' Support: 0.02825
Set #  28   'Raspberry''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' Support:
0.02045
*******************************************
Rule: 0 Support/Confidence:  (0.0211,0.9176) 'Cherry''Soda'+'Apple''Tart' --> 'Apple''Croissant'
Rule: 1 Support/Confidence:  (0.027,0.9198) 'Single''Espresso'+'Coffee''Eclair' --> 'Blackberry''Tart'
Rule: 2 Support/Confidence:  (0.0213,0.9023) 'Cherry''Soda'+'Apple''Danish' --> 'Apple''Croissant'
Rule: 3 Support/Confidence:  (0.0256,0.9534) 'Lemon''Lemonade'+'Raspberry''Lemonade' -->
'Lemon''Cookie'
Rule: 4 Support/Confidence:  (0.0256,0.9014) 'Lemon''Cookie'+'Raspberry''Lemonade' -->
'Lemon''Lemonade'
Rule: 5 Support/Confidence:  (0.0256,0.9225) 'Lemon''Cookie'+'Lemon''Lemonade' -->
'Raspberry''Lemonade'
Rule: 6 Support/Confidence:  (0.0255,0.9207) 'Lemon''Cookie'+'Lemon''Lemonade' -->
'Raspberry''Cookie'
Rule: 7 Support/Confidence:  (0.0255,0.9141) 'Lemon''Lemonade'+'Raspberry''Cookie' -->
'Lemon''Cookie'
Rule: 8 Support/Confidence:  (0.0283,0.9128) 'Walnut''Cookie'+'Vanilla''Frappuccino' --> 'Chocolate''Tart'
```

Lab1 Report

Dmitriy Timokhin, Hanson Egbert,Charlie Lou

Rule: 9 Support/Confidence: (0.0283,0.9247) 'Chocolate''Tart'+'Walnut''Cookie' --> 'Vanilla''Frappuccino'
Rule: 10 Support/Confidence: (0.0282,0.9141) 'Apple''Pie'+'Hot''Coffee' --> 'Coffee''Eclair'
Rule: 11 Support/Confidence: (0.026,0.9091) 'Apple''Danish'+'Apple''Croissant' --> 'Apple''Tart'
Rule: 12 Support/Confidence: (0.026,0.9253) 'Apple''Tart'+'Apple''Danish' --> 'Apple''Croissant'
Rule: 13 Support/Confidence: (0.026,0.9043) 'Apple''Tart'+'Apple''Croissant' --> 'Apple''Danish'
Rule: 14 Support/Confidence: (0.0256,0.9014) 'Lemon''Cookie'+'Raspberry''Lemonade' --> 'Raspberry''Cookie'
Rule: 15 Support/Confidence: (0.0256,0.9225) 'Raspberry''Lemonade'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 16 Support/Confidence: (0.0341,0.9499) 'Apple''Pie'+'Almond''Twist' --> 'Coffee''Eclair'
Rule: 17 Support/Confidence: (0.0341,0.9421) 'Almond''Twist'+'Coffee''Eclair' --> 'Apple''Pie'
Rule: 18 Support/Confidence: (0.0341,0.9168) 'Apple''Pie'+'Coffee''Eclair' --> 'Almond''Twist'
Rule: 19 Support/Confidence: (0.0339,0.9496) 'Casino''Cake'+'Chocolate''Coffee' --> 'Chocolate''Cake'
Rule: 20 Support/Confidence: (0.0339,0.9456) 'Chocolate''Cake'+'Casino''Cake' --> 'Chocolate''Coffee'
Rule: 21 Support/Confidence: (0.0211,0.9154) 'Cherry''Soda'+'Apple''Tart' --> 'Apple''Danish'
Rule: 22 Support/Confidence: (0.0326,0.9288) 'Apricot''Croissant'+'Hot''Coffee' --> 'Blueberry''Tart'
Rule: 23 Support/Confidence: (0.0326,0.9132) 'Blueberry''Tart'+'Hot''Coffee' --> 'Apricot''Croissant'
Rule: 24 Support/Confidence: (0.0205,0.9195) 'Lemon''Lemonade'+'Green''Tea' --> 'Lemon''Cookie'
Rule: 25 Support/Confidence: (0.0205,0.9215) 'Lemon''Cookie'+'Green''Tea' --> 'Lemon''Lemonade'
Rule: 26 Support/Confidence: (0.0205,0.9195) 'Raspberry''Lemonade'+'Green''Tea' --> 'Lemon''Cookie'
Rule: 27 Support/Confidence: (0.0205,0.9215) 'Lemon''Cookie'+'Green''Tea' --> 'Raspberry''Lemonade'
Rule: 28 Support/Confidence: (0.0282,0.9125) 'Almond''Twist'+'Hot''Coffee' --> 'Coffee''Eclair'
Rule: 29 Support/Confidence: (0.0205,0.9215) 'Lemon''Cookie'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 30 Support/Confidence: (0.0205,0.9073) 'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 31 Support/Confidence: (0.0283,0.9157) 'Almond''Twist'+'Hot''Coffee' --> 'Apple''Pie'
Rule: 32 Support/Confidence: (0.0283,0.9157) 'Apple''Pie'+'Hot''Coffee' --> 'Almond''Twist'
Rule: 33 Support/Confidence: (0.0204,0.9951) 'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 34 Support/Confidence: (0.0204,0.9976) 'Raspberry''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Lemonade'
Rule: 35 Support/Confidence: (0.0204,0.9903) 'Lemon''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Raspberry''Lemonade'

Lab1 Report

Dmitriy Timokhin, Hanson Egbert,Charlie Lou

Bakery 75000

Dmitriys-MacBook-Pro:csc466 Dima$ python3 lab1Run.py 75000-out1.csv .02 .9 goods.csv Bakery
Set # 1 'Strawberry''Cake'+'Napoleon''Cake' Support: 0.043146666666666667
Set # 2 'Opera''Cake'+'Apricot''Danish' Support: 0.043026666666666664
Set # 3 'Cherry''Tart'+'Apricot''Danish' Support: 0.05309333333333333
Set # 4 'Berry''Tart'+'Bottled''Water' Support: 0.0378
Set # 5 'Opera''Cake'+'Cherry''Tart' Support: 0.04337333333333333
Set # 6 'Lemon''Cake'+'Lemon''Tart' Support: 0.036853333333333335
Set # 7 'Cheese''Croissant'+'Orange''Juice' Support: 0.04306666666666667
Set # 8 'Truffle''Cake'+'Gongolais''Cookie' Support: 0.04392
Set # 9 'Marzipan''Cookie'+'Tuile''Cookie' Support: 0.05092
Set # 10 'Apple''Tart'+'Apple''Croissant'+'Cherry''Soda' Support: 0.020773333333333335
Set # 11 'Coffee''Eclair'+'Blackberry''Tart'+'Single''Espresso' Support: 0.0272
Set # 12 'Apple''Croissant'+'Apple''Danish'+'Cherry''Soda' Support: 0.0208
Set # 13 'Lemon''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade' Support: 0.025626666666666666
Set # 14 'Raspberry''Cookie'+'Lemon''Cookie'+'Lemon''Lemonade' Support: 0.02576
Set # 15 'Chocolate''Tart'+'Walnut''Cookie'+'Vanilla''Frappuccino' Support: 0.02676
Set # 16 'Coffee''Eclair'+'Apple''Pie'+'Hot''Coffee' Support: 0.028093333333333335
Set # 17 'Apple''Tart'+'Apple''Croissant'+'Apple''Danish' Support: 0.025506666666666667
Set # 18 'Raspberry''Cookie'+'Lemon''Cookie'+'Raspberry''Lemonade' Support: 0.02568
Set # 19 'Coffee''Eclair'+'Apple''Pie'+'Almond''Twist' Support: 0.03432
Set # 20 'Chocolate''Cake'+'Casino''Cake'+'Chocolate''Coffee' Support: 0.03338666666666667
Set # 21 'Apple''Tart'+'Apple''Danish'+'Cherry''Soda' Support: 0.020733333333333333
Set # 22 'Blueberry''Tart'+'Apricot''Croissant'+'Hot''Coffee' Support: 0.032826666666666664
Set # 23 'Lemon''Cookie'+'Lemon''Lemonade'+'Green''Tea' Support: 0.020853333333333335
Set # 24 'Lemon''Cookie'+'Raspberry''Lemonade'+'Green''Tea' Support: 0.020933333333333335
Set # 25 'Coffee''Eclair'+'Almond''Twist'+'Hot''Coffee' Support: 0.02812
Set # 26 'Raspberry''Cookie'+'Lemon''Cookie'+'Green''Tea' Support: 0.020773333333333335
Set # 27 'Apple''Pie'+'Almond''Twist'+'Hot''Coffee' Support: 0.028053333333333333
Set # 28 'Raspberry''Cookie'+'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' Support: 0.020746666666666667
****

Rule: 0 Support/Confidence: (0.0208,0.9074) 'Cherry''Soda'+'Apple''Croissant' --> 'Apple''Tart'
Rule: 1 Support/Confidence: (0.0208,0.9116) 'Cherry''Soda'+'Apple''Tart' --> 'Apple''Croissant'
Rule: 2 Support/Confidence: (0.0272,0.9231) 'Single''Espresso'+'Blackberry''Tart' --> 'Coffee''Eclair'
Rule: 3 Support/Confidence: (0.0272,0.9222) 'Single''Espresso'+'Coffee''Eclair' --> 'Blackberry''Tart'
Rule: 4 Support/Confidence: (0.0208,0.9086) 'Cherry''Soda'+'Apple''Croissant' --> 'Apple''Danish'
Rule: 5 Support/Confidence: (0.0256,0.9205) 'Lemon''Lemonade'+'Raspberry''Lemonade' --> 'Lemon''Cookie'
Rule: 6 Support/Confidence: (0.0256,0.9209) 'Lemon''Cookie'+'Raspberry''Lemonade' --> 'Lemon''Lemonade'
Rule: 7 Support/Confidence: (0.0256,0.9214) 'Lemon''Cookie'+'Lemon''Lemonade' --> 'Raspberry''Lemonade'
Rule: 8 Support/Confidence: (0.0258,0.9262) 'Lemon''Cookie'+'Lemon''Lemonade' --> 'Raspberry''Cookie'

Lab1 Report

Dmitriy Timokhin, Hanson Egbert,Charlie Lou

Rule: 9 Support/Confidence: (0.0258,0.9196) 'Lemon''Lemonade'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 10 Support/Confidence: (0.0258,0.9257) 'Lemon''Cookie'+'Raspberry''Cookie' --> 'Lemon''Lemonade'
Rule: 11 Support/Confidence: (0.0268,0.9396) 'Walnut''Cookie'+'Vanilla''Frappuccino' --> 'Chocolate''Tart'
Rule: 12 Support/Confidence: (0.0268,0.937) 'Chocolate''Tart'+'Walnut''Cookie' --> 'Vanilla''Frappuccino'
Rule: 13 Support/Confidence: (0.0281,0.9055) 'Apple''Pie'+'Hot''Coffee' --> 'Coffee''Eclair'
Rule: 14 Support/Confidence: (0.0255,0.9144) 'Apple''Danish'+'Apple''Croissant' --> 'Apple''Tart'
Rule: 15 Support/Confidence: (0.0255,0.9157) 'Apple''Tart'+'Apple''Danish' --> 'Apple''Croissant'
Rule: 16 Support/Confidence: (0.0255,0.9162) 'Apple''Tart'+'Apple''Croissant' --> 'Apple''Danish'
Rule: 17 Support/Confidence: (0.0257,0.9229) 'Lemon''Cookie'+'Raspberry''Lemonade' --> 'Raspberry''Cookie'
Rule: 18 Support/Confidence: (0.0257,0.9264) 'Raspberry''Lemonade'+'Raspberry''Cookie' --> 'Lemon''Cookie'
Rule: 19 Support/Confidence: (0.0257,0.9229) 'Lemon''Cookie'+'Raspberry''Cookie' --> 'Raspberry''Lemonade'
Rule: 20 Support/Confidence: (0.0343,0.9357) 'Apple''Pie'+'Almond''Twist' --> 'Coffee''Eclair'
Rule: 21 Support/Confidence: (0.0343,0.9246) 'Almond''Twist'+'Coffee''Eclair' --> 'Apple''Pie'
Rule: 22 Support/Confidence: (0.0343,0.9209) 'Apple''Pie'+'Coffee''Eclair' --> 'Almond''Twist'
Rule: 23 Support/Confidence: (0.0334,0.9474) 'Casino''Cake'+'Chocolate''Coffee' --> 'Chocolate''Cake'
Rule: 24 Support/Confidence: (0.0334,0.9396) 'Chocolate''Cake'+'Casino''Cake' --> 'Chocolate''Coffee'
Rule: 25 Support/Confidence: (0.0207,0.9099) 'Cherry''Soda'+'Apple''Tart' --> 'Apple''Danish'
Rule: 26 Support/Confidence: (0.0328,0.928) 'Apricot''Croissant'+'Hot''Coffee' --> 'Blueberry''Tart'
Rule: 27 Support/Confidence: (0.0328,0.9368) 'Blueberry''Tart'+'Hot''Coffee' --> 'Apricot''Croissant'
Rule: 28 Support/Confidence: (0.0209,0.9056) 'Lemon''Lemonade'+'Green''Tea' --> 'Lemon''Cookie'
Rule: 29 Support/Confidence: (0.0209,0.9035) 'Lemon''Cookie'+'Green''Tea' --> 'Lemon''Lemonade'
Rule: 30 Support/Confidence: (0.0209,0.9133) 'Raspberry''Lemonade'+'Green''Tea' --> 'Lemon''Cookie'
Rule: 31 Support/Confidence: (0.0209,0.907) 'Lemon''Cookie'+'Green''Tea' --> 'Raspberry''Lemonade'
Rule: 32 Support/Confidence: (0.0281,0.9094) 'Almond''Twist'+'Hot''Coffee' --> 'Coffee''Eclair'
Rule: 33 Support/Confidence: (0.0208,0.9001) 'Lemon''Cookie'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 34 Support/Confidence: (0.0281,0.9073) 'Almond''Twist'+'Hot''Coffee' --> 'Apple''Pie'
Rule: 35 Support/Confidence: (0.0281,0.9042) 'Apple''Pie'+'Hot''Coffee' --> 'Almond''Twist'
Rule: 36 Support/Confidence: (0.0207,0.9974) 'Lemon''Lemonade'+'Raspberry''Lemonade'+'Green''Tea' --> 'Raspberry''Cookie'
Rule: 37 Support/Confidence: (0.0207,0.9949) 'Raspberry''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Lemon''Lemonade'
Rule: 38 Support/Confidence: (0.0207,0.9942) 'Lemon''Lemonade'+'Green''Tea'+'Raspberry''Cookie' --> 'Raspberry''Lemonade'

Lab1 Report

Dmitriy Timokhin, Hanson Egbert,Charlie Lou

Bingo

```
Dmitriys-MacBook-Pro:csc466 Dima$ python3 lab1Run.py bingoBaskets.csv .1 .9 authors.psv Bingo
Set #  1   Anders, Charlie Jane Support: 0.115
Set #  2   Hawkins, Scott Support: 0.14
Set #  3   North, Claire / Webb, Catherine / Griffin, Kate Support: 0.148
Set #  4   Willis, Connie Support: 0.144
Set #  5   Jones, Diana Wynne Support: 0.115
Set #  6   McGuire, Seanan / Grant, Mira Support: 0.14
Set #  7   Brown, Pierce Support: 0.103
Set #  8   Kay, Guy Gavriel Support: 0.136
Set #  9   Schafer, Courtney Support: 0.16
Set #  10   Aaronovitch, Ben Support: 0.107
Set #  11   Walton, Jo Support: 0.128
Set #  12   Wecker, Helene Support: 0.123
Set #  13   Bardugo, Leigh Support: 0.103
Set #  14   Gladstone, Max Support: 0.181
Set #  15   Smith, Sherwood Support: 0.119
Set #  16   Schwab, V. E. / Schwab, Victoria Support: 0.14
Set #  17   Bennett, Robert Jackson Support: 0.128
Set #  18   Zelazny, Roger Support: 0.136
Set #  19   Drake, Darrell Support: 0.119
Set #  20   Beaulieu, Bradley P. Support: 0.107
Set #  21   Liu, Ken Support: 0.103
Set #  22   Ball, Krista D. / Ball, K. Support: 0.202
Set #  23   Herbert, Frank Support: 0.128
Set #  24   Stiefvater, Maggie Support: 0.103
Set #  25   Aaron, Rachel / Bach, Rachel Support: 0.235
Set #  26   Hurley, Kameron Support: 0.136
Set #  27   Vaughan, Brian K. Support: 0.123
Set #  28   Wurts, Janny Support: 0.136
Set #  29   Kowal, Mary Robinette Support: 0.111
Set #  30   Bear, Elizabeth Support: 0.119
Set #  31   Bancroft, Josiah &&  Sanderson, Brandon Support: 0.206
Set #  32   Bancroft, Josiah &&  Chambers, Becky Support: 0.107
Set #  33   Bancroft, Josiah &&  Eames, Nicholas Support: 0.14
Set #  34   Bancroft, Josiah &&  Mieville, China Support: 0.119
Set #  35   Addison, Katherine / Monette, Sarah &&  Lawrence, Mark Support: 0.107
Set #  36   Bancroft, Josiah &&  Jemisin, N. K. Support: 0.144
Set #  37   Pratchett, Terry &&  Sanderson, Brandon Support: 0.14
Set #  38   Lawrence, Mark &&  Rowe, Andrew Support: 0.115
Set #  39   Gaiman, Neil &&  Pratchett, Terry Support: 0.119
Set #  40   King, Stephen &&  Sanderson, Brandon Support: 0.103
Set #  41   Lawrence, Mark &&  Sanderson, Brandon Support: 0.16
Set #  42   Novik, Naomi &&  Sanderson, Brandon Support: 0.148
Set #  43   Hobb, Robin / Lindholm, Megan &&  Sanderson, Brandon Support: 0.128
```

Lab1 Report

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Set # 44 Sanderson, Brandon && Sullivan, Michael J. Support: 0.132
Set # 45 Rowe, Andrew && Sanderson, Brandon Support: 0.14
Set # 46 Bancroft, Josiah && Brennan, Marie Support: 0.115
Set # 47 Addison, Katherine / Monette, Sarah && Bancroft, Josiah Support: 0.14
Set # 48 Gaiman, Neil && Sanderson, Brandon Support: 0.152
Set # 49 Sanderson, Brandon && VanderMeer, Jeff Support: 0.111
Set # 50 Lawrence, Mark && Pratchett, Terry Support: 0.107
Set # 51 Mieville, China && Sanderson, Brandon Support: 0.111
Set # 52 Eames, Nicholas && Sanderson, Brandon Support: 0.128
Set # 53 Jemisin, N. K. && Sanderson, Brandon Support: 0.169
Set # 54 Abercrombie, Joe && Bancroft, Josiah Support: 0.107
Set # 55 Bancroft, Josiah && Lynch, Scott Support: 0.107
Set # 56 Jemisin, N. K. && Valente, Catherynne M. Support: 0.115
Set # 57 Bancroft, Josiah && VanderMeer, Jeff Support: 0.111
Set # 58 Bancroft, Josiah && Gaiman, Neil Support: 0.132
Set # 59 Bancroft, Josiah && Rowe, Andrew Support: 0.115
Set # 60 Gaiman, Neil && Lawrence, Mark Support: 0.119
Set # 61 Bancroft, Josiah && Sullivan, Michael J. Support: 0.136
Set # 62 Abercrombie, Joe && Sanderson, Brandon Support: 0.111
Set # 63 Bancroft, Josiah && Lawrence, Mark Support: 0.173
Set # 64 Hobb, Robin / Lindholm, Megan && Jemisin, N. K. Support: 0.123
Set # 65 Butcher, Jim && Sanderson, Brandon Support: 0.107
Set # 66 Addison, Katherine / Monette, Sarah && Sanderson, Brandon Support: 0.144
Set # 67 Eames, Nicholas && Lawrence, Mark Support: 0.115
Set # 68 Jemisin, N. K. && Novik, Naomi Support: 0.119
Set # 69 Bancroft, Josiah && Hobb, Robin / Lindholm, Megan Support: 0.132
Set # 70 Bancroft, Josiah && Novik, Naomi Support: 0.144
Set # 71 Lawrence, Mark && VanderMeer, Jeff Support: 0.115
Set # 72 Brennan, Marie && Jemisin, N. K. Support: 0.136
Set # 73 Arden, Katherine && Jemisin, N. K. Support: 0.115
Set # 74 Hobb, Robin / Lindholm, Megan && Lawrence, Mark Support: 0.107
Set # 75 McClellan, Brian && Sanderson, Brandon Support: 0.111
Set # 76 Bancroft, Josiah && Pratchett, Terry Support: 0.165
Set # 77 Jemisin, N. K. && Le Guin, Ursula K. Support: 0.107

Lab1 Report

Dmitriy Timokhin, Hanson Egbert,Charlie Lou

Transcription

```
Dmitriys-MacBook-Pro:csc466 Dima$ python3 lab1Run.py factor_baskets_sparse.csv .7 .8 factors.csv
Transcription
Set #  1  ['NF-Y', 'CBF_(2)']  Support:  0.717391304347826
Set #  2  ['IUF-1', 'RAR-beta']  Support:  0.717391304347826
Set #  3  ['NP-TCII', 'GATA-1A']  Support:  0.717391304347826
Set #  4  ['MZF-1', 'AP-2']  Support:  0.717391304347826
Set #  5  ['RAR-beta', 'AP-2']  Support:  0.717391304347826
Set #  6  ['TEF1/GT-IIC', 'GATA-1A']  Support:  0.7608695652173914
Set #  7  ['Tal-1', 'FOXD3']  Support:  0.717391304347826
Set #  8  ['Tal-1', 'GATA-1A']  Support:  0.717391304347826
Set #  9  ['IUF-1', 'AP-2alpha', 'AP-2alphaA']  Support:  0.7391304347826086
Set #  10  ['AP-2alphaA', 'AP-2alphaB', 'AP-2beta']  Support:  0.8260869565217391
Set #  11  ['IUF-1', 'AP-2beta', 'AP-2']  Support:  0.7391304347826086
Set #  12  ['Tal-1', 'AP-2alphaB', 'AP-2beta']  Support:  0.717391304347826
Set #  13  ['TEF2', 'AP-2alphaB', 'AP-2']  Support:  0.717391304347826
Set #  14  ['AP-2alpha', 'AP-2alphaA', 'AP-2gamma']  Support:  0.8260869565217391
Set #  15  ['IUF-1', 'AP-2alphaA', 'AP-2beta']  Support:  0.7391304347826086
Set #  16  ['IUF-1', 'AP-2alpha', 'AP-2alphaB']  Support:  0.7391304347826086
Set #  17  ['AP-2alphaA', 'AP-2alphaB', 'AP-2']  Support:  0.8260869565217391
Set #  18  ['IUF-1', 'AP-2alphaA', 'AP-2gamma']  Support:  0.7391304347826086
Set #  19  ['AP-2alpha', 'AP-2alphaA', 'AP-2beta']  Support:  0.8260869565217391
Set #  20  ['TEF2', 'AP-2alphaA', 'AP-2']  Support:  0.717391304347826
Set #  21  ['Tal-1', 'AP-2alpha', 'AP-2gamma']  Support:  0.717391304347826
Set #  22  ['IUF-1', 'AP-2alpha', 'AP-2gamma']  Support:  0.7391304347826086
Set #  23  ['IUF-1', 'AP-2alphaA', 'AP-2alphaB']  Support:  0.7391304347826086
Set #  24  ['AP-2alpha', 'AP-2alphaA', 'AP-2']  Support:  0.8260869565217391
Set #  25  ['Tal-1', 'AP-2alpha', 'AP-2alphaB']  Support:  0.717391304347826
Set #  26  ['TEF2', 'AP-2alphaB', 'AP-2gamma']  Support:  0.717391304347826
Set #  27  ['TEF2', 'AP-2alphaA', 'AP-2beta']  Support:  0.717391304347826
Set #  28  ['IUF-1', 'AP-2alpha', 'AP-2beta']  Support:  0.7391304347826086
Set #  29  ['Tal-1', 'AP-2alpha', 'AP-2']  Support:  0.717391304347826
Set #  30  ['IUF-1', 'AP-2gamma', 'AP-2']  Support:  0.7391304347826086
Set #  31  ['TEF2', 'AP-2alphaA', 'AP-2gamma']  Support:  0.717391304347826
Set #  32  ['IUF-1', 'AP-2alpha', 'AP-2']  Support:  0.7391304347826086
Set #  33  ['TEF2', 'AP-2alphaA', 'AP-2alphaB']  Support:  0.717391304347826
Set #  34  ['Tal-1', 'AP-2alpha', 'AP-2beta']  Support:  0.717391304347826
Set #  35  ['IUF-1', 'AP-2gamma', 'AP-2beta']  Support:  0.7391304347826086
Set #  36  ['IUF-1', 'AP-2alphaB', 'AP-2beta']  Support:  0.7391304347826086
Set #  37  ['Tal-1', 'AP-2alphaA', 'AP-2beta']  Support:  0.717391304347826
Set #  38  ['Tal-1', 'AP-2alphaA', 'AP-2']  Support:  0.717391304347826
Set #  39  ['IUF-1', 'AP-2alphaB', 'AP-2']  Support:  0.7391304347826086
Set #  40  ['Tal-1', 'AP-2alpha', 'AP-2alphaA']  Support:  0.717391304347826
Set #  41  ['AP-2alphaA', 'AP-2gamma', 'AP-2']  Support:  0.8260869565217391
```

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Set # 42 ['AP-2alpha', 'AP-2alphaB', 'AP-2gamma'] Support: 0.8260869565217391
Set # 43 ['Tal-1', 'AP-2alphaA', 'AP-2alphaB'] Support: 0.717391304347826
Set # 44 ['AP-2alphaA', 'AP-2beta', 'AP-2'] Support: 0.8260869565217391
Set # 45 ['AP-2alphaA', 'AP-2gamma', 'AP-2beta'] Support: 0.8260869565217391
Set # 46 ['Tal-1', 'AP-2alphaA', 'AP-2gamma'] Support: 0.717391304347826
Set # 47 ['IUF-1', 'AP-2alphaB', 'AP-2gamma'] Support: 0.7391304347826086
Set # 48 ['AP-2alpha', 'AP-2alphaB', 'AP-2'] Support: 0.8260869565217391
Set # 49 ['AP-2alpha', 'AP-2beta', 'AP-2'] Support: 0.8260869565217391
Set # 50 ['AP-2alpha', 'AP-2alphaB', 'AP-2beta'] Support: 0.8260869565217391
Set # 51 ['TEF2', 'AP-2alphaB', 'AP-2beta'] Support: 0.717391304347826
Set # 52 ['TEF2', 'AP-2beta', 'AP-2'] Support: 0.717391304347826
Set # 53 ['TEF2', 'AP-2alpha', 'AP-2alphaA'] Support: 0.717391304347826
Set # 54 ['TEF2', 'AP-2alpha', 'AP-2alphaB'] Support: 0.717391304347826
Set # 55 ['AP-2alpha', 'AP-2gamma', 'AP-2beta'] Support: 0.8260869565217391
Set # 56 ['AP-2alpha', 'AP-2alphaA', 'AP-2alphaB'] Support: 0.8260869565217391
Set # 57 ['AP-2alpha', 'AP-2gamma', 'AP-2'] Support: 0.8260869565217391
Set # 58 ['TEF2', 'AP-2alpha', 'AP-2gamma'] Support: 0.717391304347826
Set # 59 ['TEF2', 'AP-2alpha', 'AP-2beta'] Support: 0.717391304347826
Set # 60 ['TEF2', 'AP-2gamma', 'AP-2'] Support: 0.717391304347826
Set # 61 ['IUF-1', 'AP-2alphaA', 'AP-2'] Support: 0.7391304347826086
Set # 62 ['TEF2', 'AP-2alpha', 'AP-2'] Support: 0.717391304347826
Set # 63 ['TEF2', 'AP-2gamma', 'AP-2beta'] Support: 0.717391304347826
Set # 64 ['AP-2alphaA', 'AP-2alphaB', 'AP-2gamma'] Support: 0.8260869565217391
Set # 65 ['Tal-1', 'AP-2alphaB', 'AP-2'] Support: 0.717391304347826
Set # 66 ['AP-2alphaB', 'AP-2gamma', 'AP-2beta', 'AP-2'] Support: 0.8260869565217391
Set # 67 ['Tal-1', 'AP-2gamma', 'AP-2beta', 'AP-2'] Support: 0.717391304347826
****

Transcription factors occuring in almost every market basket >= 40/47
->These transcription factors were removed from the market baskets<-
---
HighSet # 1) Factor -> GATA-1 Support: 0.9782608695652174
HighSet # 2) Factor -> Elk-1 Support: 1.0
HighSet # 3) Factor -> NFAT-1 Support: 1.0
HighSet # 4) Factor -> E12 Support: 1.0
HighSet # 5) Factor -> RFX2 Support: 0.8695652173913043
HighSet # 6) Factor -> c-Fos Support: 1.0
HighSet # 7) Factor -> c-Jun Support: 1.0
HighSet # 8) Factor -> AP-1 Support: 1.0
HighSet # 9) Factor -> TFIID Support: 1.0
HighSet # 10) Factor -> Sp1 Support: 1.0
HighSet # 11) Factor -> AP-3 Support: 1.0
HighSet # 12) Factor -> LBP-1 Support: 1.0
HighSet # 13) Factor -> USF Support: 1.0
HighSet # 14) Factor -> GR/PR Support: 1.0
HighSet # 15) Factor -> c-Rel Support: 0.9347826086956522
HighSet # 16) Factor -> HSF2 Support: 0.9782608695652174

HighSet # 17) Factor -> HSF1_(long) Support: 0.9782608695652174
HighSet # 18) Factor -> HSF1 Support: 1.0
HighSet # 19) Factor -> TCF-1 Support: 1.0
HighSet # 20) Factor -> CP2 Support: 1.0
HighSet # 21) Factor -> MyoD Support: 1.0
HighSet # 22) Factor -> R1 Support: 0.8913043478260869
HighSet # 23) Factor -> AML1a Support: 1.0
HighSet # 24) Factor -> GHF-1 Support: 1.0
HighSet # 25) Factor -> T3R-alpha Support: 1.0
HighSet # 26) Factor -> DEF Support: 1.0
HighSet # 27) Factor -> NF1 Support: 1.0
HighSet # 28) Factor -> ARP-1 Support: 0.8913043478260869
HighSet # 29) Factor -> p300 Support: 0.9347826086956522
HighSet # 30) Factor -> NF-IL6 Support: 1.0
HighSet # 31) Factor -> USF-1 Support: 1.0
HighSet # 32) Factor -> USF1 Support: 1.0
HighSet # 33) Factor -> GCF Support: 0.8695652173913043
HighSet # 34) Factor -> NF-X3 Support: 0.9347826086956522
HighSet # 35) Factor -> PEA3 Support: 0.9782608695652174
HighSet # 36) Factor -> RXR-alpha Support: 0.9565217391304348
HighSet # 37) Factor -> R2 Support: 1.0
HighSet # 38) Factor -> CP1 Support: 0.9565217391304348
HighSet # 39) Factor -> CBP/CRF Support: 0.9130434782608695
HighSet # 40) Factor -> PSE1 Support: 0.9130434782608695
HighSet # 41) Factor -> Net Support: 0.9130434782608695
HighSet # 42) Factor -> HSF-2 Support: 0.9347826086956522
HighSet # 43) Factor -> H4TF2 Support: 0.9565217391304348
HighSet # 44) Factor -> AP-4 Support: 0.9347826086956522
HighSet # 45) Factor -> ENKTF1 Support: 1.0
HighSet # 46) Factor -> GATA-2 Support: 1.0
HighSet # 47) Factor -> TTF-1 Support: 0.9782608695652174
HighSet # 48) Factor -> AREB6 Support: 1.0
HighSet # 49) Factor -> C/EBP Support: 1.0
HighSet # 50) Factor -> NF-S Support: 0.9565217391304348
HighSet # 51) Factor -> YY1 Support: 1.0
HighSet # 52) Factor -> Elf-1/NTF-1 Support: 0.8913043478260869
HighSet # 53) Factor -> c-Myb Support: 1.0
HighSet # 54) Factor -> MBF-1 Support: 0.9565217391304348
HighSet # 55) Factor -> LyF-1 Support: 0.9782608695652174
HighSet # 56) Factor -> RAR-gamma Support: 0.9782608695652174
HighSet # 57) Factor -> NF-ATx Support: 0.9565217391304348
HighSet # 58) Factor -> NF-ATc Support: 0.9565217391304348
HighSet # 59) Factor -> NF-ATc3 Support: 0.9565217391304348
HighSet # 60) Factor -> NF-ATp Support: 0.9565217391304348
HighSet # 61) Factor -> NF-AT3 Support: 0.9565217391304348
HighSet # 62) Factor -> NF-AT Support: 0.9565217391304348
HighSet # 63) Factor -> PR Support: 1.0
HighSet # 64) Factor -> GATA-3 Support: 1.0

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HighSet # 65) Factor -> HOXA5 Support: 1.0
HighSet # 66) Factor -> p53 Support: 1.0
HighSet # 67) Factor -> Oct-1 Support: 0.9130434782608695
HighSet # 68) Factor -> TFII-I Support: 1.0
HighSet # 69) Factor -> CUTL1 Support: 0.9347826086956522
HighSet # 70) Factor -> TBP Support: 0.9347826086956522
HighSet # 71) Factor -> PU.1 Support: 1.0
HighSet # 72) Factor -> X2BP Support: 0.9565217391304348
HighSet # 73) Factor -> XBP-1 Support: 0.8913043478260869
HighSet # 74) Factor -> COUP Support: 0.8913043478260869
HighSet # 75) Factor -> ER Support: 0.9347826086956522
HighSet # 76) Factor -> SRY Support: 1.0
HighSet # 77) Factor -> T3R-beta Support: 0.9565217391304348
HighSet # 78) Factor -> RAR-alpha1 Support: 0.9130434782608695
HighSet # 79) Factor -> HOXD10 Support: 0.8913043478260869
HighSet # 80) Factor -> Ga Support: 0.8913043478260869
HighSet # 81) Factor -> Lmo2 Support: 0.8695652173913043
HighSet # 82) Factor -> GT-IIA Support: 0.9565217391304348
HighSet # 83) Factor -> NHP-1 Support: 0.8913043478260869
HighSet # 84) Factor -> Elf-1 Support: 0.9130434782608695
HighSet # 85) Factor -> GR Support: 0.8695652173913043