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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.

**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

1. 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?

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! ☺

**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

1. 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

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.

**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

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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'

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'

**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

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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'

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'

**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

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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'

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'

**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'

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'

**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

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

**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

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

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Transcription factors occuring in almost every market basket >= 40/47

->These transcription factors were removed from the market baskets<-

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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

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