**Books Dataset:**

**Prepare rules for the all the data sets**

**1) Try different values of support and confidence. Observe the change in number of rules for different support,confidence values**

**2) Change the minimum length in apriori algorithm**

**3) Visulize the obtained rules using different plots**

Ans:

library(arules)

library(arulesViz)

library(GGally)

library(corrplot)

library(psych)

book <- read.csv(file.choose())

> View(book)

> summary(book)

ChildBks YouthBks CookBks DoItYBks

Min. :0.000 Min. :0.0000 Min. :0.000 Min. :0.000

1st Qu.:0.000 1st Qu.:0.0000 1st Qu.:0.000 1st Qu.:0.000

Median :0.000 Median :0.0000 Median :0.000 Median :0.000

Mean :0.423 Mean :0.2475 Mean :0.431 Mean :0.282

3rd Qu.:1.000 3rd Qu.:0.0000 3rd Qu.:1.000 3rd Qu.:1.000

Max. :1.000 Max. :1.0000 Max. :1.000 Max. :1.000

RefBks ArtBks GeogBks ItalCook

Min. :0.0000 Min. :0.000 Min. :0.000 Min. :0.0000

1st Qu.:0.0000 1st Qu.:0.000 1st Qu.:0.000 1st Qu.:0.0000

Median :0.0000 Median :0.000 Median :0.000 Median :0.0000

Mean :0.2145 Mean :0.241 Mean :0.276 Mean :0.1135

3rd Qu.:0.0000 3rd Qu.:0.000 3rd Qu.:1.000 3rd Qu.:0.0000

Max. :1.0000 Max. :1.000 Max. :1.000 Max. :1.0000

ItalAtlas ItalArt Florence

Min. :0.000 Min. :0.0000 Min. :0.0000

1st Qu.:0.000 1st Qu.:0.0000 1st Qu.:0.0000

Median :0.000 Median :0.0000 Median :0.0000

Mean :0.037 Mean :0.0485 Mean :0.1085

3rd Qu.:0.000 3rd Qu.:0.0000 3rd Qu.:0.0000

Max. :1.000 Max. :1.0000 Max. :1.0000

> describe(book)

vars n mean sd median trimmed mad min max range skew

ChildBks 1 2000 0.42 0.49 0 0.40 0 0 1 1 0.31

YouthBks 2 2000 0.25 0.43 0 0.18 0 0 1 1 1.17

CookBks 3 2000 0.43 0.50 0 0.41 0 0 1 1 0.28

DoItYBks 4 2000 0.28 0.45 0 0.23 0 0 1 1 0.97

RefBks 5 2000 0.21 0.41 0 0.14 0 0 1 1 1.39

ArtBks 6 2000 0.24 0.43 0 0.18 0 0 1 1 1.21

GeogBks 7 2000 0.28 0.45 0 0.22 0 0 1 1 1.00

ItalCook 8 2000 0.11 0.32 0 0.02 0 0 1 1 2.44

ItalAtlas 9 2000 0.04 0.19 0 0.00 0 0 1 1 4.90

ItalArt 10 2000 0.05 0.21 0 0.00 0 0 1 1 4.20

Florence 11 2000 0.11 0.31 0 0.01 0 0 1 1 2.52

kurtosis se

ChildBks -1.90 0.01

YouthBks -0.63 0.01

CookBks -1.92 0.01

DoItYBks -1.06 0.01

RefBks -0.07 0.01

ArtBks -0.54 0.01

GeogBks -1.00 0.01

ItalCook 3.93 0.01

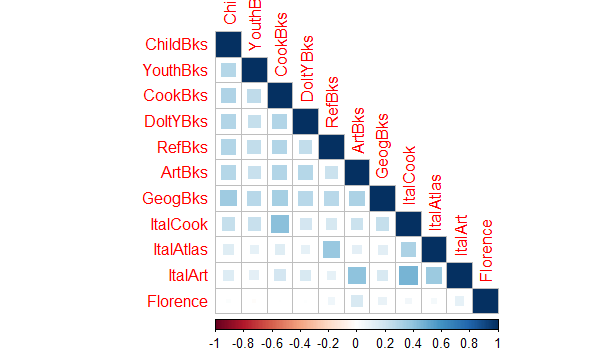
ItalAtlas 22.04 0.00

ItalArt 15.65 0.00

Florence 4.33 0.01

> ggpairs(book)

> corrplot(cor(book),method = "square",type = "lower")



sum(is.na(book))

[1] 0

> # applying apriorim algorithm

> # apriori algorithm with support =0.02 , confi =0.5 & minlen = 3

> rules\_book <- apriori(as.matrix(book),parameter = list(support =0.02,confidence=0.5,minlen=3))

Apriori

Parameter specification:

confidence minval smax arem aval originalSupport maxtime support minlen maxlen

0.5 0.1 1 none FALSE TRUE 5 0.02 3 10

target ext

rules TRUE

Algorithmic control:

filter tree heap memopt load sort verbose

0.1 TRUE TRUE FALSE TRUE 2 TRUE

Absolute minimum support count: 40

set item appearances ...[0 item(s)] done [0.00s].

set transactions ...[11 item(s), 2000 transaction(s)] done [0.00s].

sorting and recoding items ... [11 item(s)] done [0.00s].

creating transaction tree ... done [0.00s].

checking subsets of size 1 2 3 4 5 6 done [0.00s].

writing ... [641 rule(s)] done [0.00s].

creating S4 object ... done [0.00s].

> rules\_book

set of 641 rules

> (head(sort(rules\_book,by="lift")))

set of 6 rules

> inspect(head(sort(rules\_book,by="confidence")))

lhs rhs support confidence coverage lift count

[1] {ItalCook,ItalAtlas} => {RefBks} 0.0230 1 0.0230 4.662005 46

[2] {ItalCook,ItalAtlas} => {CookBks} 0.0230 1 0.0230 2.320186 46

[3] {GeogBks,ItalAtlas} => {RefBks} 0.0205 1 0.0205 4.662005 41

[4] {ChildBks,ItalAtlas} => {RefBks} 0.0285 1 0.0285 4.662005 57

[5] {CookBks,ItalAtlas} => {RefBks} 0.0285 1 0.0285 4.662005 57

[6] {ItalCook,ItalArt} => {ArtBks} 0.0375 1 0.0375 4.149378 75

> inspect(head(sort(rules\_book,by="support")))

lhs rhs support confidence coverage lift count

[1] {ChildBks,GeogBks} => {CookBks} 0.1495 0.7666667 0.1950 1.778809 299

[2] {CookBks,GeogBks} => {ChildBks} 0.1495 0.7766234 0.1925 1.835989 299

[3] {ChildBks,CookBks} => {GeogBks} 0.1495 0.5839844 0.2560 2.115885 299

[4] {ChildBks,DoItYBks} => {CookBks} 0.1460 0.7934783 0.1840 1.841017 292

[5] {CookBks,DoItYBks} => {ChildBks} 0.1460 0.7786667 0.1875 1.840820 292

[6] {ChildBks,CookBks} => {DoItYBks} 0.1460 0.5703125 0.2560 2.022385 292

> inspect(head(sort(rules\_book,by=c("count","lift")))) #maximum count = 299

lhs rhs support confidence coverage lift count

[1] {ChildBks,CookBks} => {GeogBks} 0.1495 0.5839844 0.2560 2.115885 299

[2] {CookBks,GeogBks} => {ChildBks} 0.1495 0.7766234 0.1925 1.835989 299

[3] {ChildBks,GeogBks} => {CookBks} 0.1495 0.7666667 0.1950 1.778809 299

[4] {ChildBks,CookBks} => {DoItYBks} 0.1460 0.5703125 0.2560 2.022385 292

[5] {ChildBks,DoItYBks} => {CookBks} 0.1460 0.7934783 0.1840 1.841017 292

[6] {CookBks,DoItYBks} => {ChildBks} 0.1460 0.7786667 0.1875 1.840820 292

> head(quality(rules\_book))

support confidence coverage lift count

1 0.023 1.0000000 0.0230 4.662005 46

2 0.023 0.6216216 0.0370 5.476842 46

3 0.020 0.8695652 0.0230 2.055710 40

4 0.020 0.7017544 0.0285 6.182858 40

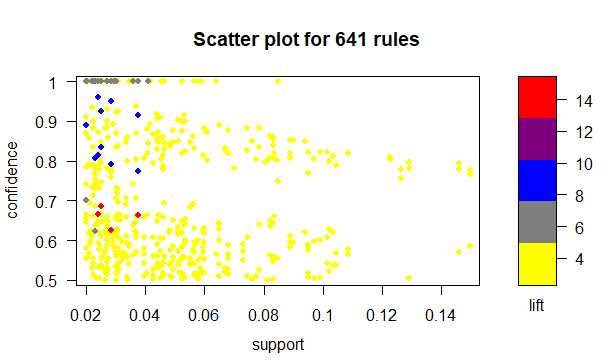
5 0.023 1.0000000 0.0230 2.320186 46

6 0.023 0.8070175 0.0285 7.110287 46

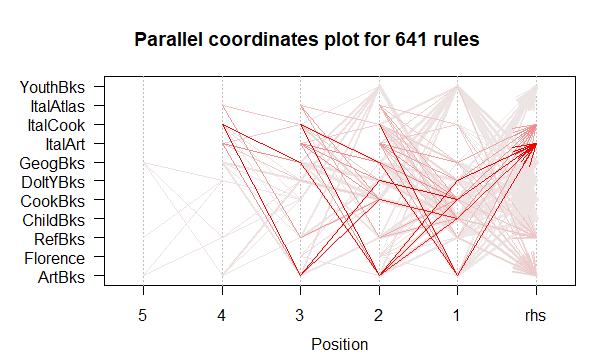
# visualisation

> colfunction <- colorRampPalette(c("red","blue","yellow"))

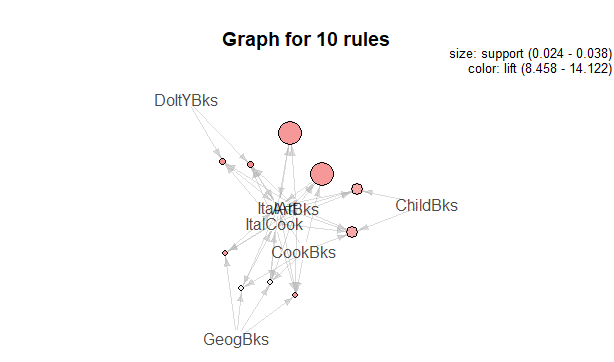
> plot(rules\_book,method = "scatterplot",jitter=0,col=colfunction(5))

> 

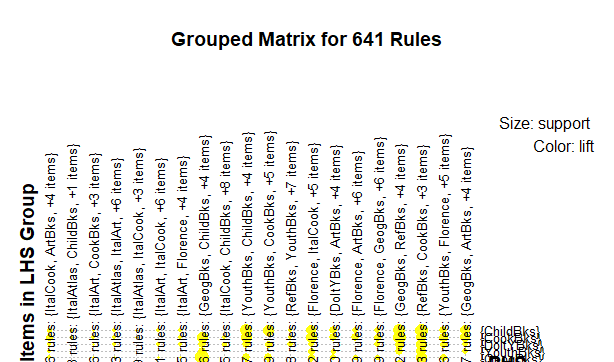
plot(rules\_book,method = "paracoord")



> plot(head(sort(rules\_book,by="lift"),n=10),method = "graph")



> plot(rules\_book,method = "grouped matrix",col=colfunction(5),n=10)



plot(rules\_book,method = "matrix")

Itemsets in Antecedent (LHS)

[1] "{CookBks,ArtBks,GeogBks,ItalArt}"

[2] "{ChildBks,CookBks,RefBks,ItalAtlas}"

[3] "{CookBks,GeogBks,ItalArt}"

[4] "{ChildBks,CookBks,ItalAtlas}"

[5] "{CookBks,DoItYBks,ArtBks,ItalCook}"

[6] "{ChildBks,CookBks,ArtBks,ItalArt}"

[7] "{DoItYBks,ArtBks,ItalCook}"

[8] "{CookBks,ArtBks,GeogBks,ItalCook}"

[9] "{ChildBks,CookBks,ItalArt}"

[10] "{CookBks,DoItYBks,ArtBks,ItalArt}"

[11] "{ChildBks,CookBks,ArtBks,ItalCook}"

[12] "{CookBks,DoItYBks,ItalArt}"

[13] "{GeogBks,ItalAtlas}"

[14] "{ChildBks,CookBks,ItalCook,ItalAtlas}"

[15] "{CookBks,ItalAtlas}"

[16] "{CookBks,RefBks,ItalAtlas}"

[17] "{ArtBks,GeogBks,ItalCook}"

[18] "{CookBks,ArtBks,ItalCook}"

[19] "{ChildBks,ArtBks,ItalCook}"

[20] "{ChildBks,ItalAtlas}"

[21] "{RefBks,ItalArt}"

[22] "{YouthBks,ItalArt}"

[23] "{ChildBks,GeogBks,ItalArt}"

[24] "{CookBks,DoItYBks,ItalCook,ItalArt}"

[25] "{CookBks,GeogBks,ItalCook,ItalArt}"

[26] "{ChildBks,CookBks,ItalCook,ItalArt}"

[27] "{ChildBks,CookBks,DoItYBks,ItalArt}"

[28] "{ArtBks,ItalCook}"

[29] "{ChildBks,RefBks,ItalAtlas}"

[30] "{DoItYBks,ItalArt}"

[31] "{GeogBks,ItalArt}"

[32] "{DoItYBks,ArtBks,ItalArt}"

[33] "{CookBks,ItalArt}"

[34] "{ArtBks,GeogBks,ItalArt}"

[35] "{CookBks,ArtBks,ItalArt}"

[36] "{ChildBks,ItalArt}"

[37] "{ChildBks,ItalCook,ItalAtlas}"

[38] "{CookBks,ItalCook,ItalAtlas}"

[39] "{ChildBks,ArtBks,ItalArt}"

[40] "{DoItYBks,ItalCook,ItalArt}"

[41] "{GeogBks,ItalCook,ItalArt}"

[42] "{ChildBks,ItalCook,ItalArt}"

[43] "{ChildBks,DoItYBks,ItalArt}"

[44] "{ItalCook,ItalAtlas}"

[45] "{ArtBks,ItalArt}"

[46] "{ChildBks,CookBks,Florence}"

[47] "{RefBks,ItalAtlas}"

[48] "{CookBks,ItalCook,ItalArt}"

[49] "{ItalCook,ItalArt}"

[50] "{ChildBks,YouthBks,CookBks,DoItYBks,ArtBks}"

[51] "{ChildBks,GeogBks,Florence}"

[52] "{ChildBks,YouthBks,CookBks,DoItYBks,GeogBks}"

[53] "{CookBks,GeogBks,Florence}"

[54] "{ChildBks,YouthBks,CookBks,ArtBks}"

[55] "{ChildBks,CookBks,DoItYBks,GeogBks}"

[56] "{ChildBks,YouthBks,CookBks,ArtBks,GeogBks}"

[57] "{ChildBks,YouthBks,DoItYBks,GeogBks}"

[58] "{ChildBks,CookBks,DoItYBks,ArtBks,GeogBks}"

[59] "{ChildBks,YouthBks,CookBks,DoItYBks}"

[60] "{ChildBks,YouthBks,CookBks,GeogBks}"

[61] "{ChildBks,CookBks,DoItYBks,RefBks,ArtBks}"

[62] "{ChildBks,RefBks,ItalCook,ItalAtlas}"

[63] "{DoItYBks,ArtBks,ItalCook,ItalArt}"

[64] "{ArtBks,GeogBks,ItalCook,ItalArt}"

[65] "{ChildBks,ArtBks,ItalCook,ItalArt}"

[66] "{ChildBks,YouthBks,RefBks,ItalCook}"

[67] "{ChildBks,RefBks,ArtBks,ItalCook}"

[68] "{ChildBks,DoItYBks,RefBks,ItalCook}"

[69] "{ChildBks,RefBks,GeogBks,ItalCook}"

[70] "{YouthBks,ArtBks,GeogBks,ItalCook}"

[71] "{ChildBks,YouthBks,ArtBks,ItalCook}"

[72] "{ChildBks,YouthBks,DoItYBks,ItalCook}"

[73] "{ChildBks,YouthBks,GeogBks,ItalCook}"

[74] "{DoItYBks,ArtBks,GeogBks,ItalCook}"

[75] "{ChildBks,DoItYBks,ArtBks,ItalCook}"

[76] "{ChildBks,ArtBks,GeogBks,ItalCook}"

[77] "{ChildBks,DoItYBks,GeogBks,ItalCook}"

[78] "{ChildBks,CookBks,DoItYBks,RefBks,GeogBks}"

[79] "{ChildBks,YouthBks,CookBks}"

[80] "{ChildBks,CookBks,DoItYBks}"

[81] "{ChildBks,YouthBks,CookBks,RefBks,ArtBks}"

[82] "{ChildBks,DoItYBks,ItalCook}"

[83] "{ChildBks,CookBks,DoItYBks,RefBks}"

[84] "{YouthBks,CookBks,DoItYBks,GeogBks}"

[85] "{ChildBks,CookBks,DoItYBks,ItalCook}"

[86] "{ChildBks,CookBks,GeogBks}"

[87] "{YouthBks,CookBks,DoItYBks,ArtBks}"

[88] "{ChildBks,YouthBks,ArtBks}"

[89] "{ChildBks,CookBks,DoItYBks,ArtBks}"

[90] "{ChildBks,CookBks,ArtBks}"

[91] "{ChildBks,YouthBks,DoItYBks,ArtBks}"

[92] "{CookBks,DoItYBks,RefBks,GeogBks}"

[93] "{ChildBks,YouthBks,ItalCook}"

[94] "{ChildBks,CookBks,RefBks,ArtBks}"

[95] "{RefBks,ArtBks,ItalCook}"

[96] "{CookBks,Florence}"

[97] "{ChildBks,CookBks,ArtBks,GeogBks}"

[98] "{CookBks,ArtBks,Florence}"

[99] "{RefBks,GeogBks,ItalCook}"

[100] "{YouthBks,GeogBks,ItalCook}"

[101] "{ChildBks,YouthBks,CookBks,ItalCook}"

[102] "{YouthBks,CookBks,ArtBks}"

[103] "{YouthBks,RefBks,ItalCook}"

[104] "{DoItYBks,GeogBks,ItalCook}"

[105] "{YouthBks,CookBks,DoItYBks}"

[106] "{ChildBks,Florence}"

[107] "{ChildBks,YouthBks,DoItYBks}"

[108] "{ChildBks,GeogBks,ItalCook}"

[109] "{CookBks,DoItYBks,RefBks,ArtBks}"

[110] "{ChildBks,CookBks,RefBks}"

[111] "{ChildBks,YouthBks,CookBks,RefBks}"

[112] "{ChildBks,RefBks,ItalCook}"

[113] "{YouthBks,CookBks,GeogBks,ItalCook}"

[114] "{ChildBks,CookBks,GeogBks,ItalCook}"

[115] "{YouthBks,ArtBks,ItalCook}"

[116] "{DoItYBks,RefBks,ItalCook}"

[117] "{ChildBks,YouthBks,CookBks,DoItYBks,RefBks}"

[118] "{CookBks,DoItYBks,GeogBks}"

[119] "{CookBks,RefBks,ArtBks}"

[120] "{CookBks,DoItYBks,GeogBks,ItalCook}"

[121] "{ChildBks,DoItYBks,GeogBks}"

[122] "{ChildBks,CookBks,RefBks,ItalCook}"

[123] "{DoItYBks,Florence}"

[124] "{CookBks,RefBks,ArtBks,ItalCook}"

[125] "{DoItYBks,ItalCook}"

[126] "{YouthBks,CookBks,GeogBks}"

[127] "{CookBks,RefBks,GeogBks,ItalCook}"

[128] "{YouthBks,CookBks,DoItYBks,RefBks,GeogBks}"

[129] "{ArtBks,ItalCook,ItalArt}"

[130] "{YouthBks,CookBks,RefBks,ArtBks}"

[131] "{YouthBks,DoItYBks,ArtBks}"

[132] "{RefBks,ItalCook,ItalAtlas}"

[133] "{YouthBks,CookBks,RefBks,ItalCook}"

[134] "{CookBks,DoItYBks,ItalCook}"

[135] "{ChildBks,DoItYBks,ArtBks,GeogBks}"

[136] "{ChildBks,ItalCook}"

[137] "{YouthBks,CookBks,ArtBks,ItalCook}"

[138] "{ChildBks,YouthBks,GeogBks}"

[139] "{ChildBks,CookBks,RefBks,ArtBks,GeogBks}"

[140] "{YouthBks,CookBks,RefBks,GeogBks}"

[141] "{RefBks,ItalCook}"

[142] "{YouthBks,CookBks,RefBks}"

[143] "{CookBks,ArtBks,ItalCook,ItalArt}"

[144] "{ChildBks,DoItYBks,RefBks,GeogBks}"

[145] "{ChildBks,RefBks,ArtBks}"

[146] "{CookBks,DoItYBks,RefBks}"

[147] "{YouthBks,CookBks,ArtBks,GeogBks}"

[148] "{DoItYBks,RefBks,GeogBks}"

[149] "{ChildBks,YouthBks,CookBks,RefBks,GeogBks}"

[150] "{CookBks,RefBks,ArtBks,GeogBks}"

[151] "{ChildBks,YouthBks,DoItYBks,ArtBks,GeogBks}"

[152] "{ChildBks,DoItYBks,ArtBks}"

[153] "{ChildBks,CookBks,RefBks,GeogBks}"

[154] "{ChildBks,CookBks,ItalCook}"

[155] "{YouthBks,DoItYBks,GeogBks}"

[156] "{GeogBks,ItalCook}"

[157] "{YouthBks,CookBks,DoItYBks,RefBks}"

[158] "{CookBks,RefBks,ItalCook}"

[159] "{ChildBks,YouthBks,RefBks}"

[160] "{ChildBks,DoItYBks,RefBks}"

[161] "{CookBks,DoItYBks,RefBks,ItalCook}"

[162] "{YouthBks,DoItYBks,RefBks,GeogBks}"

[163] "{ChildBks,YouthBks,RefBks,ArtBks}"

[164] "{CookBks,DoItYBks,ArtBks,GeogBks}"

[165] "{ChildBks,DoItYBks,RefBks,ArtBks}"

[166] "{ChildBks,ArtBks,Florence}"

[167] "{ChildBks,DoItYBks,ArtBks,ItalArt}"

[168] "{CookBks,ArtBks,GeogBks}"

[169] "{CookBks,DoItYBks,ArtBks}"

[170] "{GeogBks,Florence}"

[171] "{ChildBks,RefBks}"

[172] "{YouthBks,DoItYBks}"

[173] "{CookBks,RefBks,GeogBks}"

[174] "{YouthBks,DoItYBks,ItalCook}"

[175] "{ChildBks,YouthBks}"

[176] "{CookBks,GeogBks,ItalCook}"

[177] "{YouthBks,DoItYBks,ArtBks,GeogBks}"

[178] "{RefBks,ArtBks}"

[179] "{ChildBks,YouthBks,DoItYBks,RefBks,GeogBks}"

[180] "{YouthBks,RefBks,ArtBks}"

[181] "{YouthBks,CookBks,RefBks,ArtBks,GeogBks}"

[182] "{YouthBks,RefBks,GeogBks}"

[183] "{ChildBks,RefBks,GeogBks}"

[184] "{DoItYBks,RefBks,ArtBks}"

[185] "{ChildBks,YouthBks,RefBks,GeogBks}"

[186] "{YouthBks,DoItYBks,RefBks}"

[187] "{CookBks,ArtBks}"

[188] "{CookBks,DoItYBks,RefBks,ArtBks,GeogBks}"

[189] "{ChildBks,YouthBks,ArtBks,GeogBks}"

[190] "{DoItYBks,ArtBks,GeogBks}"

[191] "{ChildBks,CookBks}"

[192] "{YouthBks,ItalCook}"

[193] "{CookBks,DoItYBks}"

[194] "{CookBks,RefBks,ItalCook,ItalAtlas}"

[195] "{YouthBks,RefBks}"

[196] "{YouthBks,CookBks}"

[197] "{YouthBks,ArtBks,GeogBks}"

[198] "{ChildBks,ArtBks}"

[199] "{ChildBks,ArtBks,GeogBks}"

[200] "{YouthBks,ArtBks}"

[201] "{DoItYBks,RefBks}"

[202] "{RefBks,ArtBks,GeogBks}"

[203] "{ChildBks,DoItYBks}"

[204] "{DoItYBks,GeogBks}"

[205] "{YouthBks,CookBks,DoItYBks,RefBks,ArtBks}"

[206] "{CookBks,GeogBks}"

[207] "{ChildBks,DoItYBks,RefBks,ArtBks,GeogBks}"

[208] "{ChildBks,RefBks,ArtBks,GeogBks}"

[209] "{ChildBks,YouthBks,DoItYBks,RefBks}"

[210] "{YouthBks,RefBks,ArtBks,GeogBks}"

[211] "{DoItYBks,RefBks,ArtBks,GeogBks}"

[212] "{YouthBks,GeogBks}"

[213] "{CookBks,RefBks}"

[214] "{RefBks,GeogBks}"

[215] "{YouthBks,CookBks,ItalCook}"

[216] "{YouthBks,DoItYBks,RefBks,ArtBks}"

[217] "{YouthBks,CookBks,DoItYBks,ArtBks,GeogBks}"

[218] "{ChildBks,GeogBks}"

[219] "{ArtBks,GeogBks}"

[220] "{DoItYBks,ArtBks}"

[221] "{RefBks,Florence}"

[222] "{CookBks,ItalCook}"

[223] "{ChildBks,YouthBks,RefBks,ArtBks,GeogBks}"

[224] "{YouthBks,CookBks,DoItYBks,ItalCook}"

[225] "{ChildBks,YouthBks,DoItYBks,RefBks,ArtBks}"

[226] "{YouthBks,Florence}"

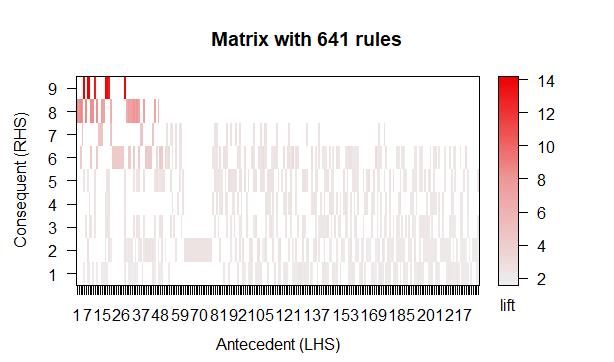
[227] "{ArtBks,GeogBks,Florence}"

[228] "{ArtBks,Florence}"

Itemsets in Consequent (RHS)

[1] "{ChildBks}" "{CookBks}" "{DoItYBks}" "{YouthBks}" "{GeogBks}" "{ArtBks}"

[7] "{RefBks}" "{ItalCook}" "{ItalArt}"

> 

plot(rules\_book,method = "matrix3D")

Itemsets in Antecedent (LHS)

[1] "{CookBks,ArtBks,GeogBks,ItalArt}"

[2] "{ChildBks,CookBks,RefBks,ItalAtlas}"

[3] "{CookBks,GeogBks,ItalArt}"

[4] "{ChildBks,CookBks,ItalAtlas}"

[5] "{CookBks,DoItYBks,ArtBks,ItalCook}"

[6] "{ChildBks,CookBks,ArtBks,ItalArt}"

[7] "{DoItYBks,ArtBks,ItalCook}"

[8] "{CookBks,ArtBks,GeogBks,ItalCook}"

[9] "{ChildBks,CookBks,ItalArt}"

[10] "{CookBks,DoItYBks,ArtBks,ItalArt}"

[11] "{ChildBks,CookBks,ArtBks,ItalCook}"

[12] "{CookBks,DoItYBks,ItalArt}"

[13] "{GeogBks,ItalAtlas}"

[14] "{ChildBks,CookBks,ItalCook,ItalAtlas}"

[15] "{CookBks,ItalAtlas}"

[16] "{CookBks,RefBks,ItalAtlas}"

[17] "{ArtBks,GeogBks,ItalCook}"

[18] "{CookBks,ArtBks,ItalCook}"

[19] "{ChildBks,ArtBks,ItalCook}"

[20] "{ChildBks,ItalAtlas}"

[21] "{RefBks,ItalArt}"

[22] "{YouthBks,ItalArt}"

[23] "{ChildBks,GeogBks,ItalArt}"

[24] "{CookBks,DoItYBks,ItalCook,ItalArt}"

[25] "{CookBks,GeogBks,ItalCook,ItalArt}"

[26] "{ChildBks,CookBks,ItalCook,ItalArt}"

[27] "{ChildBks,CookBks,DoItYBks,ItalArt}"

[28] "{ArtBks,ItalCook}"

[29] "{ChildBks,RefBks,ItalAtlas}"

[30] "{DoItYBks,ItalArt}"

[31] "{GeogBks,ItalArt}"

[32] "{DoItYBks,ArtBks,ItalArt}"

[33] "{CookBks,ItalArt}"

[34] "{ArtBks,GeogBks,ItalArt}"

[35] "{CookBks,ArtBks,ItalArt}"

[36] "{ChildBks,ItalArt}"

[37] "{ChildBks,ItalCook,ItalAtlas}"

[38] "{CookBks,ItalCook,ItalAtlas}"

[39] "{ChildBks,ArtBks,ItalArt}"

[40] "{DoItYBks,ItalCook,ItalArt}"

[41] "{GeogBks,ItalCook,ItalArt}"

[42] "{ChildBks,ItalCook,ItalArt}"

[43] "{ChildBks,DoItYBks,ItalArt}"

[44] "{ItalCook,ItalAtlas}"

[45] "{ArtBks,ItalArt}"

[46] "{ChildBks,CookBks,Florence}"

[47] "{RefBks,ItalAtlas}"

[48] "{CookBks,ItalCook,ItalArt}"

[49] "{ItalCook,ItalArt}"

[50] "{ChildBks,YouthBks,CookBks,DoItYBks,ArtBks}"

[51] "{ChildBks,GeogBks,Florence}"

[52] "{ChildBks,YouthBks,CookBks,DoItYBks,GeogBks}"

[53] "{CookBks,GeogBks,Florence}"

[54] "{ChildBks,YouthBks,CookBks,ArtBks}"

[55] "{ChildBks,CookBks,DoItYBks,GeogBks}"

[56] "{ChildBks,YouthBks,CookBks,ArtBks,GeogBks}"

[57] "{ChildBks,YouthBks,DoItYBks,GeogBks}"

[58] "{ChildBks,CookBks,DoItYBks,ArtBks,GeogBks}"

[59] "{ChildBks,YouthBks,CookBks,DoItYBks}"

[60] "{ChildBks,YouthBks,CookBks,GeogBks}"

[61] "{ChildBks,CookBks,DoItYBks,RefBks,ArtBks}"

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[63] "{DoItYBks,ArtBks,ItalCook,ItalArt}"

[64] "{ArtBks,GeogBks,ItalCook,ItalArt}"

[65] "{ChildBks,ArtBks,ItalCook,ItalArt}"

[66] "{ChildBks,YouthBks,RefBks,ItalCook}"

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[68] "{ChildBks,DoItYBks,RefBks,ItalCook}"

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[73] "{ChildBks,YouthBks,GeogBks,ItalCook}"

[74] "{DoItYBks,ArtBks,GeogBks,ItalCook}"

[75] "{ChildBks,DoItYBks,ArtBks,ItalCook}"

[76] "{ChildBks,ArtBks,GeogBks,ItalCook}"

[77] "{ChildBks,DoItYBks,GeogBks,ItalCook}"

[78] "{ChildBks,CookBks,DoItYBks,RefBks,GeogBks}"

[79] "{ChildBks,YouthBks,CookBks}"

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[83] "{ChildBks,CookBks,DoItYBks,RefBks}"

[84] "{YouthBks,CookBks,DoItYBks,GeogBks}"

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[86] "{ChildBks,CookBks,GeogBks}"

[87] "{YouthBks,CookBks,DoItYBks,ArtBks}"

[88] "{ChildBks,YouthBks,ArtBks}"

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[91] "{ChildBks,YouthBks,DoItYBks,ArtBks}"

[92] "{CookBks,DoItYBks,RefBks,GeogBks}"

[93] "{ChildBks,YouthBks,ItalCook}"

[94] "{ChildBks,CookBks,RefBks,ArtBks}"

[95] "{RefBks,ArtBks,ItalCook}"

[96] "{CookBks,Florence}"

[97] "{ChildBks,CookBks,ArtBks,GeogBks}"

[98] "{CookBks,ArtBks,Florence}"

[99] "{RefBks,GeogBks,ItalCook}"

[100] "{YouthBks,GeogBks,ItalCook}"

[101] "{ChildBks,YouthBks,CookBks,ItalCook}"

[102] "{YouthBks,CookBks,ArtBks}"

[103] "{YouthBks,RefBks,ItalCook}"

[104] "{DoItYBks,GeogBks,ItalCook}"

[105] "{YouthBks,CookBks,DoItYBks}"

[106] "{ChildBks,Florence}"

[107] "{ChildBks,YouthBks,DoItYBks}"

[108] "{ChildBks,GeogBks,ItalCook}"

[109] "{CookBks,DoItYBks,RefBks,ArtBks}"

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[111] "{ChildBks,YouthBks,CookBks,RefBks}"

[112] "{ChildBks,RefBks,ItalCook}"

[113] "{YouthBks,CookBks,GeogBks,ItalCook}"

[114] "{ChildBks,CookBks,GeogBks,ItalCook}"

[115] "{YouthBks,ArtBks,ItalCook}"

[116] "{DoItYBks,RefBks,ItalCook}"

[117] "{ChildBks,YouthBks,CookBks,DoItYBks,RefBks}"

[118] "{CookBks,DoItYBks,GeogBks}"

[119] "{CookBks,RefBks,ArtBks}"

[120] "{CookBks,DoItYBks,GeogBks,ItalCook}"

[121] "{ChildBks,DoItYBks,GeogBks}"

[122] "{ChildBks,CookBks,RefBks,ItalCook}"

[123] "{DoItYBks,Florence}"

[124] "{CookBks,RefBks,ArtBks,ItalCook}"

[125] "{DoItYBks,ItalCook}"

[126] "{YouthBks,CookBks,GeogBks}"

[127] "{CookBks,RefBks,GeogBks,ItalCook}"

[128] "{YouthBks,CookBks,DoItYBks,RefBks,GeogBks}"

[129] "{ArtBks,ItalCook,ItalArt}"

[130] "{YouthBks,CookBks,RefBks,ArtBks}"

[131] "{YouthBks,DoItYBks,ArtBks}"

[132] "{RefBks,ItalCook,ItalAtlas}"

[133] "{YouthBks,CookBks,RefBks,ItalCook}"

[134] "{CookBks,DoItYBks,ItalCook}"

[135] "{ChildBks,DoItYBks,ArtBks,GeogBks}"

[136] "{ChildBks,ItalCook}"

[137] "{YouthBks,CookBks,ArtBks,ItalCook}"

[138] "{ChildBks,YouthBks,GeogBks}"

[139] "{ChildBks,CookBks,RefBks,ArtBks,GeogBks}"

[140] "{YouthBks,CookBks,RefBks,GeogBks}"

[141] "{RefBks,ItalCook}"

[142] "{YouthBks,CookBks,RefBks}"

[143] "{CookBks,ArtBks,ItalCook,ItalArt}"

[144] "{ChildBks,DoItYBks,RefBks,GeogBks}"

[145] "{ChildBks,RefBks,ArtBks}"

[146] "{CookBks,DoItYBks,RefBks}"

[147] "{YouthBks,CookBks,ArtBks,GeogBks}"

[148] "{DoItYBks,RefBks,GeogBks}"

[149] "{ChildBks,YouthBks,CookBks,RefBks,GeogBks}"

[150] "{CookBks,RefBks,ArtBks,GeogBks}"

[151] "{ChildBks,YouthBks,DoItYBks,ArtBks,GeogBks}"

[152] "{ChildBks,DoItYBks,ArtBks}"

[153] "{ChildBks,CookBks,RefBks,GeogBks}"

[154] "{ChildBks,CookBks,ItalCook}"

[155] "{YouthBks,DoItYBks,GeogBks}"

[156] "{GeogBks,ItalCook}"

[157] "{YouthBks,CookBks,DoItYBks,RefBks}"

[158] "{CookBks,RefBks,ItalCook}"

[159] "{ChildBks,YouthBks,RefBks}"

[160] "{ChildBks,DoItYBks,RefBks}"

[161] "{CookBks,DoItYBks,RefBks,ItalCook}"

[162] "{YouthBks,DoItYBks,RefBks,GeogBks}"

[163] "{ChildBks,YouthBks,RefBks,ArtBks}"

[164] "{CookBks,DoItYBks,ArtBks,GeogBks}"

[165] "{ChildBks,DoItYBks,RefBks,ArtBks}"

[166] "{ChildBks,ArtBks,Florence}"

[167] "{ChildBks,DoItYBks,ArtBks,ItalArt}"

[168] "{CookBks,ArtBks,GeogBks}"

[169] "{CookBks,DoItYBks,ArtBks}"

[170] "{GeogBks,Florence}"

[171] "{ChildBks,RefBks}"

[172] "{YouthBks,DoItYBks}"

[173] "{CookBks,RefBks,GeogBks}"

[174] "{YouthBks,DoItYBks,ItalCook}"

[175] "{ChildBks,YouthBks}"

[176] "{CookBks,GeogBks,ItalCook}"

[177] "{YouthBks,DoItYBks,ArtBks,GeogBks}"

[178] "{RefBks,ArtBks}"

[179] "{ChildBks,YouthBks,DoItYBks,RefBks,GeogBks}"

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[181] "{YouthBks,CookBks,RefBks,ArtBks,GeogBks}"

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[183] "{ChildBks,RefBks,GeogBks}"

[184] "{DoItYBks,RefBks,ArtBks}"

[185] "{ChildBks,YouthBks,RefBks,GeogBks}"

[186] "{YouthBks,DoItYBks,RefBks}"

[187] "{CookBks,ArtBks}"

[188] "{CookBks,DoItYBks,RefBks,ArtBks,GeogBks}"

[189] "{ChildBks,YouthBks,ArtBks,GeogBks}"

[190] "{DoItYBks,ArtBks,GeogBks}"

[191] "{ChildBks,CookBks}"

[192] "{YouthBks,ItalCook}"

[193] "{CookBks,DoItYBks}"

[194] "{CookBks,RefBks,ItalCook,ItalAtlas}"

[195] "{YouthBks,RefBks}"

[196] "{YouthBks,CookBks}"

[197] "{YouthBks,ArtBks,GeogBks}"

[198] "{ChildBks,ArtBks}"

[199] "{ChildBks,ArtBks,GeogBks}"

[200] "{YouthBks,ArtBks}"

[201] "{DoItYBks,RefBks}"

[202] "{RefBks,ArtBks,GeogBks}"

[203] "{ChildBks,DoItYBks}"

[204] "{DoItYBks,GeogBks}"

[205] "{YouthBks,CookBks,DoItYBks,RefBks,ArtBks}"

[206] "{CookBks,GeogBks}"

[207] "{ChildBks,DoItYBks,RefBks,ArtBks,GeogBks}"

[208] "{ChildBks,RefBks,ArtBks,GeogBks}"

[209] "{ChildBks,YouthBks,DoItYBks,RefBks}"

[210] "{YouthBks,RefBks,ArtBks,GeogBks}"

[211] "{DoItYBks,RefBks,ArtBks,GeogBks}"

[212] "{YouthBks,GeogBks}"

[213] "{CookBks,RefBks}"

[214] "{RefBks,GeogBks}"

[215] "{YouthBks,CookBks,ItalCook}"

[216] "{YouthBks,DoItYBks,RefBks,ArtBks}"

[217] "{YouthBks,CookBks,DoItYBks,ArtBks,GeogBks}"

[218] "{ChildBks,GeogBks}"

[219] "{ArtBks,GeogBks}"

[220] "{DoItYBks,ArtBks}"

[221] "{RefBks,Florence}"

[222] "{CookBks,ItalCook}"

[223] "{ChildBks,YouthBks,RefBks,ArtBks,GeogBks}"

[224] "{YouthBks,CookBks,DoItYBks,ItalCook}"

[225] "{ChildBks,YouthBks,DoItYBks,RefBks,ArtBks}"

[226] "{YouthBks,Florence}"

[227] "{ArtBks,GeogBks,Florence}"

[228] "{ArtBks,Florence}"

Itemsets in Consequent (RHS)

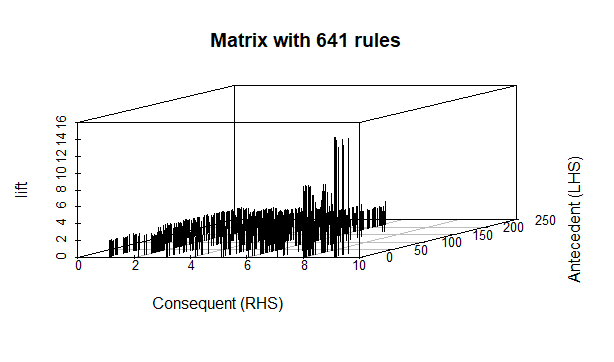
[1] "{ChildBks}" "{CookBks}" "{DoItYBks}" "{YouthBks}" "{GeogBks}" "{ArtBks}"

[7] "{RefBks}" "{ItalCook}" "{ItalArt}"

Warning message:

In plot.rules(rules\_book, method = "matrix3D") :

method 'matrix3D' is deprecated use method 'matrix' with engine '3d'

> 

> # using differnt support and confidence

>

> rules\_book2 <- apriori(as.matrix(book),parameter = list(support = 0.01,confidence =0.7, minlen = 4))

Apriori

Parameter specification:

confidence minval smax arem aval originalSupport maxtime support minlen maxlen

0.7 0.1 1 none FALSE TRUE 5 0.01 4 10

target ext

rules TRUE

Algorithmic control:

filter tree heap memopt load sort verbose

0.1 TRUE TRUE FALSE TRUE 2 TRUE

Absolute minimum support count: 20

set item appearances ...[0 item(s)] done [0.00s].

set transactions ...[11 item(s), 2000 transaction(s)] done [0.00s].

sorting and recoding items ... [11 item(s)] done [0.00s].

creating transaction tree ... done [0.00s].

checking subsets of size 1 2 3 4 5 6 7 done [0.00s].

writing ... [776 rule(s)] done [0.00s].

creating S4 object ... done [0.00s].

> rules\_book2

set of 776 rules

> inspect(head(sort(rules\_book2,by="lift")))

lhs rhs support confidence

[1] {RefBks,GeogBks,ItalArt} => {ItalAtlas} 0.0115 0.8518519

[2] {RefBks,ArtBks,GeogBks,ItalArt} => {ItalAtlas} 0.0115 0.8518519

[3] {ChildBks,RefBks,GeogBks,ItalArt} => {ItalAtlas} 0.0100 0.8333333

[4] {ChildBks,RefBks,ArtBks,GeogBks,ItalArt} => {ItalAtlas} 0.0100 0.8333333

[5] {RefBks,ArtBks,ItalArt} => {ItalAtlas} 0.0165 0.8250000

[6] {ChildBks,RefBks,ItalArt} => {ItalAtlas} 0.0145 0.8055556

coverage lift count

[1] 0.0135 23.02302 23

[2] 0.0135 23.02302 23

[3] 0.0120 22.52252 20

[4] 0.0120 22.52252 20

[5] 0.0200 22.29730 33

[6] 0.0180 21.77177 29

> inspect(head(sort(rules\_book2,by="confidence")))

lhs rhs support confidence coverage lift

[1] {ItalCook,ItalAtlas,ItalArt} => {RefBks} 0.0125 1 0.0125 4.662005

[2] {ItalCook,ItalAtlas,ItalArt} => {ArtBks} 0.0125 1 0.0125 4.149378

[3] {ItalCook,ItalAtlas,ItalArt} => {CookBks} 0.0125 1 0.0125 2.320186

[4] {RefBks,ItalAtlas,ItalArt} => {ArtBks} 0.0165 1 0.0165 4.149378

[5] {ArtBks,ItalAtlas,ItalArt} => {RefBks} 0.0165 1 0.0165 4.662005

[6] {GeogBks,ItalAtlas,ItalArt} => {RefBks} 0.0115 1 0.0115 4.662005

count

[1] 25

[2] 25

[3] 25

[4] 33

[5] 33

[6] 23

> inspect(head(sort(rules\_book2,by="support"))) # max count =178

lhs rhs support confidence coverage lift

[1] {ChildBks,DoItYBks,GeogBks} => {CookBks} 0.0890 0.8516746 0.1045 1.976043

[2] {CookBks,DoItYBks,GeogBks} => {ChildBks} 0.0890 0.8202765 0.1085 1.939188

[3] {ChildBks,ArtBks,GeogBks} => {CookBks} 0.0835 0.8186275 0.1020 1.899368

[4] {CookBks,ArtBks,GeogBks} => {ChildBks} 0.0835 0.8067633 0.1035 1.907242

[5] {ChildBks,YouthBks,GeogBks} => {CookBks} 0.0830 0.8383838 0.0990 1.945206

[6] {YouthBks,CookBks,GeogBks} => {ChildBks} 0.0830 0.8556701 0.0970 2.022861

count

[1] 178

[2] 178

[3] 167

[4] 167

[5] 166

[6] 166

> inspect(head(sort(rules\_book2,by=c("count","lift"))))

lhs rhs support confidence coverage lift

[1] {ChildBks,DoItYBks,GeogBks} => {CookBks} 0.0890 0.8516746 0.1045 1.976043

[2] {CookBks,DoItYBks,GeogBks} => {ChildBks} 0.0890 0.8202765 0.1085 1.939188

[3] {CookBks,ArtBks,GeogBks} => {ChildBks} 0.0835 0.8067633 0.1035 1.907242

[4] {ChildBks,ArtBks,GeogBks} => {CookBks} 0.0835 0.8186275 0.1020 1.899368

[5] {YouthBks,CookBks,GeogBks} => {ChildBks} 0.0830 0.8556701 0.0970 2.022861

[6] {ChildBks,YouthBks,GeogBks} => {CookBks} 0.0830 0.8383838 0.0990 1.945206

count

[1] 178

[2] 178

[3] 167

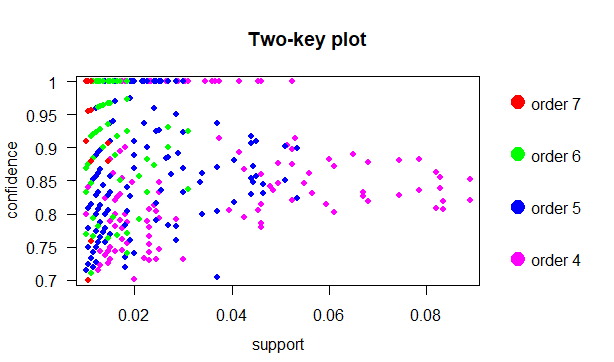
[4] 167

[5] 166

[6] 166

> #plot methods matrix , mosaic , doubledecker , graph , paracoord , scatterplot , groupedmatrix , two-key plot , matrix3D ,iplots

plot(rules\_book2,method = "two-key plot",jitter=0)



plot(rules\_book2,method = "matrix3D")

Itemsets in Antecedent (LHS)

[1] "{ChildBks,RefBks,ArtBks,GeogBks,ItalAtlas}"

[2] "{ChildBks,CookBks,RefBks,ArtBks,ItalCook,ItalArt}"

[3] "{ChildBks,CookBks,RefBks,ArtBks,ItalCook,ItalAtlas}"

[4] "{ChildBks,CookBks,RefBks,ArtBks,ItalArt}"

[5] "{ChildBks,CookBks,RefBks,ArtBks,ItalAtlas}"

[6] "{ChildBks,ArtBks,GeogBks,ItalAtlas}"

[7] "{ChildBks,CookBks,RefBks,ItalCook,ItalArt}"

[8] "{ChildBks,CookBks,ArtBks,ItalCook,ItalAtlas}"

[9] "{CookBks,RefBks,ArtBks,ItalCook,ItalArt}"

[10] "{ChildBks,RefBks,ArtBks,ItalCook,ItalArt}"

[11] "{RefBks,ArtBks,GeogBks,ItalAtlas}"

[12] "{ChildBks,CookBks,RefBks,ItalArt}"

[13] "{ChildBks,RefBks,ArtBks,ItalCook,ItalAtlas}"

[14] "{CookBks,RefBks,ArtBks,ItalCook,ItalAtlas}"

[15] "{CookBks,RefBks,ArtBks,ItalArt}"

[16] "{ChildBks,RefBks,ArtBks,GeogBks,ItalArt}"

[17] "{ChildBks,CookBks,ArtBks,ItalAtlas}"

[18] "{ChildBks,RefBks,ArtBks,ItalArt}"

[19] "{CookBks,RefBks,ArtBks,ItalAtlas}"

[20] "{ChildBks,RefBks,ArtBks,ItalAtlas}"

[21] "{CookBks,RefBks,ItalCook,ItalArt}"

[22] "{ArtBks,GeogBks,ItalAtlas}"

[23] "{CookBks,RefBks,ItalArt}"

[24] "{ChildBks,RefBks,ItalCook,ItalArt}"

[25] "{ChildBks,RefBks,GeogBks,ItalArt}"

[26] "{ChildBks,ArtBks,ItalCook,ItalAtlas}"

[27] "{CookBks,ArtBks,ItalCook,ItalAtlas}"

[28] "{ChildBks,CookBks,RefBks,GeogBks,ItalAtlas}"

[29] "{ChildBks,CookBks,RefBks,ArtBks,GeogBks,ItalArt}"

[30] "{ChildBks,RefBks,ItalArt}"

[31] "{ChildBks,CookBks,ArtBks,GeogBks,ItalArt}"

[32] "{RefBks,ArtBks,GeogBks,ItalArt}"

[33] "{RefBks,ArtBks,ItalCook,ItalArt}"

[34] "{CookBks,ArtBks,ItalAtlas}"

[35] "{ChildBks,YouthBks,CookBks,ArtBks,ItalArt}"

[36] "{YouthBks,CookBks,DoItYBks,ArtBks,ItalArt}"

[37] "{ChildBks,YouthBks,CookBks,RefBks,ItalAtlas}"

[38] "{ChildBks,CookBks,RefBks,ArtBks,ItalAtlas,ItalArt}"

[39] "{CookBks,RefBks,ArtBks,GeogBks,ItalCook}"

[40] "{ChildBks,CookBks,DoItYBks,ArtBks,GeogBks,ItalArt}"

[41] "{ChildBks,CookBks,ArtBks,ItalArt}"

[42] "{RefBks,ArtBks,ItalArt}"

[43] "{ChildBks,CookBks,DoItYBks,ArtBks,ItalArt}"

[44] "{ChildBks,ArtBks,ItalAtlas}"

[45] "{RefBks,ArtBks,ItalCook,ItalAtlas}"

[46] "{ChildBks,CookBks,RefBks,ItalAtlas}"

[47] "{RefBks,GeogBks,ItalArt}"

[48] "{ChildBks,CookBks,DoItYBks,RefBks,ItalAtlas}"

[49] "{RefBks,ItalCook,ItalArt}"

[50] "{RefBks,ArtBks,ItalAtlas}"

[51] "{ArtBks,ItalCook,ItalAtlas}"

[52] "{ChildBks,CookBks,GeogBks,ItalAtlas}"

[53] "{ChildBks,YouthBks,CookBks,ItalAtlas}"

[54] "{ChildBks,CookBks,ArtBks,ItalAtlas,ItalArt}"

[55] "{ChildBks,CookBks,RefBks,GeogBks,ItalArt}"

[56] "{RefBks,ArtBks,GeogBks,ItalCook}"

[57] "{ChildBks,CookBks,GeogBks,ItalArt}"

[58] "{ChildBks,YouthBks,CookBks,ItalArt}"

[59] "{YouthBks,CookBks,DoItYBks,ItalArt}"

[60] "{ChildBks,CookBks,RefBks,ItalAtlas,ItalArt}"

[61] "{ChildBks,CookBks,DoItYBks,GeogBks,ItalArt}"

[62] "{ChildBks,CookBks,ItalArt}"

[63] "{ChildBks,CookBks,ItalAtlas}"

[64] "{ChildBks,CookBks,DoItYBks,ItalArt}"

[65] "{ChildBks,CookBks,DoItYBks,ItalAtlas}"

[66] "{ChildBks,CookBks,ItalAtlas,ItalArt}"

[67] "{CookBks,RefBks,ArtBks,GeogBks,ItalArt}"

[68] "{YouthBks,CookBks,RefBks,ItalAtlas}"

[69] "{CookBks,RefBks,ArtBks,ItalAtlas,ItalArt}"

[70] "{YouthBks,CookBks,ArtBks,ItalArt}"

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[426] "{CookBks,DoItYBks,ArtBks,GeogBks,ItalCook,ItalArt}"

Itemsets in Consequent (RHS)

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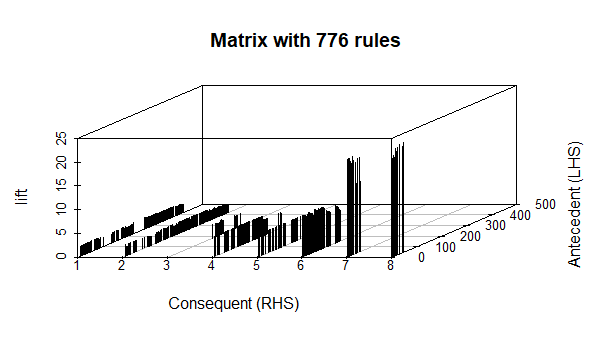
[6] "{ItalCook}" "{ItalArt}" "{ItalAtlas}"

Warning message:

In plot.rules(rules\_book2, method = "matrix3D") :

method 'matrix3D' is deprecated use method 'matrix' with engine '3d'

>



plot(rules\_book2,method = "matrix")

Itemsets in Antecedent (LHS)

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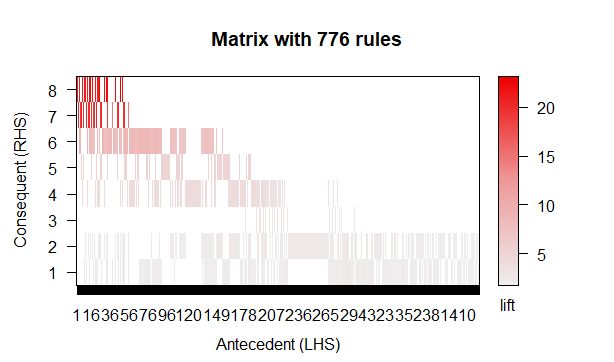
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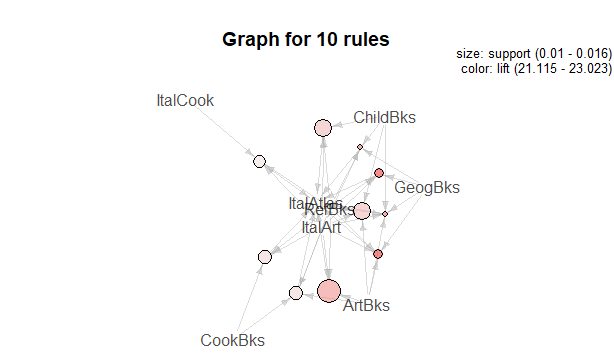
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Itemsets in Consequent (RHS)

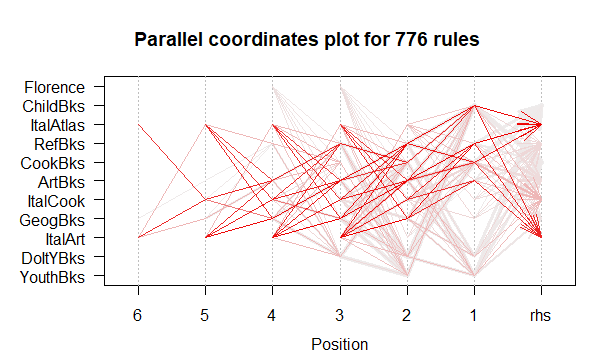
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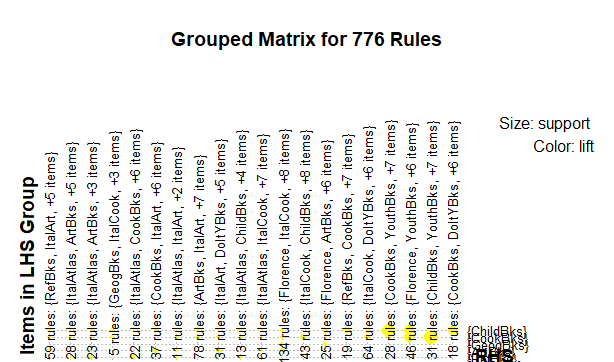
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[234] "{ChildBks,GeogBks,ItalCook,Florence}"

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[374] "{CookBks,ArtBks,GeogBks,ItalCook}"

[375] "{ArtBks,ItalArt,Florence}"

[376] "{YouthBks,CookBks,ArtBks,GeogBks}"

[377] "{ChildBks,YouthBks,ArtBks,GeogBks}"

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[412] "{ChildBks,ArtBks,GeogBks,Florence}"

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[421] "{DoItYBks,ArtBks,GeogBks,Florence}"

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[426] "{CookBks,DoItYBks,ArtBks,GeogBks,ItalCook,ItalArt}"

Itemsets in Consequent (RHS)

[1] "{ChildBks}" "{CookBks}" "{GeogBks}" "{ArtBks}" "{RefBks}"

[6] "{ItalCook}" "{ItalArt}" "{ItalAtlas}"

