Vignette ecospat package

Contents

==========

Valeria Di Cola, Olivier Broennimann, Blaise Petitpierre, Manuela D'Amen, Frank Breiner & Antoine Guisan ##### 08 November, 2017

Miscellaneous methods and utilities for spatial ecology analysis, written by current and former members and collaborators of the ecospat group of Antoine Guisan, Department of Ecology and Evolution (DEE) & Institute of Earth Surface Dynamics (IDYST), University of Lausanne, Switzerland.

ecospat offers the possibility to perform Pre-modelling Analysis, such as Spatial autocorrelation analysis, MESS (Multivariate Environmental Similarity Surfaces) analyses, Phylogenetic diversity Measures, Biotic Interactions. It also provides functions to complement *biomod2* in preparing the data, calibrating and evaluating (e.g. boyce index) and projecting the models. Complementary analysis based on model predictions (e.g. co-occurrences analyses) are also provided.

In addition, the *ecospat* package includes Niche Quantification and Overlap functions that were used in Broennimann et al. 2012 and Petitpierre et al. 2012 to quantify climatic niche shifts between the native and invaded ranges of invasive species.

1 Load data

```
library(ecospat)
```

```
## Loading required package: ade4
```

```
## Loading required package: ape

## Loading required package: gbm

## Loading required package: survival

## Loading required package: lattice

## Loading required package: splines

## Loading required package: parallel

## Loaded gbm 2.1.3

## Loading required package: sp
```

```
citation("ecospat")
```

```
##
## To cite package 'ecospat' in publications use:
##
##   Olivier Broennimann, Valeria Di Cola and Antoine Guisan (2018).
##   ecospat: Spatial Ecology Miscellaneous Methods. R package
##   version 3.0.
##   http://www.unil.ch/ecospat/home/menuguid/ecospat-resources/tools.html
##
## A BibTeX entry for LaTeX users is
##
##   @Manual{,
##     title = {ecospat: Spatial Ecology Miscellaneous Methods},
##     author = {Olivier Broennimann and Valeria {Di Cola} and Antoine Guisan},
##     year = {2018},
##     note = {R package version 3.0},
##     url = {http://www.unil.ch/ecospat/home/menuguid/ecospat-resources/tools.html},
##   }
```

1.0.1 Test data for the ecospat library

ecospat.testData()

```
data(ecospat.testData)
names(ecospat.testData)
```

```
##  [1] "numplots"                  "long"
##  [3] "lat"                       "ddeg"
##  [5] "mind"                      "srad"
##  [7] "slp"                       "topo"
##  [9] "Achillea_atrata"           "Achillea_millefolium"
## [11] "Acinos_alpinus"            "Adenostyles_glabra"
## [13] "Aposeris_foetida"          "Arnica_montana"
## [15] "Aster_bellidiastrum"       "Bartsia_alpina"
## [17] "Bellis_perennis"           "Campanula_rotundifolia"
## [19] "Centaurea_montana"         "Cerastium_latifolium"
## [21] "Cruciata_laevipes"         "Doronicum_grandiflorum"
```

```
## [23] "Galium_album"                  "Galium_anisophyllon"
## [25] "Galium_megalospermum"          "Gentiana_bavarica"
## [27] "Gentiana_lutea"                "Gentiana_purpurea"
## [29] "Gentiana_verna"                "Globularia_cordifolia"
## [31] "Globularia_nudicaulis"         "Gypsophila_repens"
## [33] "Hieracium_lactucella"          "Homogyne_alpina"
## [35] "Hypochaeris_radicata"          "Leontodon_autumnalis"
## [37] "Leontodon_helveticus"          "Myosotis_alpestris"
## [39] "Myosotis_arvensis"             "Phyteuma_orbiculare"
## [41] "Phyteuma_spicatum"             "Plantago_alpina"
## [43] "Plantago_lanceolata"           "Polygonum_bistorta"
## [45] "Polygonum_viviparum"           "Prunella_grandiflora"
## [47] "Rhinanthus_alectorolophus"     "Rumex_acetosa"
## [49] "Rumex_crispus"                 "Vaccinium_gaultherioides"
## [51] "Veronica_alpina"               "Veronica_aphylla"
## [53] "Agrostis_capillaris"           "Bromus_erectus_sstr"
## [55] "Campanula_scheuchzeri"         "Carex_sempervirens"
## [57] "Cynosurus_cristatus"           "Dactylis_glomerata"
## [59] "Daucus_carota"                 "Festuca_pratensis_sl"
## [61] "Geranium_sylvaticum"           "Leontodon_hispidus_sl"
## [63] "Potentilla_erecta"             "Pritzelago_alpina_sstr"
## [65] "Prunella_vulgaris"             "Ranunculus_acris_sl"
## [67] "Saxifraga_oppositifolia"       "Soldanella_alpina"
## [69] "Taraxacum_officinale_aggr"     "Trifolium_repens_sstr"
## [71] "Veronica_chamaedrys"           "Parnassia_palustris"
## [73] "glm_Agrostis_capillaris"       "glm_Leontodon_hispidus_sl"
## [75] "glm_Dactylis_glomerata"        "glm_Trifolium_repens_sstr"
## [77] "glm_Geranium_sylvaticum"       "glm_Ranunculus_acris_sl"
## [79] "glm_Prunella_vulgaris"         "glm_Veronica_chamaedrys"
## [81] "glm_Taraxacum_officinale_aggr" "glm_Plantago_lanceolata"
## [83] "glm_Potentilla_erecta"         "glm_Carex_sempervirens"
## [85] "glm_Soldanella_alpina"         "glm_Cynosurus_cristatus"
## [87] "glm_Campanula_scheuchzeri"     "glm_Festuca_pratensis_sl"
## [89] "glm_Bromus_erectus_sstr"       "glm_Saxifraga_oppositifolia"
## [91] "glm_Daucus_carota"             "glm_Pritzelago_alpina_sstr"
## [93] "gbm_Bromus_erectus_sstr"       "gbm_Saxifraga_oppositifolia"
## [95] "gbm_Daucus_carota"             "gbm_Pritzelago_alpina_sstr"
```

1.0.2 Test data for the Niche Overlap Analysis

ecospat.testNiche.inv()

```
data(ecospat.testNiche.inv)
names(ecospat.testNiche.inv)
```

```
##  [1] "x"           "y"           "aetpet"      "gdd"         "p"
##  [6] "pet"         "stdp"        "tmax"        "tmin"        "tmp"
## [11] "species_occ" "predictions"
```

ecospat.testNiche.nat()

```
data(ecospat.testNiche.nat)
names(ecospat.testNiche.nat)
```

```
##  [1] "x"           "y"           "aetpet"      "gdd"         "p"
##  [6] "pet"         "stdp"        "tmax"        "tmin"        "tmp"
## [11] "species_occ" "predictions"
```

1.0.3 Test tree for Phylogenetic Diversity Analysis

ecospat.testTree()

```
fpath <- system.file("extdata", "ecospat.testTree.tre", package="ecospat")
fpath
```

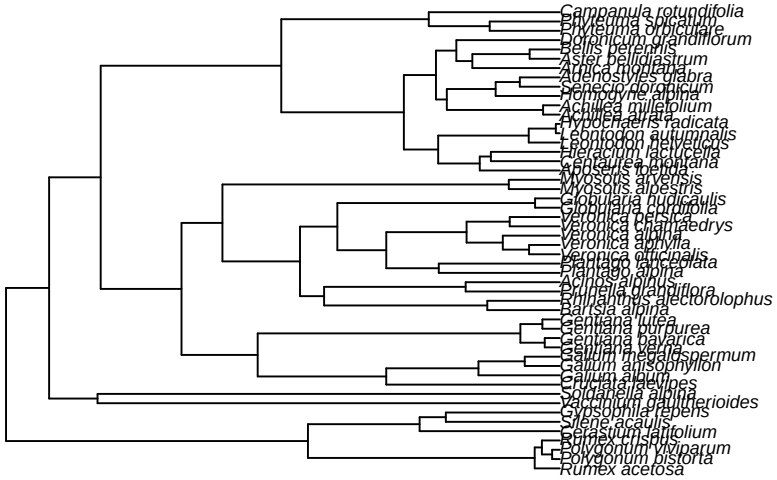
```
## [1] "C:/Users/obroenni/AppData/Local/Temp/RtmpAdePXV/Rinst1b4c4e4665ba/ecospat/extdata/ecospat.te
```

```
tree<-read.tree(fpath)
tree$tip.label
```

```
##  [1] "Rumex_acetosa"              "Polygonum_bistorta"
##  [3] "Polygonum_viviparum"        "Rumex_crispus"
##  [5] "Cerastium_latifolium"       "Silene_acaulis"
##  [7] "Gypsophila_repens"          "Vaccinium_gaultherioides"
##  [9] "Soldanella_alpina"          "Cruciata_laevipes"
## [11] "Galium_album"               "Galium_anisophyllon"
## [13] "Galium_megalospermum"       "Gentiana_verna"
## [15] "Gentiana_bavarica"          "Gentiana_purpurea"
## [17] "Gentiana_lutea"             "Bartsia_alpina"
## [19] "Rhinanthus_alectorolophus" "Prunella_grandiflora"
## [21] "Acinos_alpinus"             "Plantago_alpina"
## [23] "Plantago_lanceolata"        "Veronica_officinalis"
## [25] "Veronica_aphylla"           "Veronica_alpina"
## [27] "Veronica_chamaedrys"        "Veronica_persica"
## [29] "Globularia_cordifolia"      "Globularia_nudicaulis"
## [31] "Myosotis_alpestris"         "Myosotis_arvensis"
## [33] "Aposeris_foetida"           "Centaurea_montana"
## [35] "Hieracium_lactucella"       "Leontodon_helveticus"
## [37] "Leontodon_autumnalis"       "Hypochaeris_radicata"
## [39] "Achillea_atrata"            "Achillea_millefolium"
## [41] "Homogyne_alpina"            "Senecio_doronicum"
## [43] "Adenostyles_glabra"         "Arnica_montana"
## [45] "Aster_bellidiastrum"        "Bellis_perennis"
## [47] "Doronicum_grandiflorum"     "Phyteuma_orbiculare"
## [49] "Phyteuma_spicatum"          "Campanula_rotundifolia"
```

Plot tree

```
plot(tree, cex=0.6)
```

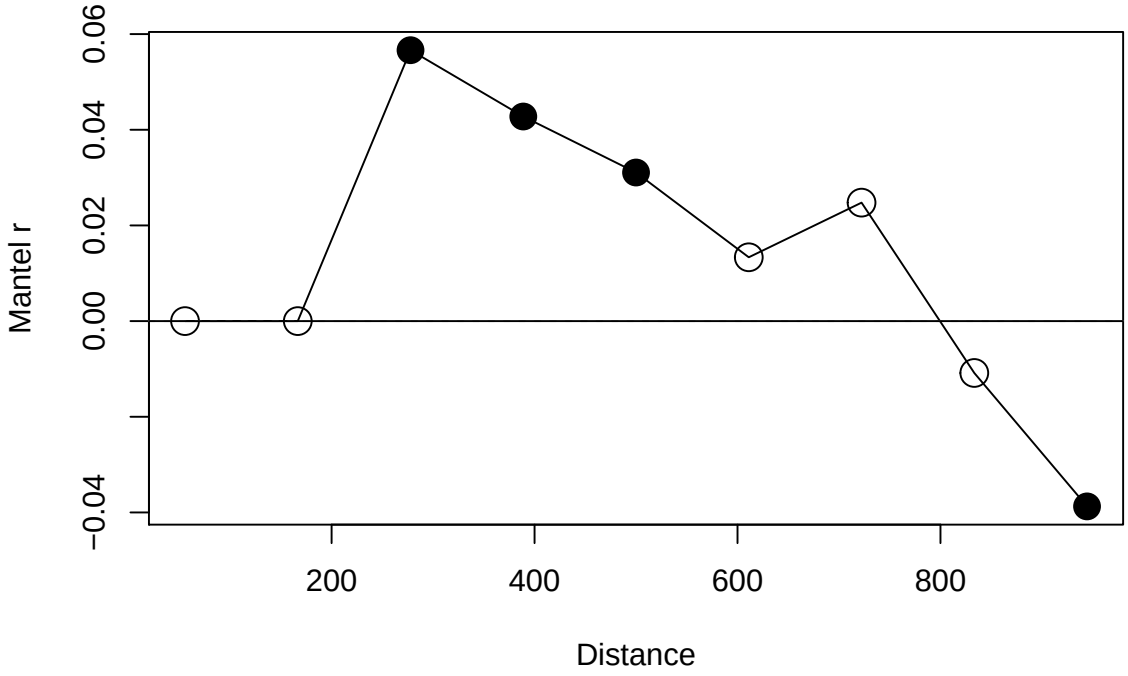


2 Pre-Modelling Analysis

2.1 Spatial Auto-correlation

2.1.1 Mantel Correlogram with *ecospat.mantel.correlogram()*

```
ecospat.mantel.correlogram(dfvar=ecospat.testData[c(2:16)],colxy=1:2, n=100,
                           colvar=3:7, max=1000, nclass=10, nperm=100)
```



The graph indicates that spatial autocorrelation (SA) is minimal at a distance of 180 meters. Note however that SA is not significantly different than zero for several distances (open circles).

2.2 Predictor Variable Selection

2.2.1 Number of Predictors with Pearson Correlation *ecospat.npred()*

```
colvar <- ecospat.testData[c(4:8)]
x <- cor(colvar, method="pearson")
ecospat.npred (x, th=0.75)
```

```
## [1] 4
```

2.2.2 Number of Predictors with Spearman Correlation *ecospat.npred()*

```
x <- cor(colvar, method="spearman")
ecospat.npred (x, th=0.75)
```

```
## [1] 4
```

2.3 Climate Analogy Tools

2.3.1 Climate Analogy with *ecospat.climan()*

```
x <- ecospat.testData[c(4:8)]
p<- x[1:90,] #A projection dataset.
ref<- x[91:300,] # A reference dataset
```

```
ecospat.climan(ref,p)
```

```
##  [1]  0.185415746 -0.028290993 -0.032909931 -0.009237875 -0.034642032
##  [6] -0.209006928 -0.084295612 -0.103622863  0.355220600 -0.136258661
## [11] -0.087182448 -0.209006928 -0.143187067 -0.124711316 -0.114844720
## [16] -0.230596451  0.276046242  0.249093277 -0.125288684 -0.101226337
## [21] -0.113883908 -0.204653076 -0.001154734 -0.132217090 -0.100461894
## [26]  0.464738681 -0.416578541 -0.044457275 -0.018475751 -0.122225532
## [31] -0.137611720 -0.050808314  0.254605027 -0.062012319  0.238294633
## [36] -0.159141330 -0.147806005  0.277670365 -0.071593533 -0.019053118
## [41]  0.390781314  0.175132571  0.401892929  0.843703731  0.286155800
## [46]  0.321142114  0.668511130  0.252253209  0.440050672  0.177247206
## [51]  0.831525456  0.303710525  0.197182304  0.219273698  0.196637663
## [56]  0.195300816  0.142395786  0.176988160 -0.051991905  0.265163111
## [61] -0.020785219 -0.017898383  0.553965995  0.409635110  0.323633285
## [66]  0.468693064  0.124983005 -0.032909931  0.165642783  0.147046687
## [71]  0.202895471  0.341992334  0.225508458  0.133254065  0.485295264
## [76] -0.047344111 -0.012282931  0.165429659  0.134199992  0.216655251
## [81]  0.139419127  0.121254775  0.098782992  0.591393741  0.110866239
## [86]  0.146010655  0.095562156  0.093353356  0.081712342  0.160531262
```

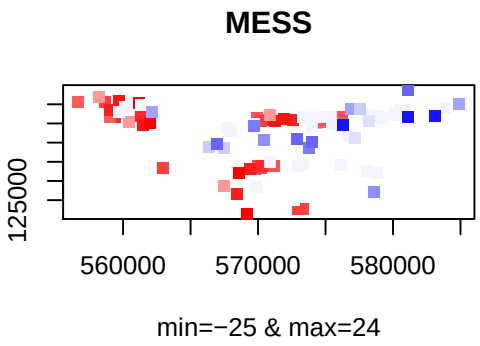
2.3.2 Extrapolation detection, creating a MESS object with *ecospat.mess()*

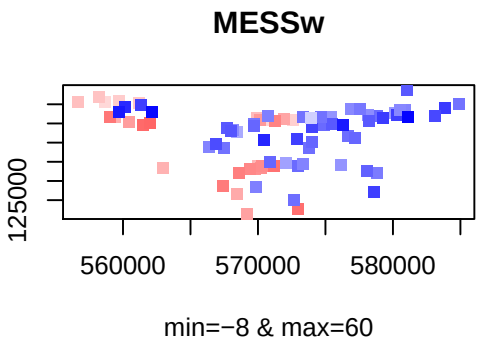
```
x <- ecospat.testData[c(2,3,4:8)]
proj<- x[1:90,] #A projection dataset.
cal<- x[91:300,] #A calibration dataset
```

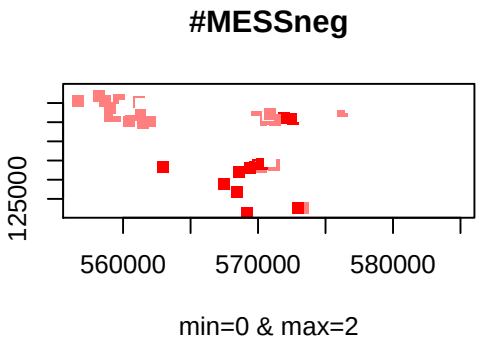
```
mess.object<-ecospat.mess (proj, cal, w="default")
```

2.3.2.1 Plot MESS with *ecospat.plot.mess()*

```
ecospat.plot.mess (mess.object, cex=1, pch=15)
```







In the MESS plot pixels in red indicate sites where at least one environmental predictor has values outside of the range of that predictor in the calibration dataset. In the MESSw plot, same as previous plot but with weighted by the number of predictors.Finally, the MESSneg plot shows at each site how many predictors have values outside of their calibration range.

2.4 Phylogenetic Diversity Measures

```
fpath <- system.file("extdata", "ecospat.testTree.tre", package="ecospat")
tree <- read.tree(fpath)
data <- ecospat.testData[9:52]
```

2.4.1 Calculate Phylogenetic Diversity Measures *ecospat.calculate.pd*

```
pd<- ecospat.calculate.pd(tree, data, method = "spanning", type = "species", root = TRUE, average =
```

```
## Progress (. = 100 pixels calculated):
## ... [300]
## All 300 pixels done.
```

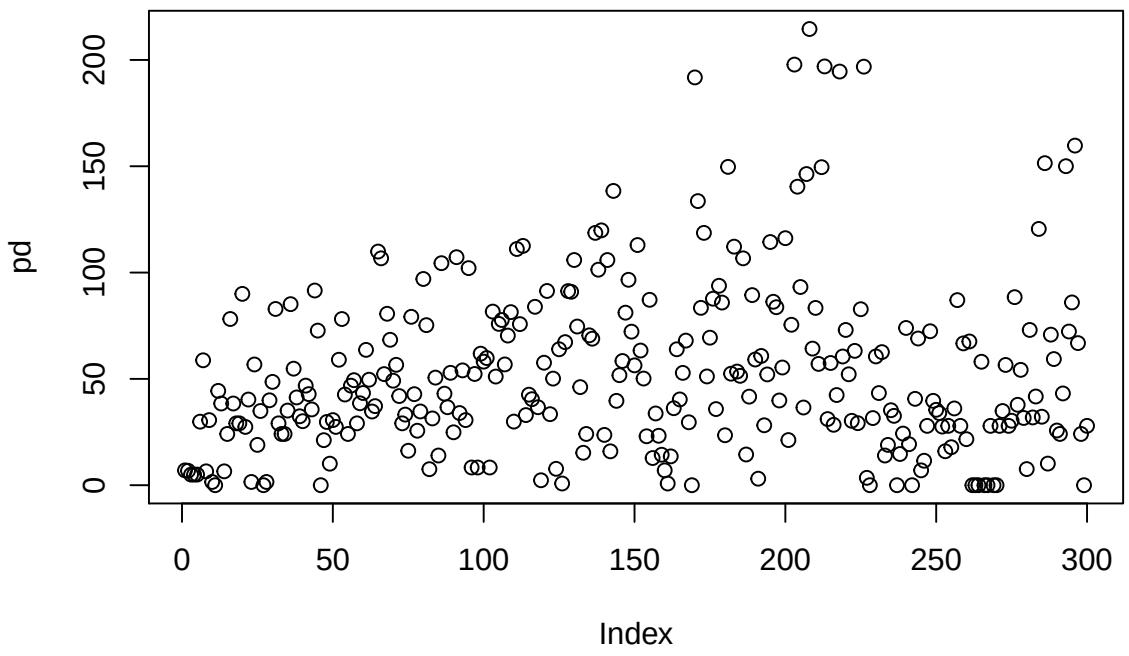
```
pd
```

```
##   [1]   6.9782188   6.7981743   4.9964700   4.9964700   4.9964700
##   [6]  29.8820547  58.7451752   6.5223035  30.6152478   1.5258335
##  [11]   0.0000000  44.3661803  38.4155607   6.5223035  24.0929443
##  [16]  78.1607950  38.4155607  29.0894143  29.0894143  89.9839758
##  [21]  27.4135569  40.2827035   1.5258335  56.7686202  18.9535475
##  [26]  34.8871800   0.0000000   1.5258335  39.9291325  48.5997861
```

```
##  [31]  82.8763723  29.0894143  24.0929443  24.0929443  35.0949481
##  [36]  85.1406422  54.7974724  41.2817284  32.4100269  30.0984781
##  [41]  46.8247511  42.8358475  35.6223697  91.5539224  72.7022527
##  [46]   0.0000000  21.1862293  29.7320308  10.1187868  30.6152478
##  [51]  27.4135569  59.0015345  78.1536692  42.6423378  24.0929443
##  [56]  46.8050070  49.3924266  29.0894143  38.5290848  43.3611373
##  [61]  63.6397674  49.6097169  34.6522309  37.1871282 109.8813371
##  [66] 106.6971561  52.2512132  80.6221671  68.3867818  49.1362998
##  [71]  56.6138690  41.9283257  29.0894143  33.2026673  16.1897593
##  [76]  79.1938213  42.8115427  25.6187778  34.6805724  96.9902366
##  [81]  75.2672695   7.5313673  31.4078882  50.5865673  13.9570775
##  [86] 104.4121025  43.0464918  36.6693230  52.8590823  24.8855847
##  [91] 107.2302322  33.9358604  54.0048319  30.6152478 102.0983385
##  [96]   8.3170826  52.3071062   8.3170826  61.8562896  58.1179346
## [101]  59.7939424   8.3170826  81.6495398  51.1054635  75.8701970
## [106]  77.6947419  56.7929250  70.3693202  81.3965205  29.9118877
## [111] 111.0790432  75.7518798 112.5482496  32.9763735  42.5644761
## [116]  40.4507005  83.8955419  36.6693230   2.3184739  57.5978451
## [121]  91.3453370  33.3983912  50.1351419   7.7084002  63.9227817
## [126]   0.7926404  67.2813325  91.2965996  90.9578739 105.9024741
## [131]  74.6128871  46.1321553  15.2479619  24.0929443  70.4802708
## [136]  68.8949899 118.6657550 101.3545260 119.8539056  23.6602184
## [141] 105.8968281  15.9336325 138.4059855  39.6674173  51.7391372
## [146]  58.4119283  81.1388699  96.6048825  72.2156025  56.3601992
## [151] 112.9489963  63.3258805  50.1594468  23.0021994  87.1886965
## [156]  12.7714946  33.7421666  23.2537702  14.3226164   6.9752071
## [161]   0.7926404  13.5641350  36.2007616  63.9227817  40.3310946
## [166]  52.8264129  67.9956878  29.5843437   0.0000000 191.7818606
## [171] 133.6077875  83.3977825 118.6711630  51.1512871  69.3838811
## [176]  87.7066616  35.8005270  93.7797077  85.8984840  23.4933413
## [181] 149.7094684  52.4451847 112.1873673  53.4479612  51.4341108
## [186] 106.6959500  14.4361405  41.6547546  89.4018733  59.1068292
## [191]   3.0516670  60.7852739  28.1850877  52.1002690 114.3651475
## [196]  86.2640717  83.7092232  39.8499777  55.3514065 116.1795597
## [201]  21.2346203  75.4593878 197.8157358 140.3806968  93.2192350
## [206]  36.5337815 146.3370747 214.5450205  64.2439145  83.3740177
## [211]  57.0440643 149.5697614 196.9415036  31.0984631  57.4769230
## [216]  28.4014469  42.3978747 194.5384819  60.5204195  73.0060715
## [221]  52.1628582  30.2801165  63.1752097  29.1789484  82.7662787
## [226] 196.8309769   3.4666557   0.0000000  31.5688084  60.5650008
## [231]  43.3334929  62.5952411  13.9570775  18.9495667  35.2646601
## [236]  32.6155790   0.0000000  14.6693623  24.2745827  73.9480832
## [241]  19.2825866   0.0000000  40.6115985  68.9862341   6.9782188
## [246]  11.5030881  27.9105497  72.4020225  39.6781995  35.4596364
## [251]  33.9160835  27.5735165  15.9619740  27.9105497  17.8628493
## [256]  36.0936777  87.0440848  27.9105497  66.6907987  21.6475811
## [261]  67.5969904   0.0000000   0.0000000   0.0000000  58.0542370
## [266]   0.0000000   0.0000000  27.9105497   0.0000000   0.0000000
## [271]  27.9105497  34.8887684  56.5556633  27.9105497  30.3097595
## [276]  88.4296666  37.8150727  54.2397810  31.6243116   7.5799087
## [281]  73.0136833  31.8638035  41.7172212 120.5228857  32.2001243
## [286] 151.4545228  10.1544492  70.8133537  59.3255687  25.7211220
## [291]  24.1115267  43.1500941 150.0299191  72.2758570  85.9498096
## [296] 159.7242106  66.8328159  24.0929443   0.0000000  27.9105497
```

2.4.1.1 Plot the results (correlation of phylogenetic diversity with species richness)

```
plot(pd)
```



2.5 Niche Quantification and Comparison with Ordination techniques

Loading test data for the niche dynamics analysis in the invaded range

```
inv <- ecospat.testNiche.inv
```

Loading test data for the niche dynamics analysis in the native range

```
nat <- ecospat.testNiche.nat
```

2.5.1 PCA-ENVIRONMENT

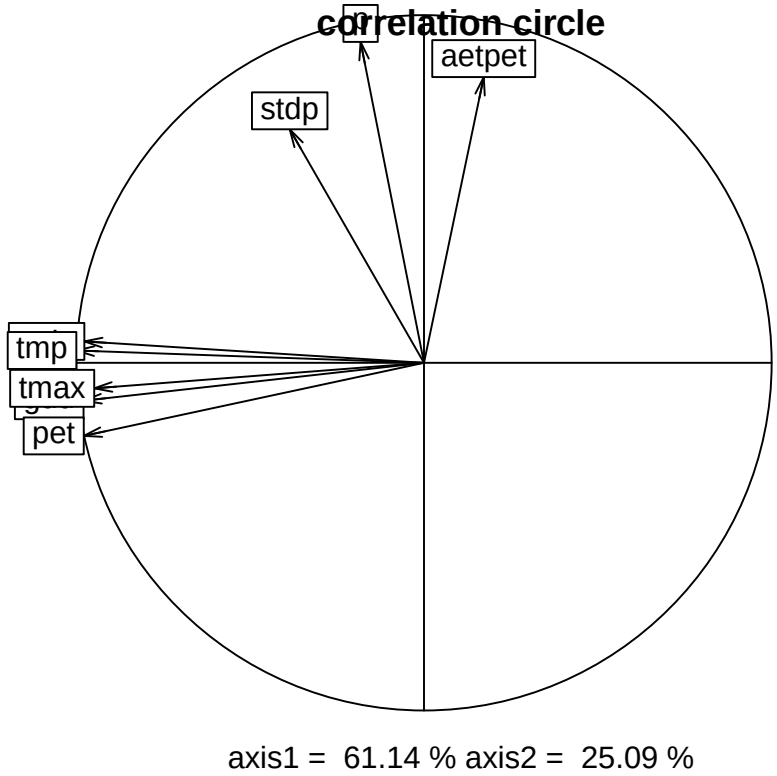
2.5.1.1 The PCA is calibrated on all the sites of the study area

Calibrating the PCA in the whole studay area, including both native and invaded ranges (same as PCAenv in Broenniman et al. 2012)

```
pca.env <- dudi.pca(rbind(nat,inv)[,3:10],scannf=F,nf=2)
```

2.5.1.2 Plot Variables Contribution with *ecospat.plot.contrib()*

```
ecospat.plot.contrib(contrib=pca.env$co, eigen=pca.env$eig)
```



The correlation circle indicate the contribution of original predictors to the PCA axes.

2.5.1.3 Predict the scores on the axes

```
# PCA scores for the whole study area
scores.globclim <- pca.env$li

# PCA scores for the species native distribution
scores.sp.nat <- suprow(pca.env,nat[which(nat[,11]==1),3:10])$li

# PCA scores for the species invasive distribution
scores.sp.inv <- suprow(pca.env,inv[which(inv[,11]==1),3:10])$li

# PCA scores for the whole native study area
scores.clim.nat <- suprow(pca.env,nat[,3:10])$li

# PCA scores for the whole invaded study area
scores.clim.inv <- suprow(pca.env,inv[,3:10])$li
```

2.5.2 Calculate the Occurrence Densities Grid with *ecospat.grid.clim.dyn()*

For a species in the native range (North America)

```
# gridding the native niche
grid.clim.nat <- ecospat.grid.clim.dyn(glob=scores.globclim,
                                       glob1=scores.clim.nat,
                                       sp=scores.sp.nat, R=100,
                                       th.sp=0)
```

For a species in the invaded range (Australia)

```
# gridding the invasive niche
grid.clim.inv <- ecospat.grid.clim.dyn(glob=scores.globclim,
                                       glob1=scores.clim.inv,
                                       sp=scores.sp.inv, R=100,
                                       th.sp=0)
```

2.5.3 Calculate Niche Overlap with *ecospat.niche.overlap()*

```
# Compute Schoener's D, index of niche overlap
D.overlap <- ecospat.niche.overlap (grid.clim.nat, grid.clim.inv, cor=T)$D
D.overlap
```

```
## [1] 0.224586
```

The niche overlap between the native and the ivaded range is 22%.

2.5.4 Perform the Niche Equivalency Test with *ecospat.niche.equivalency.test()* according to Warren et al. (2008)

It is reccomended to use at least 1000 replications for the equivalency test. As an example we used rep = 10, to reduce the computational time.

```
eq.test <- ecospat.niche.equivalency.test(grid.clim.nat, grid.clim.inv,
                                          rep=10, alternative = "greater")
```

Niche equivalency test H1: Is the overlap between the native and invaded niche higher than two random niches?

2.5.5 Perform the Niche Similarity Test with *ecospat.niche.similarity.test()*

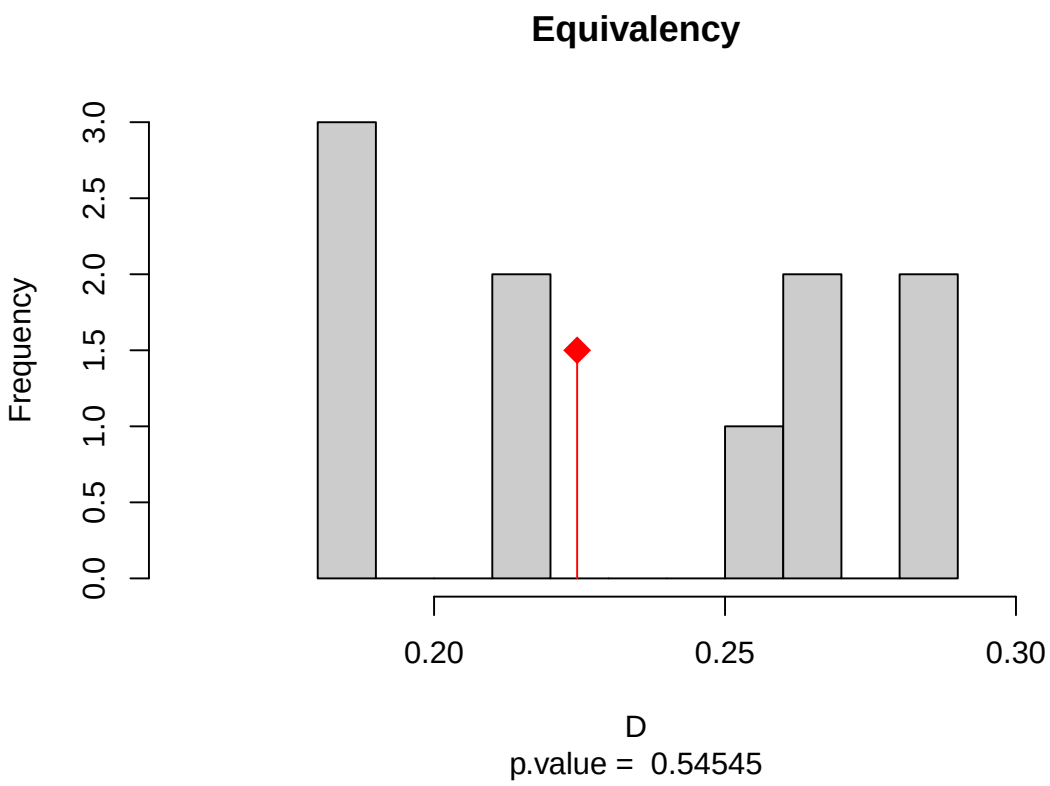
Shifting randomly the invasive niche in the invaded study area It is recomended to use at least 1000 replications for the similarity test. As an example we used rep = 10, to reduce the computational time.

```
sim.test <- ecospat.niche.similarity.test(grid.clim.nat, grid.clim.inv,
                                          rep=10, alternative = "greater",
                                          rand.type=2)
```

Niche similarity test H1: Is the overlap between the native and invaded higher than when the invasive niche is randomly introduced in the invaded study area?

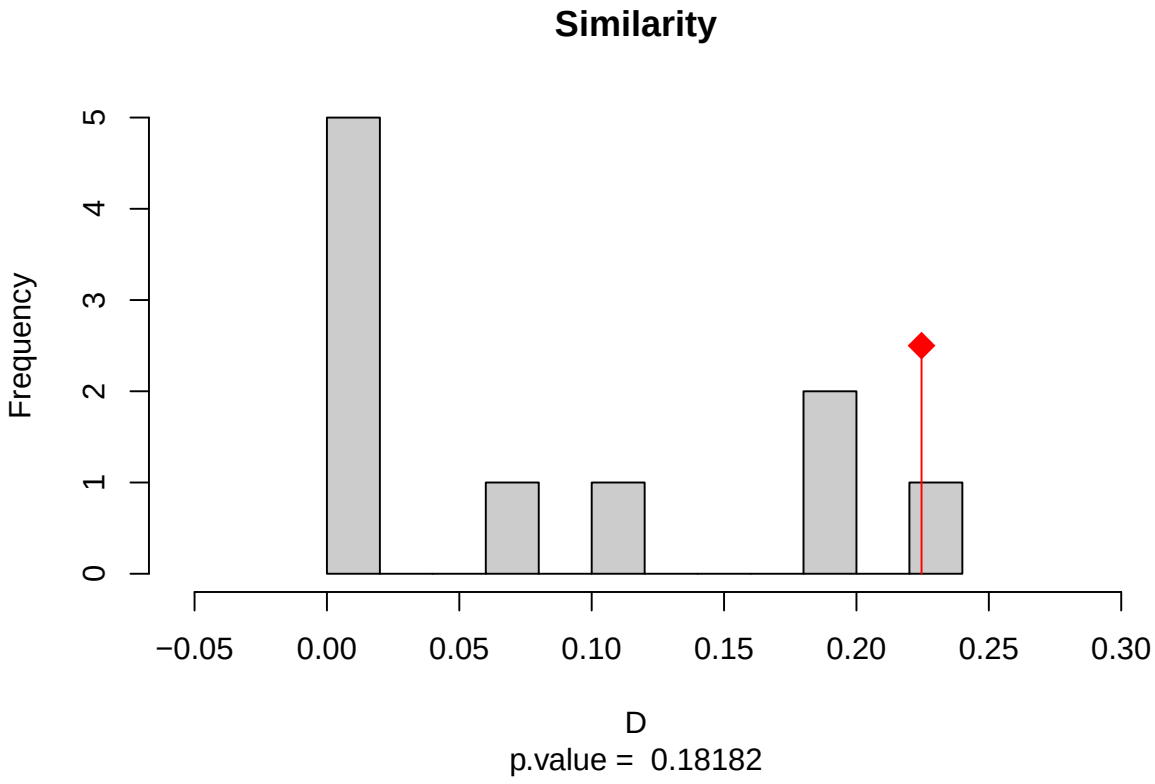
2.5.5.1 Plot Equivalency test

```
ecospat.plot.overlap.test(eq.test, "D", "Equivalency")
```



2.5.5.2 Plot Similarity test

```
ecospat.plot.overlap.test(sim.test, "D", "Similarity")
```



We see that the niche overlap D is 22% and this value is compared to the random distribution of the niche equivalency and niche similarity tests.

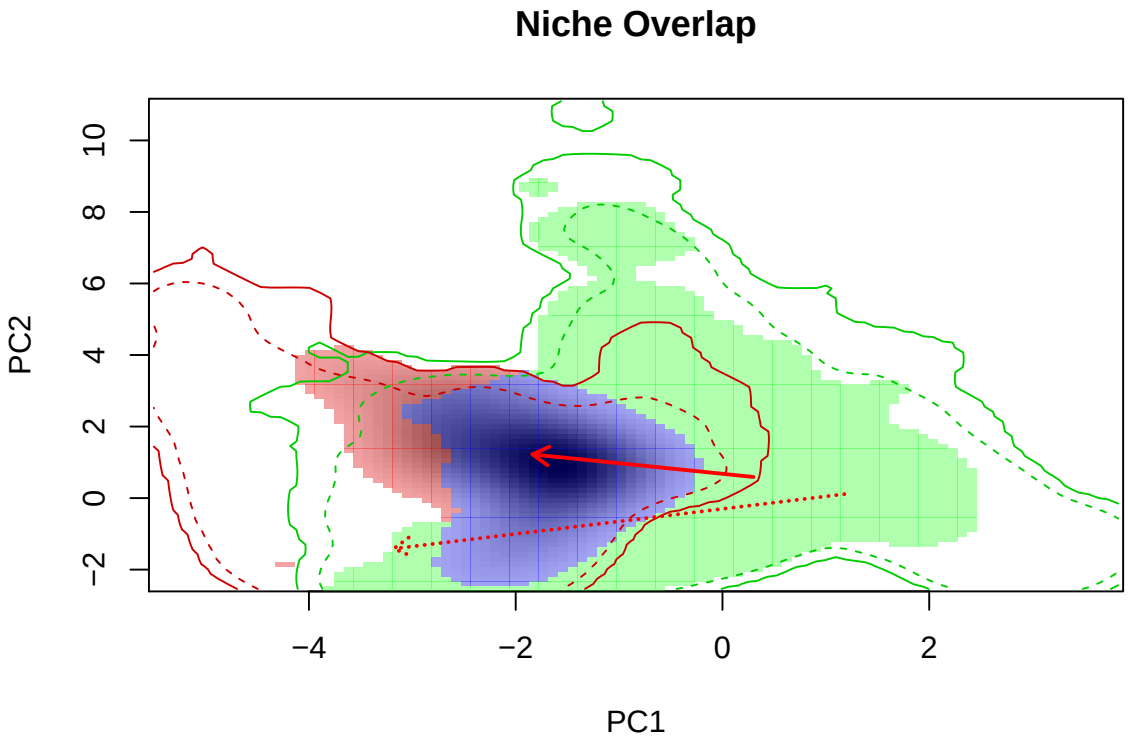
2.5.6 Delimiting niche categories and quantifying niche dynamics in analogue climates with *ecospat.niche.dyn.index()*

```
niche.dyn <- ecospat.niche.dyn.index (grid.clim.nat, grid.clim.inv, intersection = 0.1)
```

2.5.6.1 Visualizing niche categories, niche dynamics and climate analogy between ranges with *ecospat.plot.niche.dyn()*

Plot niche overlap

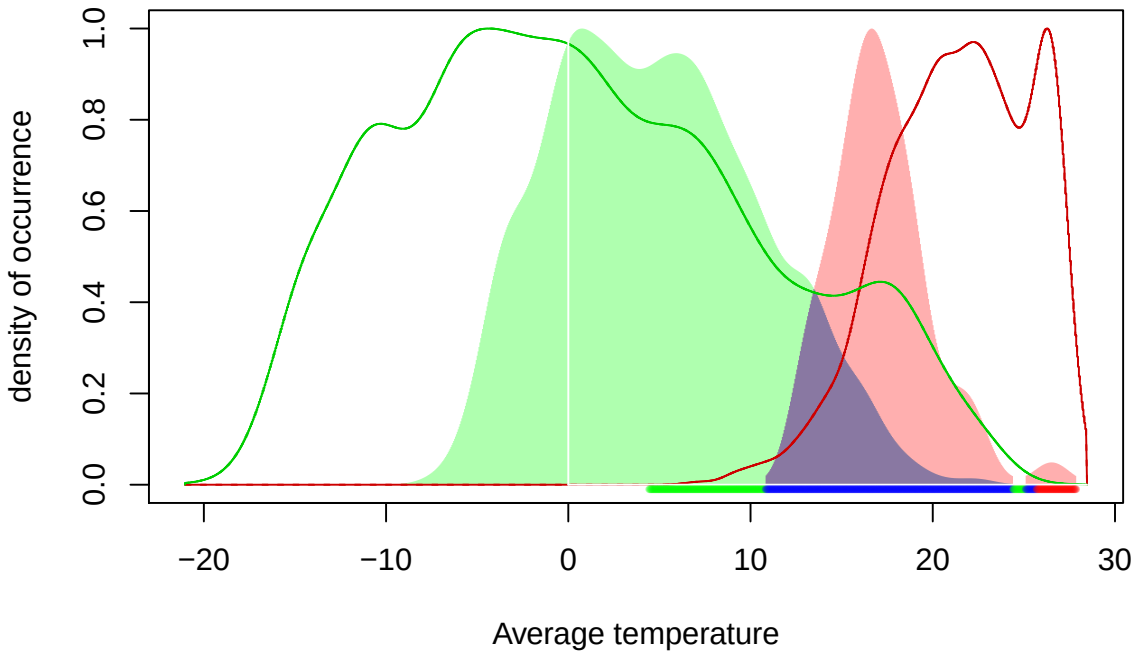
```
ecospat.plot.niche.dyn(grid.clim.nat, grid.clim.inv, quant=0.25, interest=2,
                       title= "Niche Overlap", name.axis1="PC1",
                       name.axis2="PC2")

ecospat.shift.centroids(scores.sp.nat, scores.sp.inv, scores.clim.nat, scores.clim.inv)
```



2.5.6.2 Plot the niche dynamics along one gradient (here temperature) with *ecospat.plot.niche.dyn()*

```
# gridding the native niche
grid.clim.t.nat <- ecospat.grid.clim.dyn(glob=as.data.frame(rbind(nat,inv)[,10]),
                                         glob1=as.data.frame(nat[,10]),
                                    sp=as.data.frame(nat[which(nat[,11]==1),10]),
                                    R=1000, th.sp=0)
```

```
# gridding the invaded niche
grid.clim.t.inv <- ecospat.grid.clim.dyn(glob=as.data.frame(rbind(nat,inv)[,10]),
                                         glob1=as.data.frame(inv[,10]),
                                         sp=as.data.frame(inv[which(inv[,11]==1),10]),
                                         R=1000, th.sp=0)
t.dyn<-ecospat.niche.dyn.index (grid.clim.t.nat, grid.clim.t.inv,
                                intersection=0.1)
ecospat.plot.niche.dyn(grid.clim.t.nat, grid.clim.t.inv, quant=0,
                       interest=2, title= "Niche Overlap",
                       name.axis1="Average temperature")
```



2.6 Biotic Interactions

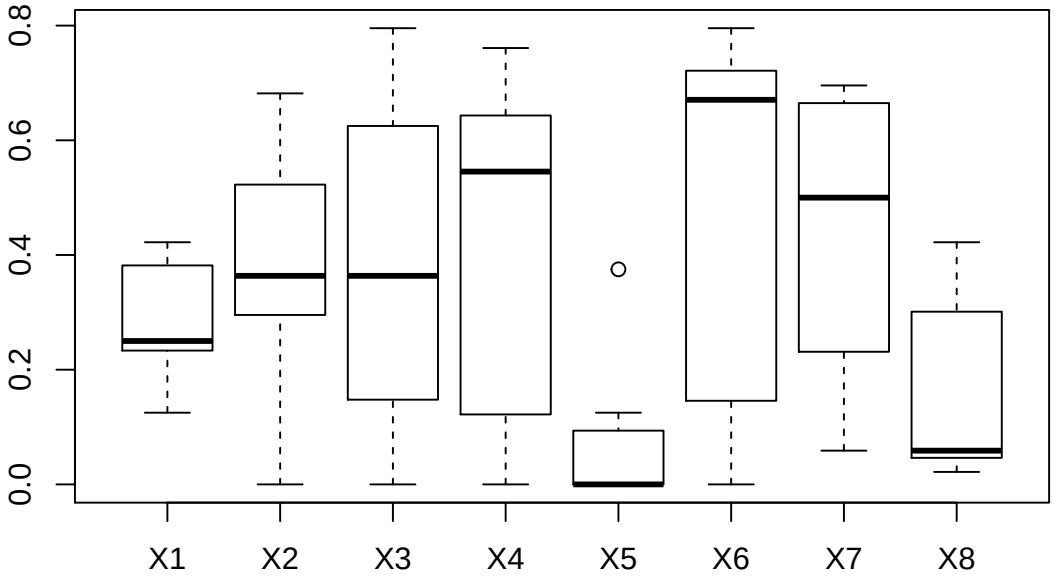
2.6.1 Species Co-occurrences Analysis with a Presence-absence matrix using the function *ecospat.co_occurrences()*

```
data <- ecospat.testData[c(9:16,54:57)]
```

For each pair of species (sp1, sp2), the number (N) of plots where both species were present is divided by the number of plots where the rarest of the two species is present. This index ranges from 0 (no co-occurrence) to 1 (always in co-occurrence) as given in eq. 1.

where N(S1 intersects S2) is the number of times species S1 and S2 co-occur, while Min(NS1, NS2) is the number of times species S1 and S2 co-occur, while is the occurrence frequency of the rarest of the two species.

```
ecospat.co_occurrences (data)
```




```
##                       Aposeris_foetida Arnica_montana Aster_bellidiastrum
## Aposeris_foetida             1.0000000      0.3636364          0.25000000
## Arnica_montana               0.3636364      1.0000000          0.36363636
## Aster_bellidiastrum          0.2500000      0.3636364          1.00000000
## Bartsia_alpina               0.2222222      0.5454545          0.59090909
## Bromus_erectus_sstr          0.1250000      0.0000000          0.00000000
## Campanula_scheuchzeri        0.2444444      0.6818182          0.79545455
## Carex_sempervirens           0.4000000      0.5000000          0.65909091
## Cynosurus_cristatus          0.4222222      0.2272727          0.04545455
##                       Bartsia_alpina Bromus_erectus_sstr
## Aposeris_foetida          0.22222222              0.1250
## Arnica_montana            0.54545455              0.0000
## Aster_bellidiastrum       0.59090909              0.0000
## Bartsia_alpina            1.00000000              0.0000
## Bromus_erectus_sstr       0.00000000              1.0000
## Campanula_scheuchzeri     0.76086957              0.0000
## Carex_sempervirens        0.69565217              0.0625
## Cynosurus_cristatus       0.02173913              0.3750
##                       Campanula_scheuchzeri Carex_sempervirens
## Aposeris_foetida                 0.24444444         0.40000000
## Arnica_montana                   0.68181818         0.50000000
## Aster_bellidiastrum              0.79545455         0.65909091
## Bartsia_alpina                   0.76086957         0.69565217
## Bromus_erectus_sstr              0.00000000         0.06250000
## Campanula_scheuchzeri            1.00000000         0.67058824
## Carex_sempervirens               0.67058824         1.00000000
## Cynosurus_cristatus              0.04705882         0.05882353
##                       Cynosurus_cristatus
## Aposeris_foetida               0.42222222
## Arnica_montana                 0.22727273
## Aster_bellidiastrum            0.04545455
```

```
## Bartsia_alpina                0.02173913
## Bromus_erectus_sstr           0.37500000
## Campanula_scheuchzeri         0.04705882
## Carex_sempervirens            0.05882353
## Cynosurus_cristatus           1.00000000
```

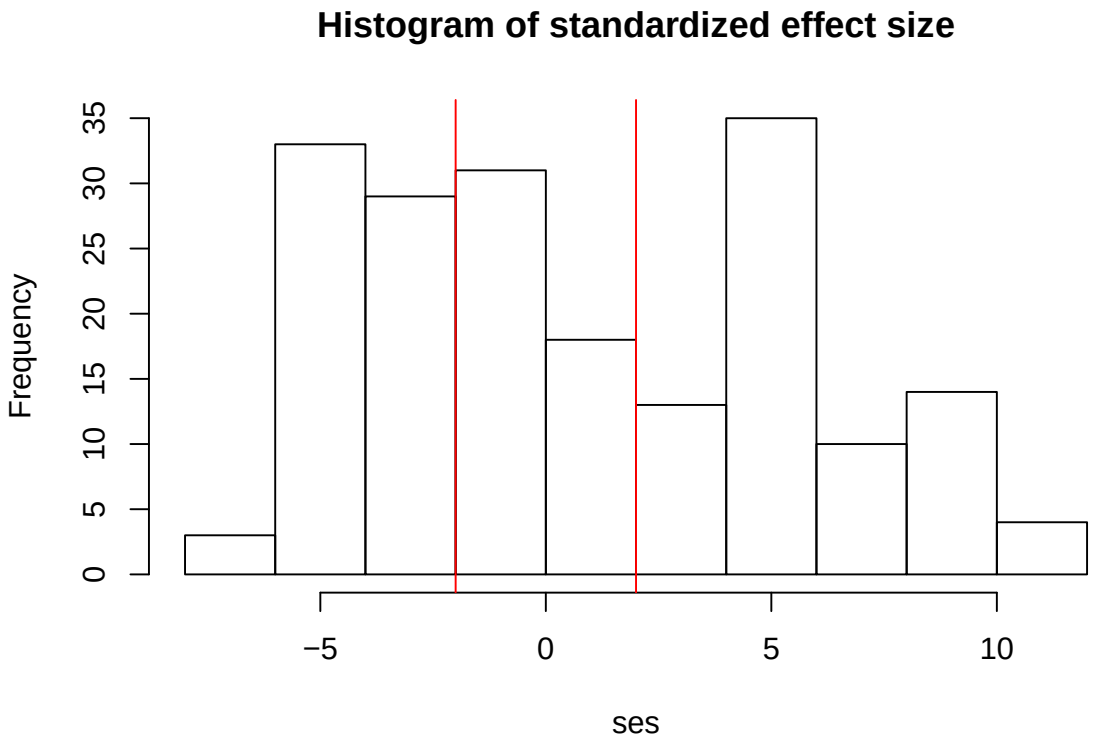
2.6.2 Pairwise co-occurrence Analysis with calculation of the C-score index using the function *ecospat.Cscore()*

This function allows to apply a pairwise null model analysis to a presence-absence community matrix to determine which species associations are significant across the study area. The strength of associations is quantified by the C-score index and a 'fixed-equiprobable' null model algorithm is applied.

It is recomended to use at least 10000 permutatiobns for the test. As an example we used nperm = 100, to reduce the computational time.

```
data<- ecospat.testData[c(53,62,58,70,61,66,65,71,69,43,63,56,68,57,55,60,54,67,59,64)]
nperm <- 100
outpath <- getwd()
ecospat.Cscore(data, nperm, outpath)
```

```
## Computing observed co-occurence matrix
## ............
## ............
## ............
## Computing permutations
## ............
## 100  permutations to go
## ............
## 50  permutations to go
## ............
## Computing P-values
## ............
## Exporting dataset
## ............
## ............
## ............
```



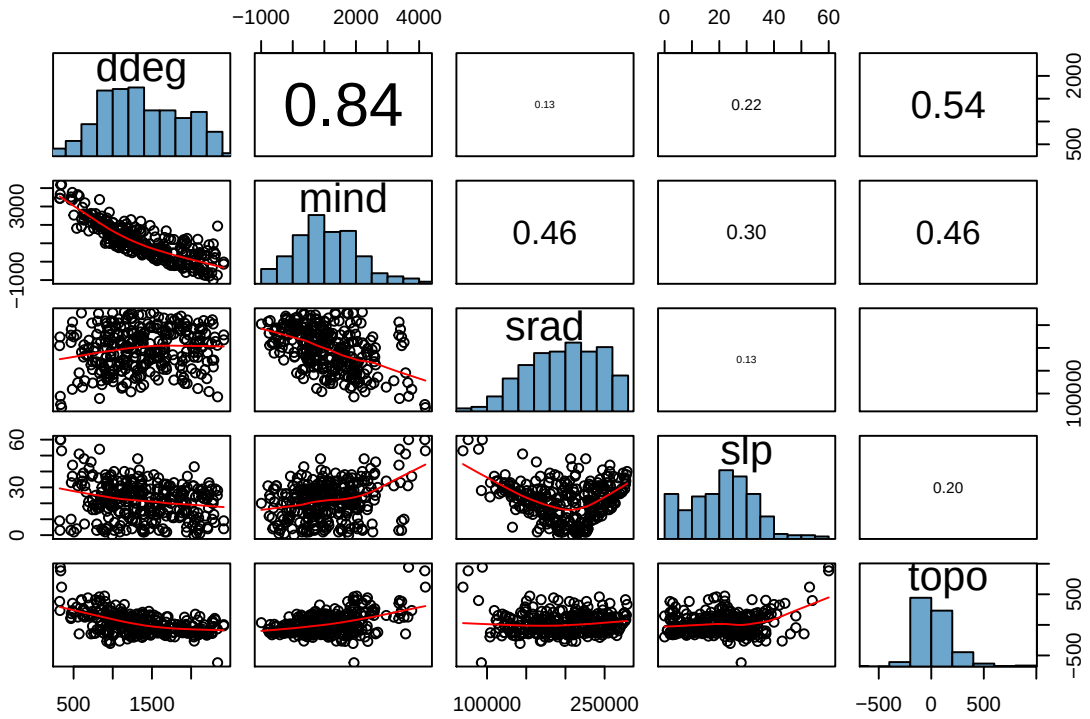

```
## $ObsCscoreTot
## [1] 2675.468
##
## $SimCscoreTot
## [1] 2466.706
##
## $PVal.less
## [1] 1
##
## $PVal.greater
## [1] 0.00990099
##
## $SES.Tot
## [1] 54.66405
```

The function returns the C-score index for the observed community (ObsCscoreTot), p.value (PValTot) and standardized effect size (SES.Tot). It saves also a table in the working directory where the same metrics are calculated for each species pair (only the table with species pairs with significant p-values is saved in this version)

2.7 Data Preparation

2.7.1 Correlation Plot of Variables with *ecospat.cor.plot()*

```
data <- ecospat.testData[,4:8]
ecospat.cor.plot(data)
```



A scatter plot of matrices, with bivariate scatter plots below the diagonal, histograms on the diagonal, and the Pearson correlation above the diagonal. Useful for descriptive statistics of small data sets (better with less than 10 variables).

2.7.2 Calibration And Evaluation Dataset

```
data <- ecospat.testData
caleval <- ecospat.caleval (data = ecospat.testData[53], xy = data[2:3],
                            row.num = 1:nrow(data), nrep = 2, ratio = 0.7,
                            disaggregate = 0.2, pseudoabs = 100, npres = 10,
                            replace = FALSE)
caleval
```

```
## $eval
##    yeval yeval
## 1     63    NA
## 2    179    77
## 3     NA    93
## 4    245    79
## 5     71    37
## 6    133    21
## 7    217   240
## 8    152    56
## 9    139   212
## 10   288     4
## 11   272   169
## 12   228    67
## 13    44    53
## 14   185    18
## 15   115   233
```

```
## 16    49   225
## 17    43    36
## 18   121   294
## 19   192   236
## 20   214   198
## 21    24   205
## 22    27    55
## 23   276   113
## 24    94   272
## 25   205   273
## 26   275   200
## 27    95   276
## 28   219    15
## 29   100   292
## 30    20   291
## 31   200   219
## 32   241     3
## 33    55   271
##
## $cal
##    ycal ycal
## 1    NA  183
## 2    NA  127
## 3    NA  257
## 4   132   NA
## 5    NA   NA
## 6    62   NA
## 7    NA   NA
## 8   239    5
## 9   281   17
## 10  206  106
## 11   16  251
## 12  145  224
## 13  210  100
## 14   45  300
## 15  211  189
## 16    2  243
## 17  259  223
## 18  220  252
## 19   22  249
## 20  232  206
## 21  113  255
## 22  265   84
## 23  229  222
## 24   30   51
## 25  253  274
## 26  254  290
## 27  234  178
## 28  196  166
## 29  155  214
## 30  271   33
## 31  201   14
## 32  258  263
## 33  248  155
## 34  238  264
## 35  168  259
## 36   15   45
## 37  203   16
```

```
## 38  231  247
## 39  244  269
## 40  286  289
## 41  186  221
## 42   23  147
## 43  297  260
## 44  299  115
## 45  246  241
## 46  273  140
## 47  237  157
## 48  267  230
## 49  106  116
## 50  116   11
## 51  154  235
## 52    8  171
## 53  262  110
## 54  199   71
## 55  150  201
## 56  291   85
## 57  266  246
## 58  157  268
## 59  292   75
## 60  182  177
## 61   57   34
## 62  293  296
## 63  263  120
## 64  181  180
## 65  223  114
## 66   31  134
## 67  270  242
## 68  204  283
## 69  114  188
## 70  278  261
## 71  256  184
## 72  123  193
## 73    3  217
## 74  184  156
## 75  279  295
## 76  224  250
## 77  242  192
```

We obtained an evaluation and calibration dataset with a desired ratio of disaggregation.

3 Core Niche Modelling

3.1 Model Evaluation

3.1.1 Presence-only Evaluation Indices- Boyce Index

The argument fit is a vector containing the predicted suitability values

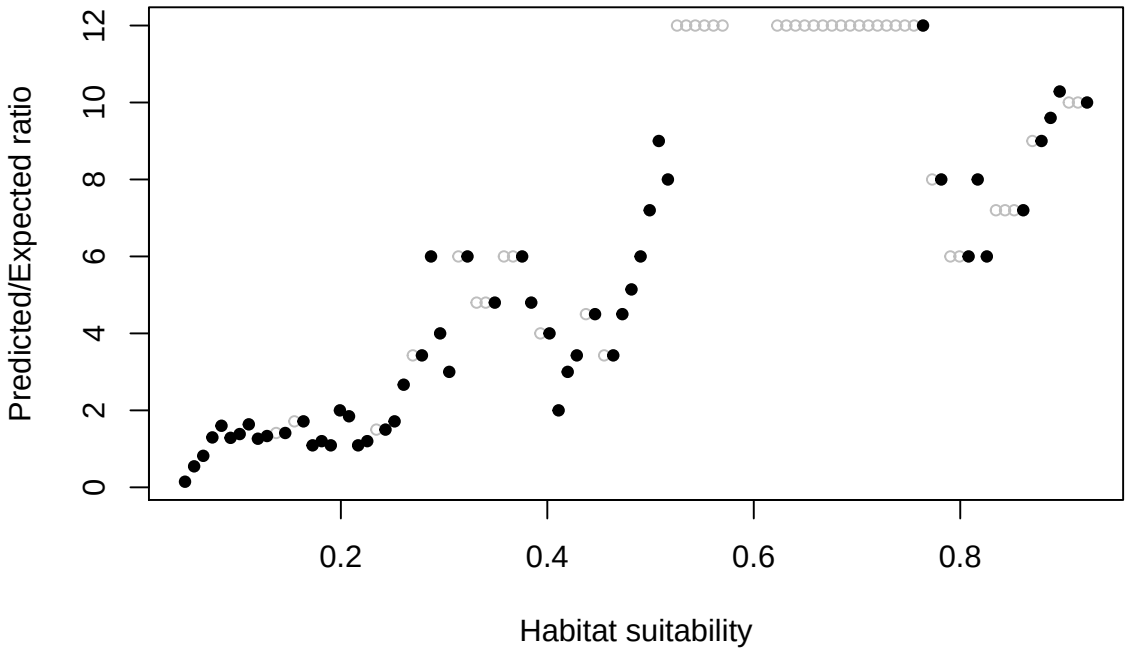
```
fit <- ecospat.testData$glm_Saxifraga_oppositifolia
```

The argument obs is a vector containing the predicted suitability values of the validation points (presence records)

```
obs<-ecospat.testData$glm_Saxifraga_oppositifolia[which(ecospat.testData$Saxifraga_oppositifolia==1)
```

Calculate and plot Boyce Index with *ecospat.boyce*

```
ecospat.boyce (fit, obs, nclass = 0, window.w = "default", res = 100,
               PEplot = TRUE)$Spearman.cor
```




```
## [1] 0.91
```

Here the boyce index is 0.91. If the rank of predicted expected ratio would be completely ordered along habitat suitability axis then boyce index would be 1.

3.1.2 Accuracy of Community Prediction

Indices of accuracy of community predictions *ecospat.CommunityEval()*

```
eval<-ecospat.testData[c(53,62,58,70,61,66,65,71,69,43,63,56,68,57,55,60,54,67,59,64)]
pred<-ecospat.testData[c(73:92)]
```

```
ecospat.CommunityEval (eval, pred, proba=T, ntir=5)
```

```
## trial 1 on 5
## trial 2 on 5
## trial 3 on 5
## trial 4 on 5
## trial 5 on 5
```

```
## $deviation.rich.pred
##       1   2  3  4   5
## 1     2  -3  2 -3   1
## 2    -5  -6 -6 -5  -7
## 3    -4  -4 -7 -7  -5
## 4    -6  -6 -3 -2  -4
## 5    -9 -10 -9 -8  -8
## 6     0   0  0  0  -3
## 7    -4  -7 -3 -4  -5
## 8    -7  -5 -6 -1  -7
## 9     5   2  3  1   3
## 10   -6  -7 -6 -8  -2
## 11  -10  -9 -8 -9 -10
## 12    2   3  1  1  -2
## 13   -2  -1  1  0   1
## 14   -3  -2 -4 -4  -4
## 15    1  -1  0  1  -1
## 16   -3  -4 -3 -5  -1
## 17   -2  -4 -7 -3  -6
## 18   -1   0 -3 -4  -2
## 19    3   6  8  9   3
## 20   -3  -3 -5 -7  -6
## 21   -3  -3 -1 -4  -3
## 22   -6  -5 -2 -3  -5
## 23   -7  -5 -6 -8  -4
## 24    2   5  3  4   1
## 25   -3  -4 -1  0  -5
## 26   -1   2  0  2  -1
## 27   -4  -9 -7 -3  -5
## 28   -4   0 -2 -2  -2
## 29   -2   1  2  2   1
## 30   -7  -6 -3 -4  -7
## 31   -1   0 -2 -2  -3
## 32   -3   1 -1  3   2
## 33   -2  -3 -2  0  -3
## 34   -6  -3 -2 -5  -6
## 35    2   1  4  2   0
## 36   -3  -4  0 -5  -3
## 37    3   5 -1  3   4
## 38   -8  -1 -3 -5  -6
## 39   -1   1  2  0   4
## 40    1  -2 -1 -1  -2
## 41    3   1  1  3   2
## 42    2   5  0  4   1
## 43    2  -1  1  0  -1
## 44    6   5  4  1   3
## 45   -2  -1 -1 -1   4
## 46   -1   1  2  0   4
## 47   -3   0  0 -1  -1
## 48    2   0 -1 -2   2
## 49   -3   1  0  2   0
## 50    4   4  1  3   2
## 51    6   3  5  5   5
## 52   -1  -1  1 -5  -3
## 53    0   5  3  1   2
## 54   -1   2 -1  5  -1
## 55   -5  -4 -4 -5  -3
## 56   -3  -3 -5 -3  -3
```

```
## 57    0   2  2  1   1
## 58   -2  -1  0 -2  -3
## 59    2   0  2  0  -2
## 60   -1   1  1 -3   0
## 61   -1   2  3  2  -1
## 62    2   3  0  4   2
## 63    5   3  4  3   0
## 64    3   0  0  0   2
## 65    3   6  8  6   4
## 66    7   5  7  6   4
## 67    6   8  5  6   3
## 68    0   0  2  6  -1
## 69    2   2 -2  4   2
## 70    3   4  5  6   6
## 71   -3   0 -4 -5  -5
## 72    2   2  0  2   1
## 73    3   0  0 -1  -1
## 74    3   0  3  0   1
## 75  -12 -10 -8 -8  -7
## 76    2   5  7  5   3
## 77    1   2  5  0   3
## 78    3   5  1  3   0
## 79   -8  -6 -6 -2  -4
## 80    2  -1 -1  1  -2
## 81    6   3  4  5   4
## 82    4   3  5  3   1
## 83    8   7  5  7   7
## 84   -3  -1  0 -4  -4
## 85   -5  -4 -1 -4  -4
## 86    6   6  7  6   3
## 87    7   2  6  8   4
## 88    0   0  4  2   2
## 89   -1   2  2  2   4
## 90    2   3  3  8   3
## 91    5   3  4  0   4
## 92    3   2  3  5   4
## 93    2   2  6  3   4
## 94   -4  -3 -3 -6  -1
## 95    3   3  2  2   2
## 96    7   3  7  6   5
## 97   -3  -1 -1 -3  -3
## 98    5   3  1  3   2
## 99    7   6  9  9   0
## 100   4   6  3  5   4
## 101   1   1 -1  2   0
## 102   3   1  5  2   2
## 103   1   0  2  2  -2
## 104   5   7  4  1   5
## 105   5  -1  2  1   2
## 106   0   2  2  4   2
## 107   1   2  1  0   1
## 108   4   3  5  2   4
## 109   5   4  2  5   6
## 110  -9  -5 -8 -9  -8
## 111   5   4  3  5   3
## 112   0   4  2  5   4
## 113   1   4  1  4   1
## 114  -2  -6 -1 -4  -2
```

```
## 115  -2   0  3  2  -1
## 116  -5  -4 -4 -5  -3
## 117   6   7  5  7   6
## 118   7   7  6 10   6
## 119  -5  -1  0 -3  -3
## 120  -4  -3 -4 -1  -4
## 121  -1  -1  0  2   0
## 122   7   3  5  2   1
## 123   3   7  7  3   3
## 124   1   2  3  3   4
## 125   2  -6 -1 -4  -2
## 126   2   2  3  0   1
## 127   3   6  4  6   6
## 128   3   7  8  4   9
## 129   5   7  7  6   5
## 130   2   2  1  3   5
## 131   4  -1  6  4   1
## 132   3   7  3  6   2
## 133   0   0 -2 -4   2
## 134  -3  -4 -3  2   0
## 135   9   7  3  3   6
## 136   0   5  5  4   2
## 137   3   4  5  0   1
## 138   2   0 -1  1   4
## 139  -1  -2 -4 -3  -3
## 140  -1  -1  0 -2   0
## 141   6   3  4  5   6
## 142   5   4  5  5   8
## 143  -3  -1 -4 -3  -4
## 144   3   9  7  7   9
## 145  -4  -1 -2 -3  -2
## 146  -1  -1  1 -1   0
## 147   1  -2  0 -1   0
## 148   1   1  4  3   3
## 149   2   4  3  3   5
## 150  -2  -1 -3 -5  -4
## 151   4  -2  0 -2   1
## 152   0  -3  0 -1   1
## 153   5   6  5  4   6
## 154  -3  -4  0 -5  -2
## 155   1   0 -1  1   1
## 156  -2  -3 -2 -3  -4
## 157  -6  -3 -3 -4  -2
## 158   6   1  2  5   5
## 159   4   4  3  5   2
## 160  -3  -1 -1  2   1
## 161  -2  -1  2 -5  -1
## 162   2   1  0  3   3
## 163   2   1  2 -1   0
## 164  -3  -4 -3 -2  -3
## 165   0  -1  2  1   1
## 166  -2  -2 -4 -1  -4
## 167   4  -5  4  2   2
## 168  -3  -6 -3 -4  -2
## 169  -2  -3 -3 -5  -6
## 170   4   4  1  5   3
## 171  -1  -3 -2 -2   0
## 172   0  -1  0 -2  -1
```

```
## 173   5   4  4  8   2
## 174  -3  -5 -1 -2  -3
## 175   6  -1  1  3   1
## 176   2   1  4  3  -1
## 177  -4  -5 -3 -1   0
## 178   6   4  5  6   4
## 179   4   6  2  3   3
## 180  -1   2  0  1  -1
## 181  -2  -6 -2 -5  -5
## 182   1   3  3  2   4
## 183   3   2  1  2   2
## 184   1   2  1  0   0
## 185  -1   1  2  3   2
## 186  -6  -2 -4 -3   0
## 187  -1   4 -1 -1   0
## 188   0  -1 -1 -4   1
## 189   2   2  1  0   2
## 190   3   3  4  1   4
## 191  -1   1  3  3   2
## 192   1  -2 -2 -3  -2
## 193  -5  -3  0  0  -5
## 194   3   2  5  2   3
## 195   5   3  0  4   1
## 196  -3  -3 -1 -5   0
## 197   1   3  5  6   2
## 198  -3  -4 -2  0   1
## 199   0  -7 -4 -2  -3
## 200  -3  -3 -6 -2   0
## 201   0   0 -4 -1  -2
## 202   3   3  5  2   2
## 203  -3  -1 -2 -2  -1
## 204  -1   2 -1  0   0
## 205  -2   1 -5  3   1
## 206  -1   0 -2 -1  -2
## 207   3   2  1  2   2
## 208  -1   4  2  4   1
## 209   3   1  3  2  -4
## 210  -4  -6 -4 -3  -2
## 211  -1  -1 -2  0  -1
## 212   0  -2  3 -1   2
## 213   2   3  1  4   2
## 214  -7  -3 -5 -3  -2
## 215   3  -1  3  3   1
## 216  -2  -2  2  2   3
## 217   1  -2  2 -3   0
## 218   2   2  1 -3   0
## 219   1  -1  2  2   1
## 220   3  -3  0  4   0
## 221   1   1 -1 -2  -1
## 222  -2  -4 -2 -6   0
## 223  -2   1 -3 -1  -6
## 224   1  -2 -1  0   3
## 225   1   1  1  2   1
## 226   3   3  4  1   0
## 227   3   2 -2  2   4
## 228  -2  -6 -2 -4  -4
## 229  -4  -4 -5 -1  -2
## 230   2   2 -1  1   2
```

```
## 231   4   3  4 -1   4
## 232  -1   2  1  0  -3
## 233  -2  -1 -1  2  -1
## 234   1  -1 -1 -1   0
## 235  -2  -2 -3 -6  -5
## 236   1  -4 -2  0  -2
## 237  -1  -1  0 -2  -5
## 238  -2  -2 -2 -1  -4
## 239   0   1 -2  3   1
## 240   0  -2 -2 -4   0
## 241  -3  -4 -3 -3  -3
## 242  -3  -4 -4 -5  -1
## 243   1   0  2  0   1
## 244   1  -1  0  2   1
## 245  -3  -3 -1 -5  -3
## 246  -2  -2 -3  0  -2
## 247  -2  -2 -2 -2  -1
## 248  -2   0  1  0   1
## 249   0   1  0  2   2
## 250  -1  -3 -2 -2  -2
## 251   1   1  1 -1  -1
## 252  -2  -2 -4  0  -2
## 253   0  -3 -1  0  -1
## 254  -3  -3 -4 -3  -2
## 255  -3  -2 -3  1   0
## 256  -2  -1 -3 -2  -1
## 257   1  -2  0  0   3
## 258  -3  -2 -3 -2  -1
## 259  -1  -3 -2 -1  -2
## 260  -2   0  0 -2  -4
## 261  -3   0 -4 -3  -2
## 262  -3  -2 -3 -5  -2
## 263  -3  -3 -2 -4  -3
## 264  -3  -3 -3 -3  -3
## 265  -1  -3 -1 -2  -1
## 266  -1  -2 -4 -3  -3
## 267  -4  -2 -2  1  -4
## 268   0  -3 -3 -3   0
## 269  -2  -1 -3 -1  -5
## 270  -2  -1 -5 -4  -3
## 271  -3  -4 -2 -3  -2
## 272  -2  -4 -3 -4  -3
## 273   0  -1 -1 -4  -2
## 274  -2  -3 -3 -2  -2
## 275  -3   0 -3 -1  -1
## 276  -3  -4 -3 -6  -3
## 277   2   0  4  4   1
## 278  -3  -4 -4 -4  -4
## 279   4  -1  0  0   1
## 280  10   7  6  8  10
## 281  -1  -2 -3 -1  -2
## 282   2   1  4  4   6
## 283  -2  -1  0 -4  -4
## 284   1  -1 -1  3   0
## 285  -1  -2  0 -2  -1
## 286   1   3 -2 -1   0
## 287  -1  -1  0  1   1
## 288   0   3 -1  0   1
```

```
## 289   2  -1  2 -3   0
## 290  -5  -1 -2 -1   0
## 291   1  -1 -2  1   2
## 292  -3  -1 -3  1   1
## 293   0   1  1 -2   0
## 294   3   1  0  1   0
## 295   2   0  2 -1   2
## 296  -2   1 -3  1   1
## 297  -1  -3 -2 -3  -2
## 298   1   0  5  1  -1
## 299   0   0 -2  0  -1
## 300  -1   0  1  1   1
##
## $overprediction
##              1          2          3          4          5
## 1   0.05882353 0.23529412 0.05882353 0.29411765 0.11764706
## 2   0.37500000 0.43750000 0.37500000 0.37500000 0.43750000
## 3   0.26666667 0.33333333 0.46666667 0.46666667 0.40000000
## 4   0.40000000 0.40000000 0.26666667 0.26666667 0.26666667
## 5   0.50000000 0.55555556 0.50000000 0.44444444 0.44444444
## 6   0.10000000 0.20000000 0.30000000 0.10000000 0.30000000
## 7   0.33333333 0.46666667 0.33333333 0.33333333 0.33333333
## 8   0.46666667 0.40000000 0.40000000 0.26666667 0.60000000
## 9   0.10000000 0.20000000 0.30000000 0.20000000 0.10000000
## 10  0.46666667 0.46666667 0.46666667 0.53333333 0.26666667
## 11  0.50000000 0.45000000 0.40000000 0.45000000 0.50000000
## 12  0.12500000 0.00000000 0.25000000 0.12500000 0.25000000
## 13  0.30000000 0.10000000 0.10000000 0.10000000 0.20000000
## 14  0.30769231 0.23076923 0.38461538 0.30769231 0.38461538
## 15  0.22222222 0.33333333 0.33333333 0.11111111 0.33333333
## 16  0.40000000 0.40000000 0.40000000 0.50000000 0.30000000
## 17  0.28571429 0.35714286 0.57142857 0.28571429 0.50000000
## 18  0.15384615 0.15384615 0.30769231 0.38461538 0.23076923
## 19  0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 20  0.38461538 0.38461538 0.38461538 0.53846154 0.46153846
## 21  0.33333333 0.50000000 0.25000000 0.50000000 0.33333333
## 22  0.61538462 0.61538462 0.38461538 0.30769231 0.53846154
## 23  0.43750000 0.37500000 0.37500000 0.50000000 0.37500000
## 24  0.30000000 0.20000000 0.10000000 0.10000000 0.20000000
## 25  0.18750000 0.37500000 0.12500000 0.06250000 0.37500000
## 26  0.14285714 0.07142857 0.07142857 0.14285714 0.21428571
## 27  0.20000000 0.45000000 0.35000000 0.15000000 0.25000000
## 28  0.46153846 0.30769231 0.38461538 0.23076923 0.30769231
## 29  0.33333333 0.16666667 0.08333333 0.08333333 0.08333333
## 30  0.57142857 0.50000000 0.21428571 0.28571429 0.57142857
## 31  0.40000000 0.30000000 0.40000000 0.40000000 0.40000000
## 32  0.44444444 0.22222222 0.33333333 0.00000000 0.11111111
## 33  0.38461538 0.30769231 0.30769231 0.30769231 0.30769231
## 34  0.53846154 0.38461538 0.23076923 0.46153846 0.53846154
## 35  0.20000000 0.20000000 0.10000000 0.20000000 0.20000000
## 36  0.25000000 0.58333333 0.33333333 0.41666667 0.33333333
## 37  0.14285714 0.14285714 0.28571429 0.28571429 0.14285714
## 38  0.61538462 0.30769231 0.30769231 0.53846154 0.53846154
## 39  0.40000000 0.30000000 0.30000000 0.30000000 0.10000000
## 40  0.10000000 0.30000000 0.20000000 0.10000000 0.30000000
## 41  0.11111111 0.00000000 0.11111111 0.22222222 0.22222222
## 42  0.30000000 0.20000000 0.10000000 0.10000000 0.40000000
## 43  0.25000000 0.33333333 0.08333333 0.16666667 0.25000000
```

```
## 44  0.00000000 0.10000000 0.30000000 0.50000000 0.10000000
## 45  0.30000000 0.20000000 0.20000000 0.40000000 0.10000000
## 46  0.25000000 0.25000000 0.16666667 0.16666667 0.16666667
## 47  0.28571429 0.28571429 0.28571429 0.21428571 0.14285714
## 48  0.16666667 0.16666667 0.33333333 0.25000000 0.08333333
## 49  0.33333333 0.25000000 0.16666667 0.25000000 0.25000000
## 50  0.25000000 0.12500000 0.50000000 0.00000000 0.25000000
## 51  0.00000000 0.11111111 0.22222222 0.11111111 0.00000000
## 52  0.13333333 0.20000000 0.13333333 0.40000000 0.26666667
## 53  0.09090909 0.18181818 0.18181818 0.36363636 0.27272727
## 54  0.37500000 0.25000000 0.25000000 0.12500000 0.37500000
## 55  0.40000000 0.26666667 0.33333333 0.40000000 0.20000000
## 56  0.18750000 0.31250000 0.37500000 0.25000000 0.25000000
## 57  0.27272727 0.27272727 0.18181818 0.27272727 0.18181818
## 58  0.25000000 0.33333333 0.25000000 0.33333333 0.25000000
## 59  0.22222222 0.11111111 0.00000000 0.22222222 0.33333333
## 60  0.28571429 0.21428571 0.21428571 0.42857143 0.14285714
## 61  0.40000000 0.30000000 0.30000000 0.30000000 0.20000000
## 62  0.09090909 0.27272727 0.09090909 0.18181818 0.27272727
## 63  0.00000000 0.09090909 0.09090909 0.00000000 0.27272727
## 64  0.07142857 0.07142857 0.14285714 0.14285714 0.07142857
## 65  0.20000000 0.10000000 0.00000000 0.10000000 0.10000000
## 66  0.11111111 0.22222222 0.11111111 0.22222222 0.00000000
## 67  0.22222222 0.00000000 0.22222222 0.22222222 0.22222222
## 68  0.22222222 0.11111111 0.33333333 0.11111111 0.44444444
## 69  0.18181818 0.27272727 0.54545455 0.18181818 0.27272727
## 70  0.12500000 0.25000000 0.25000000 0.12500000 0.00000000
## 71  0.35714286 0.21428571 0.35714286 0.50000000 0.50000000
## 72  0.20000000 0.30000000 0.30000000 0.30000000 0.20000000
## 73  0.11111111 0.11111111 0.44444444 0.33333333 0.33333333
## 74  0.18181818 0.36363636 0.09090909 0.18181818 0.27272727
## 75  0.60000000 0.50000000 0.40000000 0.40000000 0.35000000
## 76  0.00000000 0.00000000 0.00000000 0.00000000 0.16666667
## 77  0.25000000 0.25000000 0.12500000 0.25000000 0.00000000
## 78  0.11111111 0.22222222 0.22222222 0.44444444 0.33333333
## 79  0.50000000 0.38888889 0.38888889 0.22222222 0.33333333
## 80  0.30769231 0.46153846 0.38461538 0.23076923 0.53846154
## 81  0.12500000 0.12500000 0.12500000 0.12500000 0.25000000
## 82  0.16666667 0.16666667 0.08333333 0.08333333 0.25000000
## 83  0.00000000 0.00000000 0.12500000 0.00000000 0.00000000
## 84  0.27777778 0.16666667 0.11111111 0.33333333 0.22222222
## 85  0.35294118 0.35294118 0.23529412 0.29411765 0.35294118
## 86  0.20000000 0.00000000 0.10000000 0.10000000 0.30000000
## 87  0.11111111 0.33333333 0.22222222 0.11111111 0.11111111
## 88  0.50000000 0.20000000 0.10000000 0.20000000 0.40000000
## 89  0.33333333 0.16666667 0.16666667 0.33333333 0.25000000
## 90  0.18181818 0.18181818 0.18181818 0.00000000 0.18181818
## 91  0.20000000 0.20000000 0.10000000 0.20000000 0.30000000
## 92  0.22222222 0.22222222 0.33333333 0.11111111 0.11111111
## 93  0.25000000 0.25000000 0.12500000 0.12500000 0.00000000
## 94  0.42857143 0.21428571 0.28571429 0.50000000 0.28571429
## 95  0.25000000 0.25000000 0.37500000 0.12500000 0.12500000
## 96  0.00000000 0.20000000 0.00000000 0.10000000 0.20000000
## 97  0.38461538 0.30769231 0.46153846 0.38461538 0.53846154
## 98  0.00000000 0.18181818 0.18181818 0.27272727 0.27272727
## 99  0.11111111 0.00000000 0.00000000 0.11111111 0.44444444
## 100 0.25000000 0.00000000 0.16666667 0.25000000 0.08333333
## 101 0.23076923 0.30769231 0.23076923 0.23076923 0.30769231
```

```
## 102 0.08333333 0.08333333 0.08333333 0.16666667 0.16666667
## 103 0.16666667 0.33333333 0.16666667 0.33333333 0.41666667
## 104 0.25000000 0.00000000 0.25000000 0.37500000 0.25000000
## 105 0.15384615 0.23076923 0.23076923 0.30769231 0.30769231
## 106 0.23076923 0.23076923 0.15384615 0.15384615 0.15384615
## 107 0.28571429 0.28571429 0.14285714 0.35714286 0.21428571
## 108 0.10000000 0.10000000 0.10000000 0.30000000 0.10000000
## 109 0.22222222 0.22222222 0.22222222 0.44444444 0.44444444
## 110 0.45000000 0.25000000 0.40000000 0.45000000 0.40000000
## 111 0.08333333 0.00000000 0.25000000 0.08333333 0.16666667
## 112 0.40000000 0.20000000 0.30000000 0.20000000 0.10000000
## 113 0.25000000 0.25000000 0.25000000 0.08333333 0.41666667
## 114 0.29411765 0.47058824 0.23529412 0.41176471 0.17647059
## 115 0.58333333 0.33333333 0.08333333 0.33333333 0.33333333
## 116 0.31578947 0.26315789 0.21052632 0.26315789 0.15789474
## 117 0.22222222 0.11111111 0.22222222 0.11111111 0.33333333
## 118 0.14285714 0.42857143 0.14285714 0.00000000 0.14285714
## 119 0.41176471 0.11764706 0.17647059 0.29411765 0.17647059
## 120 0.29411765 0.23529412 0.29411765 0.23529412 0.35294118
## 121 0.28571429 0.35714286 0.28571429 0.14285714 0.28571429
## 122 0.00000000 0.44444444 0.11111111 0.22222222 0.33333333
## 123 0.18181818 0.00000000 0.18181818 0.27272727 0.36363636
## 124 0.21428571 0.07142857 0.07142857 0.14285714 0.07142857
## 125 0.00000000 0.38888889 0.16666667 0.33333333 0.22222222
## 126 0.25000000 0.25000000 0.25000000 0.41666667 0.25000000
## 127 0.11111111 0.11111111 0.22222222 0.11111111 0.11111111
## 128 0.22222222 0.11111111 0.00000000 0.33333333 0.00000000
## 129 0.10000000 0.20000000 0.10000000 0.20000000 0.20000000
## 130 0.40000000 0.40000000 0.30000000 0.20000000 0.10000000
## 131 0.30000000 0.30000000 0.10000000 0.10000000 0.10000000
## 132 0.10000000 0.10000000 0.20000000 0.10000000 0.30000000
## 133 0.26666667 0.26666667 0.33333333 0.26666667 0.13333333
## 134 0.33333333 0.40000000 0.40000000 0.13333333 0.26666667
## 135 0.00000000 0.11111111 0.33333333 0.22222222 0.22222222
## 136 0.33333333 0.08333333 0.08333333 0.08333333 0.16666667
## 137 0.27272727 0.09090909 0.09090909 0.36363636 0.36363636
## 138 0.30769231 0.23076923 0.38461538 0.23076923 0.15384615
## 139 0.25000000 0.31250000 0.43750000 0.31250000 0.31250000
## 140 0.17647059 0.23529412 0.11764706 0.23529412 0.17647059
## 141 0.00000000 0.16666667 0.16666667 0.08333333 0.00000000
## 142 0.08333333 0.08333333 0.08333333 0.00000000 0.00000000
## 143 0.37500000 0.18750000 0.31250000 0.25000000 0.31250000
## 144 0.20000000 0.00000000 0.00000000 0.00000000 0.10000000
## 145 0.46666667 0.20000000 0.26666667 0.33333333 0.26666667
## 146 0.26666667 0.20000000 0.13333333 0.13333333 0.13333333
## 147 0.18750000 0.31250000 0.12500000 0.18750000 0.12500000
## 148 0.33333333 0.25000000 0.25000000 0.25000000 0.33333333
## 149 0.10000000 0.30000000 0.30000000 0.10000000 0.10000000
## 150 0.22222222 0.11111111 0.22222222 0.33333333 0.22222222
## 151 0.07142857 0.28571429 0.14285714 0.28571429 0.14285714
## 152 0.12500000 0.31250000 0.06250000 0.18750000 0.12500000
## 153 0.09090909 0.00000000 0.18181818 0.09090909 0.09090909
## 154 0.23529412 0.35294118 0.17647059 0.41176471 0.17647059
## 155 0.13333333 0.20000000 0.20000000 0.06666667 0.20000000
## 156 0.10000000 0.15000000 0.10000000 0.15000000 0.20000000
## 157 0.30000000 0.15000000 0.15000000 0.20000000 0.10000000
## 158 0.18181818 0.18181818 0.27272727 0.18181818 0.18181818
## 159 0.27272727 0.18181818 0.18181818 0.18181818 0.45454545
```

```
## 160 0.23529412 0.17647059 0.23529412 0.05882353 0.11764706
## 161 0.18750000 0.12500000 0.12500000 0.37500000 0.31250000
## 162 0.13333333 0.13333333 0.20000000 0.13333333 0.06666667
## 163 0.06666667 0.20000000 0.00000000 0.20000000 0.13333333
## 164 0.37500000 0.43750000 0.31250000 0.37500000 0.25000000
## 165 0.12500000 0.18750000 0.06250000 0.06250000 0.12500000
## 166 0.22222222 0.22222222 0.27777778 0.16666667 0.22222222
## 167 0.00000000 0.53846154 0.15384615 0.15384615 0.30769231
## 168 0.27777778 0.38888889 0.22222222 0.22222222 0.16666667
## 169 0.15789474 0.15789474 0.21052632 0.26315789 0.36842105
## 170 0.00000000 0.15384615 0.23076923 0.07692308 0.23076923
## 171 0.31250000 0.25000000 0.18750000 0.12500000 0.12500000
## 172 0.20000000 0.26666667 0.20000000 0.26666667 0.33333333
## 173 0.20000000 0.30000000 0.20000000 0.10000000 0.10000000
## 174 0.22222222 0.38888889 0.11111111 0.22222222 0.27777778
## 175 0.08333333 0.25000000 0.41666667 0.25000000 0.33333333
## 176 0.21428571 0.14285714 0.00000000 0.00000000 0.21428571
## 177 0.23529412 0.35294118 0.23529412 0.11764706 0.05882353
## 178 0.00000000 0.18181818 0.18181818 0.09090909 0.36363636
## 179 0.16666667 0.16666667 0.16666667 0.16666667 0.16666667
## 180 0.11764706 0.05882353 0.05882353 0.05882353 0.11764706
## 181 0.10000000 0.30000000 0.10000000 0.25000000 0.25000000
## 182 0.28571429 0.07142857 0.21428571 0.14285714 0.07142857
## 183 0.06666667 0.13333333 0.13333333 0.20000000 0.00000000
## 184 0.00000000 0.13333333 0.06666667 0.13333333 0.20000000
## 185 0.13333333 0.06666667 0.06666667 0.06666667 0.13333333
## 186 0.31578947 0.10526316 0.21052632 0.21052632 0.05263158
## 187 0.26666667 0.06666667 0.20000000 0.20000000 0.20000000
## 188 0.11764706 0.17647059 0.17647059 0.29411765 0.11764706
## 189 0.13333333 0.20000000 0.13333333 0.20000000 0.13333333
## 190 0.08333333 0.16666667 0.16666667 0.25000000 0.16666667
## 191 0.33333333 0.20000000 0.06666667 0.06666667 0.13333333
## 192 0.05882353 0.17647059 0.29411765 0.29411765 0.23529412
## 193 0.26315789 0.15789474 0.05263158 0.05263158 0.26315789
## 194 0.21428571 0.21428571 0.00000000 0.21428571 0.14285714
## 195 0.07692308 0.15384615 0.15384615 0.07692308 0.23076923
## 196 0.15789474 0.21052632 0.10526316 0.31578947 0.05263158
## 197 0.08333333 0.00000000 0.08333333 0.00000000 0.25000000
## 198 0.22222222 0.27777778 0.22222222 0.05555556 0.05555556
## 199 0.05555556 0.44444444 0.27777778 0.16666667 0.27777778
## 200 0.22222222 0.16666667 0.33333333 0.16666667 0.05555556
## 201 0.05555556 0.11111111 0.33333333 0.16666667 0.16666667
## 202 0.08333333 0.08333333 0.16666667 0.08333333 0.08333333
## 203 0.43750000 0.25000000 0.37500000 0.37500000 0.18750000
## 204 0.18750000 0.06250000 0.06250000 0.12500000 0.12500000
## 205 0.17647059 0.05882353 0.29411765 0.00000000 0.05882353
## 206 0.16666667 0.05555556 0.22222222 0.11111111 0.16666667
## 207 0.14285714 0.07142857 0.07142857 0.00000000 0.14285714
## 208 0.13333333 0.00000000 0.06666667 0.00000000 0.20000000
## 209 0.00000000 0.07142857 0.14285714 0.21428571 0.42857143
## 210 0.26315789 0.31578947 0.21052632 0.21052632 0.10526316
## 211 0.11111111 0.16666667 0.16666667 0.05555556 0.11111111
## 212 0.18750000 0.25000000 0.06250000 0.18750000 0.06250000
## 213 0.20000000 0.00000000 0.20000000 0.06666667 0.13333333
## 214 0.41176471 0.23529412 0.47058824 0.17647059 0.17647059
## 215 0.13333333 0.20000000 0.06666667 0.06666667 0.20000000
## 216 0.18750000 0.18750000 0.12500000 0.06250000 0.06250000
## 217 0.06250000 0.25000000 0.06250000 0.43750000 0.25000000
```

```
## 218 0.13333333 0.06666667 0.13333333 0.26666667 0.26666667
## 219 0.06666667 0.26666667 0.06666667 0.06666667 0.06666667
## 220 0.06666667 0.33333333 0.13333333 0.00000000 0.20000000
## 221 0.05882353 0.00000000 0.11764706 0.23529412 0.23529412
## 222 0.17647059 0.23529412 0.17647059 0.41176471 0.11764706
## 223 0.15789474 0.00000000 0.15789474 0.10526316 0.31578947
## 224 0.06250000 0.18750000 0.18750000 0.12500000 0.06250000
## 225 0.06250000 0.00000000 0.06250000 0.00000000 0.12500000
## 226 0.00000000 0.00000000 0.00000000 0.07142857 0.14285714
## 227 0.07142857 0.07142857 0.28571429 0.07142857 0.07142857
## 228 0.15789474 0.31578947 0.15789474 0.21052632 0.21052632
## 229 0.21052632 0.26315789 0.26315789 0.10526316 0.15789474
## 230 0.06250000 0.06250000 0.12500000 0.00000000 0.00000000
## 231 0.06666667 0.06666667 0.06666667 0.33333333 0.00000000
## 232 0.13333333 0.00000000 0.06666667 0.26666667 0.33333333
## 233 0.31250000 0.18750000 0.25000000 0.06250000 0.25000000
## 234 0.00000000 0.11764706 0.11764706 0.05882353 0.05882353
## 235 0.15789474 0.10526316 0.15789474 0.31578947 0.26315789
## 236 0.00000000 0.29411765 0.23529412 0.11764706 0.17647059
## 237 0.16666667 0.16666667 0.11111111 0.22222222 0.33333333
## 238 0.10526316 0.15789474 0.15789474 0.10526316 0.21052632
## 239 0.05882353 0.11764706 0.23529412 0.00000000 0.05882353
## 240 0.11111111 0.11111111 0.16666667 0.27777778 0.05555556
## 241 0.21052632 0.26315789 0.15789474 0.15789474 0.21052632
## 242 0.15789474 0.21052632 0.26315789 0.31578947 0.10526316
## 243 0.05882353 0.05882353 0.05882353 0.11764706 0.05882353
## 244 0.05882353 0.17647059 0.05882353 0.00000000 0.05882353
## 245 0.15000000 0.15000000 0.05000000 0.25000000 0.15000000
## 246 0.10526316 0.15789474 0.21052632 0.05263158 0.10526316
## 247 0.10526316 0.15789474 0.15789474 0.15789474 0.10526316
## 248 0.17647059 0.05882353 0.00000000 0.05882353 0.00000000
## 249 0.06250000 0.06250000 0.06250000 0.06250000 0.06250000
## 250 0.11764706 0.23529412 0.11764706 0.11764706 0.11764706
## 251 0.05882353 0.05882353 0.11764706 0.17647059 0.05882353
## 252 0.10000000 0.10000000 0.20000000 0.00000000 0.10000000
## 253 0.05263158 0.15789474 0.10526316 0.05263158 0.10526316
## 254 0.21052632 0.15789474 0.21052632 0.15789474 0.10526316
## 255 0.16666667 0.11111111 0.16666667 0.00000000 0.05555556
## 256 0.11111111 0.11111111 0.16666667 0.11111111 0.11111111
## 257 0.18750000 0.18750000 0.18750000 0.18750000 0.00000000
## 258 0.16666667 0.16666667 0.16666667 0.16666667 0.11111111
## 259 0.16666667 0.16666667 0.11111111 0.16666667 0.16666667
## 260 0.11111111 0.05555556 0.11111111 0.16666667 0.22222222
## 261 0.22222222 0.05555556 0.33333333 0.22222222 0.16666667
## 262 0.15000000 0.10000000 0.15000000 0.25000000 0.10000000
## 263 0.15000000 0.15000000 0.10000000 0.20000000 0.15000000
## 264 0.15789474 0.15789474 0.15789474 0.15789474 0.15789474
## 265 0.11764706 0.29411765 0.17647059 0.23529412 0.11764706
## 266 0.10526316 0.10526316 0.21052632 0.15789474 0.15789474
## 267 0.22222222 0.11111111 0.11111111 0.05555556 0.22222222
## 268 0.00000000 0.16666667 0.16666667 0.16666667 0.05555556
## 269 0.10526316 0.05263158 0.15789474 0.05263158 0.26315789
## 270 0.10526316 0.05263158 0.26315789 0.21052632 0.15789474
## 271 0.15789474 0.21052632 0.10526316 0.15789474 0.10526316
## 272 0.15789474 0.21052632 0.15789474 0.26315789 0.15789474
## 273 0.11111111 0.16666667 0.11111111 0.22222222 0.16666667
## 274 0.10526316 0.15789474 0.15789474 0.10526316 0.10526316
## 275 0.16666667 0.11111111 0.16666667 0.05555556 0.11111111
```

```
## 276 0.35714286 0.42857143 0.42857143 0.50000000 0.28571429
## 277 0.08333333 0.33333333 0.16666667 0.16666667 0.33333333
## 278 0.46153846 0.38461538 0.30769231 0.46153846 0.30769231
## 279 0.23076923 0.38461538 0.23076923 0.30769231 0.30769231
## 280 0.00000000 0.11111111 0.11111111 0.00000000 0.00000000
## 281 0.05263158 0.10526316 0.21052632 0.10526316 0.15789474
## 282 0.15384615 0.30769231 0.07692308 0.00000000 0.07692308
## 283 0.16666667 0.16666667 0.11111111 0.27777778 0.33333333
## 284 0.07142857 0.28571429 0.35714286 0.14285714 0.35714286
## 285 0.23529412 0.17647059 0.11764706 0.29411765 0.11764706
## 286 0.05882353 0.00000000 0.29411765 0.23529412 0.17647059
## 287 0.13333333 0.26666667 0.13333333 0.13333333 0.13333333
## 288 0.11764706 0.00000000 0.17647059 0.11764706 0.05882353
## 289 0.12500000 0.12500000 0.12500000 0.18750000 0.12500000
## 290 0.27777778 0.11111111 0.16666667 0.11111111 0.11111111
## 291 0.11764706 0.17647059 0.23529412 0.11764706 0.05882353
## 292 0.29411765 0.11764706 0.29411765 0.05882353 0.11764706
## 293 0.06250000 0.00000000 0.12500000 0.12500000 0.00000000
## 294 0.00000000 0.06250000 0.12500000 0.00000000 0.06250000
## 295 0.06250000 0.12500000 0.00000000 0.12500000 0.00000000
## 296 0.17647059 0.05882353 0.23529412 0.05882353 0.11764706
## 297 0.11764706 0.23529412 0.11764706 0.29411765 0.17647059
## 298 0.20000000 0.30000000 0.00000000 0.20000000 0.20000000
## 299 0.00000000 0.05555556 0.11111111 0.00000000 0.11111111
## 300 0.11111111 0.05555556 0.05555556 0.00000000 0.05555556
##
## $underprediction
##              1          2          3         4          5
## 1   1.00000000 0.33333333 1.00000000 0.6666667 1.00000000
## 2   0.25000000 0.25000000 0.00000000 0.2500000 0.00000000
## 3   0.00000000 0.20000000 0.00000000 0.0000000 0.20000000
## 4   0.00000000 0.00000000 0.20000000 0.4000000 0.00000000
## 5   0.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 6   0.10000000 0.20000000 0.30000000 0.1000000 0.00000000
## 7   0.20000000 0.00000000 0.40000000 0.2000000 0.00000000
## 8   0.00000000 0.20000000 0.00000000 0.6000000 0.40000000
## 9   0.60000000 0.40000000 0.60000000 0.3000000 0.40000000
## 10  0.20000000 0.00000000 0.20000000 0.0000000 0.40000000
## 11         NaN        NaN        NaN       NaN        NaN
## 12  0.25000000 0.25000000 0.25000000 0.1666667 0.00000000
## 13  0.10000000 0.00000000 0.20000000 0.1000000 0.30000000
## 14  0.14285714 0.14285714 0.14285714 0.0000000 0.14285714
## 15  0.27272727 0.18181818 0.27272727 0.1818182 0.18181818
## 16  0.10000000 0.00000000 0.10000000 0.0000000 0.20000000
## 17  0.33333333 0.16666667 0.16666667 0.1666667 0.16666667
## 18  0.14285714 0.28571429 0.14285714 0.1428571 0.14285714
## 19  0.20000000 0.40000000 0.53333333 0.6000000 0.20000000
## 20  0.28571429 0.28571429 0.00000000 0.0000000 0.00000000
## 21  0.12500000 0.37500000 0.25000000 0.2500000 0.12500000
## 22  0.28571429 0.42857143 0.42857143 0.1428571 0.28571429
## 23  0.00000000 0.25000000 0.00000000 0.0000000 0.50000000
## 24  0.50000000 0.70000000 0.40000000 0.5000000 0.30000000
## 25  0.00000000 0.50000000 0.25000000 0.2500000 0.25000000
## 26  0.16666667 0.50000000 0.16666667 0.6666667 0.33333333
## 27         NaN        NaN        NaN       NaN        NaN
## 28  0.28571429 0.57142857 0.42857143 0.1428571 0.28571429
## 29  0.25000000 0.37500000 0.37500000 0.3750000 0.25000000
## 30  0.16666667 0.16666667 0.00000000 0.0000000 0.16666667
```

```
## 31  0.30000000 0.30000000 0.20000000 0.2000000 0.10000000
## 32  0.09090909 0.27272727 0.18181818 0.2727273 0.27272727
## 33  0.42857143 0.14285714 0.28571429 0.5714286 0.14285714
## 34  0.14285714 0.28571429 0.14285714 0.1428571 0.14285714
## 35  0.40000000 0.30000000 0.50000000 0.4000000 0.20000000
## 36  0.00000000 0.37500000 0.50000000 0.0000000 0.12500000
## 37  0.30769231 0.46153846 0.07692308 0.3846154 0.38461538
## 38  0.00000000 0.42857143 0.14285714 0.2857143 0.14285714
## 39  0.30000000 0.40000000 0.50000000 0.3000000 0.50000000
## 40  0.20000000 0.10000000 0.10000000 0.0000000 0.10000000
## 41  0.36363636 0.09090909 0.18181818 0.4545455 0.36363636
## 42  0.50000000 0.70000000 0.10000000 0.5000000 0.50000000
## 43  0.62500000 0.37500000 0.25000000 0.2500000 0.25000000
## 44  0.60000000 0.60000000 0.70000000 0.6000000 0.40000000
## 45  0.10000000 0.10000000 0.10000000 0.3000000 0.50000000
## 46  0.25000000 0.50000000 0.50000000 0.2500000 0.75000000
## 47  0.16666667 0.66666667 0.66666667 0.3333333 0.16666667
## 48  0.50000000 0.25000000 0.37500000 0.1250000 0.37500000
## 49  0.12500000 0.50000000 0.25000000 0.6250000 0.37500000
## 50  0.50000000 0.41666667 0.41666667 0.2500000 0.33333333
## 51  0.54545455 0.36363636 0.63636364 0.5454545 0.45454545
## 52  0.20000000 0.40000000 0.60000000 0.2000000 0.20000000
## 53  0.11111111 0.77777778 0.55555556 0.5555556 0.55555556
## 54  0.16666667 0.33333333 0.08333333 0.5000000 0.16666667
## 55  0.20000000 0.00000000 0.20000000 0.2000000 0.00000000
## 56  0.00000000 0.50000000 0.25000000 0.2500000 0.25000000
## 57  0.33333333 0.55555556 0.44444444 0.4444444 0.33333333
## 58  0.12500000 0.37500000 0.37500000 0.2500000 0.00000000
## 59  0.36363636 0.09090909 0.18181818 0.1818182 0.09090909
## 60  0.50000000 0.66666667 0.66666667 0.5000000 0.33333333
## 61  0.30000000 0.50000000 0.60000000 0.5000000 0.10000000
## 62  0.33333333 0.66666667 0.11111111 0.6666667 0.55555556
## 63  0.55555556 0.44444444 0.55555556 0.3333333 0.33333333
## 64  0.66666667 0.16666667 0.33333333 0.3333333 0.50000000
## 65  0.50000000 0.70000000 0.80000000 0.7000000 0.50000000
## 66  0.72727273 0.63636364 0.72727273 0.7272727 0.36363636
## 67  0.72727273 0.72727273 0.63636364 0.7272727 0.45454545
## 68  0.18181818 0.09090909 0.45454545 0.6363636 0.27272727
## 69  0.44444444 0.55555556 0.44444444 0.6666667 0.55555556
## 70  0.33333333 0.50000000 0.58333333 0.5833333 0.50000000
## 71  0.33333333 0.50000000 0.16666667 0.3333333 0.33333333
## 72  0.40000000 0.50000000 0.30000000 0.5000000 0.30000000
## 73  0.36363636 0.09090909 0.36363636 0.1818182 0.18181818
## 74  0.55555556 0.44444444 0.44444444 0.2222222 0.44444444
## 75         NaN        NaN        NaN       NaN        NaN
## 76  0.14285714 0.35714286 0.50000000 0.3571429 0.28571429
## 77  0.25000000 0.33333333 0.50000000 0.1666667 0.25000000
## 78  0.36363636 0.63636364 0.27272727 0.6363636 0.27272727
## 79  0.50000000 0.50000000 0.50000000 1.0000000 1.00000000
## 80  0.85714286 0.71428571 0.57142857 0.5714286 0.71428571
## 81  0.58333333 0.33333333 0.41666667 0.5000000 0.50000000
## 82  0.75000000 0.62500000 0.75000000 0.5000000 0.50000000
## 83  0.66666667 0.58333333 0.50000000 0.5833333 0.58333333
## 84  1.00000000 1.00000000 1.00000000 1.0000000 0.00000000
## 85  0.33333333 0.66666667 1.00000000 0.3333333 0.66666667
## 86  0.80000000 0.60000000 0.80000000 0.7000000 0.60000000
## 87  0.72727273 0.45454545 0.72727273 0.8181818 0.45454545
## 88  0.50000000 0.20000000 0.50000000 0.4000000 0.60000000
```

```
## 89  0.37500000 0.50000000 0.50000000 0.7500000 0.87500000
## 90  0.44444444 0.55555556 0.55555556 0.8888889 0.55555556
## 91  0.70000000 0.50000000 0.50000000 0.2000000 0.70000000
## 92  0.45454545 0.36363636 0.54545455 0.5454545 0.45454545
## 93  0.33333333 0.33333333 0.58333333 0.3333333 0.33333333
## 94  0.33333333 0.00000000 0.16666667 0.1666667 0.50000000
## 95  0.41666667 0.41666667 0.41666667 0.2500000 0.25000000
## 96  0.70000000 0.50000000 0.70000000 0.7000000 0.70000000
## 97  0.28571429 0.42857143 0.71428571 0.2857143 0.57142857
## 98  0.55555556 0.55555556 0.33333333 0.6666667 0.55555556
## 99  0.72727273 0.54545455 0.81818182 0.9090909 0.36363636
## 100 0.87500000 0.75000000 0.62500000 1.0000000 0.62500000
## 101 0.57142857 0.71428571 0.28571429 0.7142857 0.57142857
## 102 0.50000000 0.25000000 0.75000000 0.5000000 0.50000000
## 103 0.37500000 0.50000000 0.50000000 0.7500000 0.37500000
## 104 0.58333333 0.58333333 0.50000000 0.3333333 0.58333333
## 105 1.00000000 0.28571429 0.71428571 0.7142857 0.85714286
## 106 0.42857143 0.71428571 0.57142857 0.8571429 0.57142857
## 107 0.83333333 1.00000000 0.50000000 0.8333333 0.66666667
## 108 0.50000000 0.40000000 0.60000000 0.5000000 0.50000000
## 109 0.63636364 0.54545455 0.36363636 0.8181818 0.90909091
## 110        NaN        NaN        NaN       NaN        NaN
## 111 0.75000000 0.50000000 0.75000000 0.7500000 0.62500000
## 112 0.40000000 0.60000000 0.50000000 0.7000000 0.50000000
## 113 0.50000000 0.87500000 0.50000000 0.6250000 0.75000000
## 114 1.00000000 0.66666667 1.00000000 1.0000000 0.33333333
## 115 0.62500000 0.50000000 0.50000000 0.7500000 0.37500000
## 116 1.00000000 1.00000000 0.00000000 0.0000000 0.00000000
## 117 0.72727273 0.72727273 0.63636364 0.7272727 0.81818182
## 118 0.61538462 0.76923077 0.53846154 0.7692308 0.53846154
## 119 0.66666667 0.33333333 1.00000000 0.6666667 0.00000000
## 120 0.33333333 0.33333333 0.33333333 1.0000000 0.66666667
## 121 0.50000000 0.66666667 0.66666667 0.6666667 0.66666667
## 122 0.63636364 0.63636364 0.54545455 0.3636364 0.36363636
## 123 0.55555556 0.77777778 1.00000000 0.6666667 0.77777778
## 124 0.66666667 0.50000000 0.66666667 0.8333333 0.83333333
## 125 1.00000000 0.50000000 1.00000000 1.0000000 1.00000000
## 126 0.62500000 0.62500000 0.75000000 0.6250000 0.50000000
## 127 0.36363636 0.63636364 0.54545455 0.6363636 0.63636364
## 128 0.45454545 0.72727273 0.72727273 0.6363636 0.81818182
## 129 0.60000000 0.90000000 0.80000000 0.8000000 0.70000000
## 130 0.60000000 0.60000000 0.40000000 0.5000000 0.60000000
## 131 0.70000000 0.20000000 0.70000000 0.5000000 0.20000000
## 132 0.40000000 0.80000000 0.50000000 0.7000000 0.50000000
## 133 0.80000000 0.80000000 0.60000000 0.0000000 0.80000000
## 134 0.40000000 0.40000000 0.60000000 0.8000000 0.80000000
## 135 0.81818182 0.72727273 0.54545455 0.4545455 0.72727273
## 136 0.50000000 0.75000000 0.75000000 0.6250000 0.50000000
## 137 0.66666667 0.55555556 0.66666667 0.4444444 0.55555556
## 138 0.85714286 0.42857143 0.57142857 0.5714286 0.85714286
## 139 0.75000000 0.75000000 0.75000000 0.5000000 0.50000000
## 140 0.66666667 1.00000000 0.66666667 0.6666667 1.00000000
## 141 0.75000000 0.62500000 0.75000000 0.7500000 0.75000000
## 142 0.75000000 0.62500000 0.75000000 0.6250000 1.00000000
## 143 0.75000000 0.50000000 0.25000000 0.2500000 0.25000000
## 144 0.50000000 0.90000000 0.70000000 0.7000000 1.00000000
## 145 0.60000000 0.40000000 0.40000000 0.4000000 0.40000000
## 146 0.60000000 0.40000000 0.60000000 0.2000000 0.40000000
```

```
## 147 1.00000000 0.75000000 0.50000000 0.5000000 0.50000000
## 148 0.62500000 0.50000000 0.87500000 0.7500000 0.87500000
## 149 0.30000000 0.70000000 0.60000000 0.4000000 0.60000000
## 150 1.00000000 0.50000000 0.50000000 0.5000000 0.00000000
## 151 0.83333333 0.33333333 0.33333333 0.3333333 0.50000000
## 152 0.50000000 0.50000000 0.25000000 0.5000000 0.75000000
## 153 0.66666667 0.66666667 0.77777778 0.5555556 0.77777778
## 154 0.33333333 0.66666667 1.00000000 0.6666667 0.33333333
## 155 0.60000000 0.60000000 0.40000000 0.4000000 0.80000000
## 156        NaN        NaN        NaN       NaN        NaN
## 157        NaN        NaN        NaN       NaN        NaN
## 158 0.88888889 0.33333333 0.55555556 0.7777778 0.77777778
## 159 0.77777778 0.66666667 0.55555556 0.7777778 0.77777778
## 160 0.33333333 0.66666667 1.00000000 1.0000000 1.00000000
## 161 0.25000000 0.25000000 1.00000000 0.2500000 1.00000000
## 162 0.80000000 0.60000000 0.60000000 1.0000000 0.80000000
## 163 0.60000000 0.80000000 0.40000000 0.4000000 0.40000000
## 164 0.75000000 0.75000000 0.50000000 1.0000000 0.25000000
## 165 0.50000000 0.50000000 0.75000000 0.5000000 0.75000000
## 166 1.00000000 1.00000000 0.50000000 1.0000000 0.00000000
## 167 0.57142857 0.28571429 0.85714286 0.5714286 0.85714286
## 168 1.00000000 0.50000000 0.50000000 0.0000000 0.50000000
## 169 1.00000000 0.00000000 1.00000000 0.0000000 1.00000000
## 170 0.57142857 0.85714286 0.57142857 0.8571429 0.85714286
## 171 1.00000000 0.25000000 0.25000000 0.0000000 0.50000000
## 172 0.60000000 0.60000000 0.60000000 0.4000000 0.80000000
## 173 0.70000000 0.70000000 0.60000000 0.9000000 0.30000000
## 174 0.50000000 1.00000000 0.50000000 1.0000000 1.00000000
## 175 0.87500000 0.25000000 0.75000000 0.7500000 0.62500000
## 176 0.83333333 0.50000000 0.66666667 0.5000000 0.33333333
## 177 0.00000000 0.33333333 0.33333333 0.3333333 0.33333333
## 178 0.66666667 0.66666667 0.77777778 0.7777778 0.88888889
## 179 0.75000000 1.00000000 0.50000000 0.6250000 0.62500000
## 180 0.33333333 1.00000000 0.33333333 0.6666667 0.33333333
## 181        NaN        NaN        NaN       NaN        NaN
## 182 0.83333333 0.66666667 1.00000000 0.6666667 0.83333333
## 183 0.80000000 0.80000000 0.60000000 1.0000000 0.40000000
## 184 0.20000000 0.80000000 0.40000000 0.4000000 0.60000000
## 185 0.20000000 0.40000000 0.60000000 0.8000000 0.80000000
## 186 0.00000000 0.00000000 0.00000000 1.0000000 1.00000000
## 187 0.60000000 1.00000000 0.40000000 0.4000000 0.60000000
## 188 0.66666667 0.66666667 0.66666667 0.3333333 1.00000000
## 189 0.80000000 1.00000000 0.60000000 0.6000000 0.80000000
## 190 0.50000000 0.62500000 0.75000000 0.5000000 0.75000000
## 191 0.80000000 0.80000000 0.80000000 0.8000000 0.80000000
## 192 0.66666667 0.33333333 1.00000000 0.6666667 0.66666667
## 193 0.00000000 0.00000000 1.00000000 1.0000000 0.00000000
## 194 1.00000000 0.83333333 0.83333333 0.8333333 0.83333333
## 195 0.85714286 0.71428571 0.28571429 0.7142857 0.57142857
## 196 0.00000000 1.00000000 1.00000000 1.0000000 1.00000000
## 197 0.25000000 0.37500000 0.75000000 0.7500000 0.62500000
## 198 0.50000000 0.50000000 1.00000000 0.5000000 1.00000000
## 199 0.50000000 0.50000000 0.50000000 0.5000000 1.00000000
## 200 0.50000000 0.00000000 0.00000000 0.5000000 0.50000000
## 201 0.50000000 1.00000000 1.00000000 1.0000000 0.50000000
## 202 0.50000000 0.50000000 0.87500000 0.3750000 0.37500000
## 203 1.00000000 0.75000000 1.00000000 1.0000000 0.50000000
## 204 0.50000000 0.75000000 0.00000000 0.5000000 0.50000000
```

```
## 205 0.33333333 0.66666667 0.00000000 1.0000000 0.66666667
## 206 1.00000000 0.50000000 1.00000000 0.5000000 0.50000000
## 207 0.83333333 0.50000000 0.33333333 0.3333333 0.66666667
## 208 0.20000000 0.80000000 0.60000000 0.8000000 0.80000000
## 209 0.50000000 0.33333333 0.83333333 0.8333333 0.33333333
## 210 1.00000000 0.00000000 0.00000000 1.0000000 0.00000000
## 211 0.50000000 1.00000000 0.50000000 0.5000000 0.50000000
## 212 0.75000000 0.50000000 1.00000000 0.5000000 0.75000000
## 213 1.00000000 0.60000000 0.80000000 1.0000000 0.80000000
## 214 0.00000000 0.33333333 1.00000000 0.0000000 0.33333333
## 215 1.00000000 0.40000000 0.80000000 0.8000000 0.80000000
## 216 0.25000000 0.25000000 1.00000000 0.7500000 1.00000000
## 217 0.50000000 0.50000000 0.75000000 1.0000000 1.00000000
## 218 0.80000000 0.60000000 0.60000000 0.2000000 0.80000000
## 219 0.40000000 0.60000000 0.60000000 0.6000000 0.40000000
## 220 0.80000000 0.40000000 0.40000000 0.8000000 0.60000000
## 221 0.66666667 0.33333333 0.33333333 0.6666667 1.00000000
## 222 0.33333333 0.00000000 0.33333333 0.3333333 0.66666667
## 223 1.00000000 1.00000000 0.00000000 1.0000000 0.00000000
## 224 0.50000000 0.25000000 0.50000000 0.5000000 1.00000000
## 225 0.50000000 0.25000000 0.50000000 0.5000000 0.75000000
## 226 0.50000000 0.50000000 0.66666667 0.3333333 0.33333333
## 227 0.66666667 0.50000000 0.33333333 0.5000000 0.83333333
## 228 1.00000000 0.00000000 1.00000000 0.0000000 0.00000000
## 229 0.00000000 1.00000000 0.00000000 1.0000000 1.00000000
## 230 0.75000000 0.75000000 0.25000000 0.2500000 0.50000000
## 231 1.00000000 0.80000000 1.00000000 0.8000000 0.80000000
## 232 0.20000000 0.40000000 0.40000000 0.8000000 0.40000000
## 233 0.75000000 0.50000000 0.75000000 0.7500000 0.75000000
## 234 0.33333333 0.33333333 0.33333333 0.0000000 0.33333333
## 235 1.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 236 0.33333333 0.33333333 0.66666667 0.6666667 0.33333333
## 237 1.00000000 1.00000000 1.00000000 1.0000000 0.50000000
## 238 0.00000000 1.00000000 1.00000000 1.0000000 0.00000000
## 239 0.33333333 1.00000000 0.66666667 1.0000000 0.66666667
## 240 1.00000000 0.00000000 0.50000000 0.5000000 0.50000000
## 241 1.00000000 1.00000000 0.00000000 0.0000000 1.00000000
## 242 0.00000000 0.00000000 1.00000000 1.0000000 1.00000000
## 243 0.66666667 0.33333333 1.00000000 0.6666667 0.66666667
## 244 0.66666667 0.66666667 0.33333333 0.6666667 0.66666667
## 245        NaN        NaN        NaN       NaN        NaN
## 246 0.00000000 1.00000000 1.00000000 1.0000000 0.00000000
## 247 0.00000000 1.00000000 1.00000000 1.0000000 1.00000000
## 248 0.33333333 0.33333333 0.33333333 0.3333333 0.33333333
## 249 0.25000000 0.50000000 0.25000000 0.7500000 0.75000000
## 250 0.33333333 0.33333333 0.00000000 0.0000000 0.00000000
## 251 0.66666667 0.66666667 1.00000000 0.6666667 0.00000000
## 252        NaN        NaN        NaN       NaN        NaN
## 253 1.00000000 0.00000000 1.00000000 1.0000000 1.00000000
## 254 1.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 255 0.00000000 0.00000000 0.00000000 0.5000000 0.50000000
## 256 0.00000000 0.50000000 0.00000000 0.0000000 0.50000000
## 257 1.00000000 0.25000000 0.75000000 0.7500000 0.75000000
## 258 0.00000000 0.50000000 0.00000000 0.5000000 0.50000000
## 259 1.00000000 0.00000000 0.00000000 1.0000000 0.50000000
## 260 0.00000000 0.50000000 1.00000000 0.5000000 0.00000000
## 261 0.50000000 0.50000000 1.00000000 0.5000000 0.50000000
## 262        NaN        NaN        NaN       NaN        NaN
```

```
## 263        NaN        NaN        NaN       NaN        NaN
## 264 0.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 265 0.33333333 0.66666667 0.66666667 0.6666667 0.33333333
## 266 1.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 267 0.00000000 0.00000000 0.00000000 1.0000000 0.00000000
## 268 0.00000000 0.00000000 0.00000000 0.0000000 0.50000000
## 269 0.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 270 0.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 271 0.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 272 1.00000000 0.00000000 0.00000000 1.0000000 0.00000000
## 273 1.00000000 1.00000000 0.50000000 0.0000000 0.50000000
## 274 0.00000000 0.00000000 0.00000000 0.0000000 0.00000000
## 275 0.00000000 1.00000000 0.00000000 0.0000000 0.50000000
## 276 0.33333333 0.33333333 0.50000000 0.1666667 0.16666667
## 277 0.37500000 0.50000000 0.75000000 0.7500000 0.62500000
## 278 0.42857143 0.14285714 0.00000000 0.2857143 0.00000000
## 279 1.00000000 0.57142857 0.42857143 0.5714286 0.71428571
## 280 0.90909091 0.72727273 0.63636364 0.7272727 0.90909091
## 281 0.00000000 0.00000000 1.00000000 1.0000000 1.00000000
## 282 0.57142857 0.71428571 0.71428571 0.5714286 1.00000000
## 283 0.50000000 1.00000000 1.00000000 0.5000000 1.00000000
## 284 0.33333333 0.50000000 0.66666667 0.8333333 0.83333333
## 285 1.00000000 0.33333333 0.66666667 1.0000000 0.33333333
## 286 0.66666667 1.00000000 1.00000000 1.0000000 1.00000000
## 287 0.20000000 0.60000000 0.40000000 0.6000000 0.60000000
## 288 0.66666667 1.00000000 0.66666667 0.6666667 0.66666667
## 289 1.00000000 0.25000000 1.00000000 0.0000000 0.50000000
## 290 0.00000000 0.50000000 0.50000000 0.5000000 1.00000000
## 291 1.00000000 0.66666667 0.66666667 1.0000000 1.00000000
## 292 0.66666667 0.33333333 0.66666667 0.6666667 1.00000000
## 293 0.25000000 0.25000000 0.75000000 0.0000000 0.00000000
## 294 0.75000000 0.50000000 0.50000000 0.2500000 0.25000000
## 295 0.75000000 0.50000000 0.50000000 0.2500000 0.50000000
## 296 0.33333333 0.66666667 0.33333333 0.6666667 1.00000000
## 297 0.33333333 0.33333333 0.00000000 0.6666667 0.33333333
## 298 0.30000000 0.30000000 0.50000000 0.3000000 0.10000000
## 299 0.00000000 0.50000000 0.00000000 0.0000000 0.50000000
## 300 0.50000000 0.50000000 1.00000000 0.5000000 1.00000000
##
## $prediction.success
##        1    2    3    4    5
## 1   0.80 0.75 0.80 0.65 0.75
## 2   0.65 0.60 0.70 0.65 0.65
## 3   0.80 0.70 0.65 0.65 0.65
## 4   0.70 0.70 0.75 0.70 0.80
## 5   0.55 0.50 0.55 0.60 0.60
## 6   0.90 0.80 0.70 0.90 0.85
## 7   0.70 0.65 0.65 0.70 0.75
## 8   0.65 0.65 0.70 0.65 0.45
## 9   0.65 0.70 0.55 0.75 0.75
## 10  0.60 0.65 0.60 0.60 0.70
## 11  0.50 0.55 0.60 0.55 0.50
## 12  0.80 0.85 0.75 0.85 0.90
## 13  0.80 0.95 0.85 0.90 0.75
## 14  0.75 0.80 0.70 0.80 0.70
## 15  0.75 0.75 0.70 0.85 0.75
## 16  0.75 0.80 0.75 0.75 0.75
## 17  0.70 0.70 0.55 0.75 0.60
```

```
## 18  0.85 0.80 0.75 0.70 0.80
## 19  0.85 0.70 0.60 0.55 0.85
## 20  0.65 0.65 0.75 0.65 0.70
## 21  0.75 0.55 0.75 0.60 0.75
## 22  0.50 0.45 0.60 0.75 0.55
## 23  0.65 0.65 0.70 0.60 0.60
## 24  0.60 0.55 0.75 0.70 0.75
## 25  0.85 0.60 0.85 0.90 0.65
## 26  0.85 0.80 0.90 0.70 0.75
## 27  0.80 0.55 0.65 0.85 0.75
## 28  0.60 0.60 0.60 0.80 0.70
## 29  0.70 0.75 0.80 0.80 0.85
## 30  0.55 0.60 0.85 0.80 0.55
## 31  0.65 0.70 0.70 0.70 0.75
## 32  0.75 0.75 0.75 0.85 0.80
## 33  0.60 0.75 0.70 0.60 0.75
## 34  0.60 0.65 0.80 0.65 0.60
## 35  0.70 0.75 0.70 0.70 0.80
## 36  0.85 0.50 0.60 0.75 0.75
## 37  0.75 0.65 0.85 0.65 0.70
## 38  0.60 0.65 0.75 0.55 0.60
## 39  0.65 0.65 0.60 0.70 0.70
## 40  0.85 0.80 0.85 0.95 0.80
## 41  0.75 0.95 0.85 0.65 0.70
## 42  0.60 0.55 0.90 0.70 0.55
## 43  0.60 0.65 0.85 0.80 0.75
## 44  0.70 0.65 0.50 0.45 0.75
## 45  0.80 0.85 0.85 0.65 0.70
## 46  0.75 0.65 0.70 0.80 0.60
## 47  0.75 0.60 0.60 0.75 0.85
## 48  0.70 0.80 0.65 0.80 0.80
## 49  0.75 0.65 0.80 0.60 0.70
## 50  0.60 0.70 0.55 0.85 0.70
## 51  0.70 0.75 0.55 0.65 0.75
## 52  0.85 0.75 0.75 0.65 0.75
## 53  0.90 0.55 0.65 0.55 0.60
## 54  0.75 0.70 0.85 0.65 0.75
## 55  0.65 0.80 0.70 0.65 0.85
## 56  0.85 0.65 0.65 0.75 0.75
## 57  0.70 0.60 0.70 0.65 0.75
## 58  0.80 0.65 0.70 0.70 0.85
## 59  0.70 0.90 0.90 0.80 0.80
## 60  0.65 0.65 0.65 0.55 0.80
## 61  0.65 0.60 0.55 0.60 0.85
## 62  0.80 0.55 0.90 0.60 0.60
## 63  0.75 0.75 0.70 0.85 0.70
## 64  0.75 0.90 0.80 0.80 0.80
## 65  0.65 0.60 0.60 0.60 0.70
## 66  0.55 0.55 0.55 0.50 0.80
## 67  0.50 0.60 0.55 0.50 0.65
## 68  0.80 0.90 0.60 0.60 0.65
## 69  0.70 0.60 0.50 0.60 0.60
## 70  0.75 0.60 0.55 0.60 0.70
## 71  0.65 0.70 0.70 0.55 0.55
## 72  0.70 0.60 0.70 0.60 0.75
## 73  0.75 0.90 0.60 0.75 0.75
## 74  0.65 0.60 0.75 0.80 0.65
## 75  0.40 0.50 0.60 0.60 0.65
```

```
## 76  0.90 0.75 0.65 0.75 0.75
## 77  0.75 0.70 0.65 0.80 0.85
## 78  0.75 0.55 0.75 0.45 0.70
## 79  0.50 0.60 0.60 0.70 0.60
## 80  0.50 0.45 0.55 0.65 0.40
## 81  0.60 0.75 0.70 0.65 0.60
## 82  0.60 0.65 0.65 0.75 0.65
## 83  0.60 0.65 0.65 0.65 0.65
## 84  0.65 0.75 0.80 0.60 0.80
## 85  0.65 0.60 0.65 0.70 0.60
## 86  0.50 0.70 0.55 0.60 0.55
## 87  0.55 0.60 0.50 0.50 0.70
## 88  0.50 0.80 0.70 0.70 0.50
## 89  0.65 0.70 0.70 0.50 0.50
## 90  0.70 0.65 0.65 0.60 0.65
## 91  0.55 0.65 0.70 0.80 0.50
## 92  0.65 0.70 0.55 0.65 0.70
## 93  0.70 0.70 0.60 0.75 0.80
## 94  0.60 0.85 0.75 0.60 0.65
## 95  0.65 0.65 0.60 0.80 0.80
## 96  0.65 0.65 0.65 0.60 0.55
## 97  0.65 0.65 0.45 0.65 0.45
## 98  0.75 0.65 0.75 0.55 0.60
## 99  0.55 0.70 0.55 0.45 0.60
## 100 0.50 0.70 0.65 0.45 0.70
## 101 0.65 0.55 0.75 0.60 0.60
## 102 0.75 0.85 0.65 0.70 0.70
## 103 0.75 0.60 0.70 0.50 0.60
## 104 0.55 0.65 0.60 0.65 0.55
## 105 0.55 0.75 0.60 0.55 0.50
## 106 0.70 0.60 0.70 0.60 0.70
## 107 0.55 0.50 0.75 0.50 0.65
## 108 0.70 0.75 0.65 0.60 0.70
## 109 0.55 0.60 0.70 0.35 0.30
## 110 0.55 0.75 0.60 0.55 0.60
## 111 0.65 0.80 0.55 0.65 0.65
## 112 0.60 0.60 0.60 0.55 0.70
## 113 0.65 0.50 0.65 0.70 0.45
## 114 0.60 0.50 0.65 0.50 0.80
## 115 0.40 0.60 0.75 0.50 0.65
## 116 0.65 0.70 0.80 0.75 0.85
## 117 0.50 0.55 0.55 0.55 0.40
## 118 0.55 0.35 0.60 0.50 0.60
## 119 0.55 0.85 0.70 0.65 0.85
## 120 0.70 0.75 0.70 0.65 0.60
## 121 0.65 0.55 0.60 0.70 0.60
## 122 0.65 0.45 0.65 0.70 0.65
## 123 0.65 0.65 0.45 0.55 0.45
## 124 0.65 0.80 0.75 0.65 0.70
## 125 0.90 0.60 0.75 0.60 0.70
## 126 0.60 0.60 0.55 0.50 0.65
## 127 0.75 0.60 0.60 0.60 0.60
## 128 0.65 0.55 0.60 0.50 0.55
## 129 0.65 0.45 0.55 0.50 0.55
## 130 0.50 0.50 0.65 0.65 0.65
## 131 0.50 0.75 0.60 0.70 0.85
## 132 0.75 0.55 0.65 0.60 0.60
## 133 0.60 0.60 0.60 0.80 0.70
```

```
## 134 0.65 0.60 0.55 0.70 0.60
## 135 0.55 0.55 0.55 0.65 0.50
## 136 0.60 0.65 0.65 0.70 0.70
## 137 0.55 0.70 0.65 0.60 0.55
## 138 0.50 0.70 0.55 0.65 0.60
## 139 0.65 0.60 0.50 0.65 0.65
## 140 0.75 0.65 0.80 0.70 0.70
## 141 0.70 0.65 0.60 0.65 0.70
## 142 0.65 0.70 0.65 0.75 0.60
## 143 0.55 0.75 0.70 0.75 0.70
## 144 0.65 0.55 0.65 0.65 0.45
## 145 0.50 0.75 0.70 0.65 0.70
## 146 0.65 0.75 0.75 0.85 0.80
## 147 0.65 0.60 0.80 0.75 0.80
## 148 0.55 0.65 0.50 0.55 0.45
## 149 0.80 0.50 0.55 0.75 0.65
## 150 0.70 0.85 0.75 0.65 0.80
## 151 0.70 0.70 0.80 0.70 0.75
## 152 0.80 0.65 0.90 0.75 0.75
## 153 0.65 0.70 0.55 0.70 0.60
## 154 0.75 0.60 0.70 0.55 0.80
## 155 0.75 0.70 0.75 0.85 0.65
## 156 0.90 0.85 0.90 0.85 0.80
## 157 0.70 0.85 0.85 0.80 0.90
## 158 0.50 0.75 0.60 0.55 0.55
## 159 0.50 0.60 0.65 0.55 0.40
## 160 0.75 0.75 0.65 0.80 0.75
## 161 0.80 0.85 0.70 0.65 0.55
## 162 0.70 0.75 0.70 0.65 0.75
## 163 0.80 0.65 0.90 0.75 0.80
## 164 0.55 0.50 0.65 0.50 0.75
## 165 0.80 0.75 0.80 0.85 0.75
## 166 0.70 0.70 0.70 0.75 0.80
## 167 0.80 0.55 0.60 0.70 0.50
## 168 0.65 0.60 0.75 0.80 0.80
## 169 0.80 0.85 0.75 0.75 0.60
## 170 0.80 0.60 0.65 0.65 0.55
## 171 0.55 0.75 0.80 0.90 0.80
## 172 0.70 0.65 0.70 0.70 0.55
## 173 0.55 0.50 0.60 0.50 0.80
## 174 0.75 0.55 0.85 0.70 0.65
## 175 0.60 0.75 0.45 0.55 0.55
## 176 0.60 0.75 0.80 0.85 0.75
## 177 0.80 0.65 0.75 0.85 0.90
## 178 0.70 0.60 0.55 0.60 0.40
## 179 0.60 0.50 0.70 0.65 0.65
## 180 0.85 0.80 0.90 0.85 0.85
## 181 0.90 0.70 0.90 0.75 0.75
## 182 0.55 0.75 0.55 0.70 0.70
## 183 0.75 0.70 0.75 0.60 0.90
## 184 0.95 0.70 0.85 0.80 0.70
## 185 0.85 0.85 0.80 0.75 0.70
## 186 0.70 0.90 0.80 0.75 0.90
## 187 0.65 0.70 0.75 0.75 0.70
## 188 0.80 0.75 0.75 0.70 0.75
## 189 0.70 0.60 0.75 0.70 0.70
## 190 0.75 0.65 0.60 0.65 0.60
## 191 0.55 0.65 0.75 0.75 0.70
```

```
## 192 0.85 0.80 0.60 0.65 0.70
## 193 0.75 0.85 0.90 0.90 0.75
## 194 0.55 0.60 0.75 0.60 0.65
## 195 0.65 0.65 0.80 0.70 0.65
## 196 0.85 0.75 0.85 0.65 0.90
## 197 0.85 0.85 0.65 0.70 0.60
## 198 0.75 0.70 0.70 0.90 0.85
## 199 0.90 0.55 0.70 0.80 0.65
## 200 0.75 0.85 0.70 0.80 0.90
## 201 0.90 0.80 0.60 0.75 0.80
## 202 0.75 0.75 0.55 0.80 0.80
## 203 0.45 0.65 0.50 0.50 0.75
## 204 0.75 0.80 0.95 0.80 0.80
## 205 0.80 0.85 0.75 0.85 0.85
## 206 0.75 0.90 0.70 0.85 0.80
## 207 0.65 0.80 0.85 0.90 0.70
## 208 0.85 0.80 0.80 0.80 0.65
## 209 0.85 0.85 0.65 0.60 0.60
## 210 0.70 0.70 0.80 0.75 0.90
## 211 0.85 0.75 0.80 0.90 0.85
## 212 0.70 0.70 0.75 0.75 0.80
## 213 0.60 0.85 0.65 0.70 0.70
## 214 0.65 0.75 0.45 0.85 0.80
## 215 0.65 0.75 0.75 0.75 0.65
## 216 0.80 0.80 0.70 0.80 0.75
## 217 0.85 0.70 0.80 0.45 0.60
## 218 0.70 0.80 0.75 0.75 0.60
## 219 0.85 0.65 0.80 0.80 0.85
## 220 0.75 0.65 0.80 0.80 0.70
## 221 0.85 0.95 0.85 0.70 0.65
## 222 0.80 0.80 0.80 0.60 0.80
## 223 0.80 0.95 0.85 0.85 0.70
## 224 0.85 0.80 0.75 0.80 0.75
## 225 0.85 0.95 0.85 0.90 0.75
## 226 0.85 0.85 0.80 0.85 0.80
## 227 0.75 0.80 0.70 0.80 0.70
## 228 0.80 0.70 0.80 0.80 0.80
## 229 0.80 0.70 0.75 0.85 0.80
## 230 0.80 0.80 0.85 0.95 0.90
## 231 0.70 0.75 0.70 0.55 0.80
## 232 0.85 0.90 0.85 0.60 0.65
## 233 0.60 0.75 0.65 0.80 0.65
## 234 0.95 0.85 0.85 0.95 0.90
## 235 0.80 0.90 0.85 0.70 0.75
## 236 0.95 0.70 0.70 0.80 0.80
## 237 0.75 0.75 0.80 0.70 0.65
## 238 0.90 0.80 0.80 0.85 0.80
## 239 0.90 0.75 0.70 0.85 0.85
## 240 0.80 0.90 0.80 0.70 0.90
## 241 0.75 0.70 0.85 0.85 0.75
## 242 0.85 0.80 0.70 0.65 0.85
## 243 0.85 0.90 0.80 0.80 0.85
## 244 0.85 0.75 0.90 0.90 0.85
## 245 0.85 0.85 0.95 0.75 0.85
## 246 0.90 0.80 0.75 0.90 0.90
## 247 0.90 0.80 0.80 0.80 0.85
## 248 0.80 0.90 0.95 0.90 0.95
## 249 0.90 0.85 0.90 0.80 0.80
```

```
## 250 0.85 0.75 0.90 0.90 0.90
## 251 0.85 0.85 0.75 0.75 0.95
## 252 0.90 0.90 0.80 1.00 0.90
## 253 0.90 0.85 0.85 0.90 0.85
## 254 0.75 0.85 0.80 0.85 0.90
## 255 0.85 0.90 0.85 0.95 0.90
## 256 0.90 0.85 0.85 0.90 0.85
## 257 0.65 0.80 0.70 0.70 0.85
## 258 0.85 0.80 0.85 0.80 0.85
## 259 0.75 0.85 0.90 0.75 0.80
## 260 0.90 0.90 0.80 0.80 0.80
## 261 0.75 0.90 0.60 0.75 0.80
## 262 0.85 0.90 0.85 0.75 0.90
## 263 0.85 0.85 0.90 0.80 0.85
## 264 0.85 0.85 0.85 0.85 0.85
## 265 0.85 0.65 0.75 0.70 0.85
## 266 0.85 0.90 0.80 0.85 0.85
## 267 0.80 0.90 0.90 0.85 0.80
## 268 1.00 0.85 0.85 0.85 0.90
## 269 0.90 0.95 0.85 0.95 0.75
## 270 0.90 0.95 0.75 0.80 0.85
## 271 0.85 0.80 0.90 0.85 0.90
## 272 0.80 0.80 0.85 0.70 0.85
## 273 0.80 0.75 0.85 0.80 0.80
## 274 0.90 0.85 0.85 0.90 0.90
## 275 0.85 0.80 0.85 0.95 0.85
## 276 0.65 0.60 0.55 0.60 0.75
## 277 0.80 0.60 0.60 0.60 0.55
## 278 0.55 0.70 0.80 0.60 0.80
## 279 0.50 0.55 0.70 0.60 0.55
## 280 0.50 0.55 0.60 0.60 0.50
## 281 0.95 0.90 0.75 0.85 0.80
## 282 0.70 0.55 0.70 0.80 0.60
## 283 0.80 0.75 0.80 0.70 0.60
## 284 0.85 0.65 0.55 0.65 0.50
## 285 0.65 0.80 0.80 0.60 0.85
## 286 0.85 0.85 0.60 0.65 0.70
## 287 0.85 0.65 0.80 0.75 0.75
## 288 0.80 0.85 0.75 0.80 0.85
## 289 0.70 0.85 0.70 0.85 0.80
## 290 0.75 0.85 0.80 0.85 0.80
## 291 0.75 0.75 0.70 0.75 0.80
## 292 0.65 0.85 0.65 0.85 0.75
## 293 0.90 0.95 0.75 0.90 1.00
## 294 0.85 0.85 0.80 0.95 0.90
## 295 0.80 0.80 0.90 0.85 0.90
## 296 0.80 0.85 0.75 0.85 0.75
## 297 0.85 0.75 0.90 0.65 0.80
## 298 0.75 0.70 0.75 0.75 0.85
## 299 1.00 0.90 0.90 1.00 0.85
## 300 0.85 0.90 0.85 0.95 0.85
##
## $sensitivity
##             1         2         3         4         5
## 1   0.0000000 0.3333333 0.0000000 0.1666667 0.0000000
## 2   0.3333333 0.3000000 0.4000000 0.3333333 0.3636364
## 3   0.5555556 0.4444444 0.4166667 0.4166667 0.4000000
## 4   0.4545455 0.4545455 0.5000000 0.4285714 0.5555556
```

```
## 5   0.1818182 0.1666667 0.1818182 0.2000000 0.2000000
## 6   0.9000000 0.8000000 0.7000000 0.9000000 0.7692308
## 7   0.4444444 0.4166667 0.3750000 0.4444444 0.5000000
## 8   0.4166667 0.4000000 0.4545455 0.3333333 0.2500000
## 9   0.8000000 0.7500000 0.5714286 0.7777778 0.8571429
## 10  0.3636364 0.4166667 0.3636364 0.3846154 0.4285714
## 11  0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 12  0.9000000 1.0000000 0.8181818 0.9090909 0.8571429
## 13  0.7500000 0.9090909 0.8888889 0.9000000 0.7777778
## 14  0.6000000 0.6666667 0.5454545 0.6363636 0.5454545
## 15  0.8000000 0.7500000 0.7272727 0.9000000 0.7500000
## 16  0.6923077 0.7142857 0.6923077 0.6666667 0.7272727
## 17  0.5000000 0.5000000 0.3846154 0.5555556 0.4166667
## 18  0.7500000 0.7142857 0.6000000 0.5454545 0.6666667
## 19  1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 20  0.5000000 0.5000000 0.5833333 0.5000000 0.5384615
## 21  0.6363636 0.4545455 0.6666667 0.5000000 0.6363636
## 22  0.3846154 0.3333333 0.4444444 0.6000000 0.4166667
## 23  0.3636364 0.3333333 0.4000000 0.3333333 0.2500000
## 24  0.6250000 0.6000000 0.8571429 0.8333333 0.7777778
## 25  0.5714286 0.2500000 0.6000000 0.7500000 0.3333333
## 26  0.7142857 0.7500000 0.8333333 0.5000000 0.5714286
## 27  0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 28  0.4545455 0.4285714 0.4444444 0.6666667 0.5555556
## 29  0.6000000 0.7142857 0.8333333 0.8333333 0.8571429
## 30  0.3846154 0.4166667 0.6666667 0.6000000 0.3846154
## 31  0.6363636 0.7000000 0.6666667 0.6666667 0.6923077
## 32  0.7142857 0.8000000 0.7500000 1.0000000 0.8888889
## 33  0.4444444 0.6000000 0.5555556 0.4285714 0.6000000
## 34  0.4615385 0.5000000 0.6666667 0.5000000 0.4615385
## 35  0.7500000 0.7777778 0.8333333 0.7500000 0.8000000
## 36  0.7272727 0.4166667 0.5000000 0.6153846 0.6363636
## 37  0.9000000 0.8750000 0.8571429 0.8000000 0.8888889
## 38  0.4666667 0.5000000 0.6000000 0.4166667 0.4615385
## 39  0.6363636 0.6666667 0.6250000 0.7000000 0.8333333
## 40  0.8888889 0.7500000 0.8181818 0.9090909 0.7500000
## 41  0.8750000 1.0000000 0.9000000 0.7500000 0.7777778
## 42  0.6250000 0.6000000 0.9000000 0.8333333 0.5555556
## 43  0.5000000 0.5555556 0.8571429 0.7500000 0.6666667
## 44  1.0000000 0.8000000 0.5000000 0.4444444 0.8571429
## 45  0.7500000 0.8181818 0.8181818 0.6363636 0.8333333
## 46  0.6666667 0.5714286 0.6666667 0.7500000 0.5000000
## 47  0.5555556 0.3333333 0.3333333 0.5714286 0.7142857
## 48  0.6666667 0.7500000 0.5555556 0.7000000 0.8333333
## 49  0.6363636 0.5714286 0.7500000 0.5000000 0.6250000
## 50  0.7500000 0.8750000 0.6363636 1.0000000 0.8000000
## 51  1.0000000 0.8750000 0.6666667 0.8333333 1.0000000
## 52  0.6666667 0.5000000 0.5000000 0.4000000 0.5000000
## 53  0.8888889 0.5000000 0.6666667 0.5000000 0.5714286
## 54  0.7692308 0.8000000 0.8461538 0.8571429 0.7692308
## 55  0.4000000 0.5555556 0.4444444 0.4000000 0.6250000
## 56  0.5714286 0.2857143 0.3333333 0.4285714 0.4285714
## 57  0.6666667 0.5714286 0.7142857 0.6250000 0.7500000
## 58  0.7000000 0.5555556 0.6250000 0.6000000 0.7272727
## 59  0.7777778 0.9090909 1.0000000 0.8181818 0.7692308
## 60  0.4285714 0.4000000 0.4000000 0.3333333 0.6666667
## 61  0.6363636 0.6250000 0.5714286 0.6250000 0.8181818
## 62  0.8571429 0.5000000 0.8888889 0.6000000 0.5714286
```

```
## 63  1.0000000 0.8333333 0.8000000 1.0000000 0.6666667
## 64  0.6666667 0.8333333 0.6666667 0.6666667 0.7500000
## 65  0.7142857 0.7500000 1.0000000 0.7500000 0.8333333
## 66  0.7500000 0.6666667 0.7500000 0.6000000 1.0000000
## 67  0.6000000 1.0000000 0.6666667 0.6000000 0.7500000
## 68  0.8181818 0.9090909 0.6666667 0.8000000 0.6666667
## 69  0.7142857 0.5714286 0.4545455 0.6000000 0.5714286
## 70  0.8888889 0.7500000 0.7142857 0.8333333 1.0000000
## 71  0.4444444 0.5000000 0.5000000 0.3636364 0.3636364
## 72  0.7500000 0.6250000 0.7000000 0.6250000 0.7777778
## 73  0.8750000 0.9090909 0.6363636 0.7500000 0.7500000
## 74  0.6666667 0.5555556 0.8333333 0.7777778 0.6250000
## 75  0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 76  1.0000000 1.0000000 1.0000000 1.0000000 0.9090909
## 77  0.8181818 0.8000000 0.8571429 0.8333333 1.0000000
## 78  0.8750000 0.6666667 0.8000000 0.5000000 0.7272727
## 79  0.1000000 0.1250000 0.1250000 0.0000000 0.0000000
## 80  0.2000000 0.2500000 0.3750000 0.5000000 0.2222222
## 81  0.8333333 0.8888889 0.8750000 0.8571429 0.7500000
## 82  0.5000000 0.6000000 0.6666667 0.8000000 0.5714286
## 83  1.0000000 1.0000000 0.8571429 1.0000000 1.0000000
## 84  0.0000000 0.0000000 0.0000000 0.0000000 0.3333333
## 85  0.2500000 0.1428571 0.0000000 0.2857143 0.1428571
## 86  0.5000000 1.0000000 0.6666667 0.7500000 0.5714286
## 87  0.7500000 0.6666667 0.6000000 0.6666667 0.8571429
## 88  0.5000000 0.8000000 0.8333333 0.7500000 0.5000000
## 89  0.5555556 0.6666667 0.6666667 0.3333333 0.2500000
## 90  0.7142857 0.6666667 0.6666667 1.0000000 0.6666667
## 91  0.6000000 0.7142857 0.8333333 0.8000000 0.5000000
## 92  0.7500000 0.7777778 0.6250000 0.8333333 0.8571429
## 93  0.8000000 0.8000000 0.8333333 0.8888889 1.0000000
## 94  0.4000000 0.6666667 0.5555556 0.4166667 0.4285714
## 95  0.7777778 0.7777778 0.7000000 0.9000000 0.9000000
## 96  1.0000000 0.7142857 1.0000000 0.7500000 0.6000000
## 97  0.5000000 0.5000000 0.2500000 0.5000000 0.3000000
## 98  1.0000000 0.6666667 0.7500000 0.5000000 0.5714286
## 99  0.7500000 1.0000000 1.0000000 0.5000000 0.6363636
## 100 0.2500000 1.0000000 0.6000000 0.0000000 0.7500000
## 101 0.5000000 0.3333333 0.6250000 0.4000000 0.4285714
## 102 0.8000000 0.8571429 0.6666667 0.6666667 0.6666667
## 103 0.7142857 0.5000000 0.6666667 0.3333333 0.5000000
## 104 0.7142857 1.0000000 0.7500000 0.7272727 0.7142857
## 105 0.0000000 0.6250000 0.4000000 0.3333333 0.2000000
## 106 0.5714286 0.4000000 0.6000000 0.3333333 0.6000000
## 107 0.2000000 0.0000000 0.6000000 0.1666667 0.4000000
## 108 0.8333333 0.8571429 0.8000000 0.6250000 0.8333333
## 109 0.6666667 0.7142857 0.7777778 0.3333333 0.2000000
## 110 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 111 0.6666667 1.0000000 0.4000000 0.6666667 0.6000000
## 112 0.6000000 0.6666667 0.6250000 0.6000000 0.8333333
## 113 0.5714286 0.2500000 0.5714286 0.7500000 0.2857143
## 114 0.0000000 0.1111111 0.0000000 0.0000000 0.4000000
## 115 0.3000000 0.5000000 0.8000000 0.3333333 0.5555556
## 116 0.0000000 0.0000000 0.2000000 0.1666667 0.2500000
## 117 0.6000000 0.7500000 0.6666667 0.7500000 0.4000000
## 118 0.8333333 0.5000000 0.8571429 1.0000000 0.8571429
## 119 0.1250000 0.5000000 0.0000000 0.1666667 0.5000000
## 120 0.2857143 0.3333333 0.2857143 0.0000000 0.1428571
```

```
## 121 0.4285714 0.2857143 0.3333333 0.5000000 0.3333333
## 122 1.0000000 0.5000000 0.8333333 0.7777778 0.7000000
## 123 0.6666667 1.0000000 0.0000000 0.5000000 0.3333333
## 124 0.4000000 0.7500000 0.6666667 0.3333333 0.5000000
## 125       NaN 0.1250000 0.0000000 0.0000000 0.0000000
## 126 0.5000000 0.5000000 0.4000000 0.3750000 0.5714286
## 127 0.8750000 0.8000000 0.7142857 0.8000000 0.8000000
## 128 0.7500000 0.7500000 1.0000000 0.5714286 1.0000000
## 129 0.8000000 0.3333333 0.6666667 0.5000000 0.6000000
## 130 0.5000000 0.5000000 0.6666667 0.7142857 0.8000000
## 131 0.5000000 0.7272727 0.7500000 0.8333333 0.8888889
## 132 0.8571429 0.6666667 0.7142857 0.7500000 0.6250000
## 133 0.2000000 0.2000000 0.2857143 0.5555556 0.3333333
## 134 0.3750000 0.3333333 0.2500000 0.3333333 0.2000000
## 135 1.0000000 0.7500000 0.6250000 0.7500000 0.6000000
## 136 0.5000000 0.6666667 0.6666667 0.7500000 0.6666667
## 137 0.5000000 0.8000000 0.7500000 0.5555556 0.5000000
## 138 0.2000000 0.5714286 0.3750000 0.5000000 0.3333333
## 139 0.2000000 0.1666667 0.1250000 0.2857143 0.2857143
## 140 0.2500000 0.0000000 0.3333333 0.2000000 0.0000000
## 141 1.0000000 0.6000000 0.5000000 0.6666667 1.0000000
## 142 0.6666667 0.7500000 0.6666667 1.0000000       NaN
## 143 0.1428571 0.4000000 0.3750000 0.4285714 0.3750000
## 144 0.7142857 1.0000000 1.0000000 1.0000000 0.0000000
## 145 0.2222222 0.5000000 0.4285714 0.3750000 0.4285714
## 146 0.3333333 0.5000000 0.5000000 0.6666667 0.6000000
## 147 0.0000000 0.1666667 0.5000000 0.4000000 0.5000000
## 148 0.4285714 0.5714286 0.2500000 0.4000000 0.2000000
## 149 0.8750000 0.5000000 0.5714286 0.8571429 0.8000000
## 150 0.0000000 0.3333333 0.2000000 0.1428571 0.3333333
## 151 0.5000000 0.5000000 0.6666667 0.5000000 0.6000000
## 152 0.5000000 0.2857143 0.7500000 0.4000000 0.3333333
## 153 0.7500000 1.0000000 0.5000000 0.8000000 0.6666667
## 154 0.3333333 0.1428571 0.0000000 0.1250000 0.4000000
## 155 0.5000000 0.4000000 0.5000000 0.7500000 0.2500000
## 156 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 157 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 158 0.3333333 0.7500000 0.5714286 0.5000000 0.5000000
## 159 0.4000000 0.6000000 0.6666667 0.5000000 0.2857143
## 160 0.3333333 0.2500000 0.0000000 0.0000000 0.0000000
## 161 0.5000000 0.6000000 0.0000000 0.3333333 0.0000000
## 162 0.3333333 0.5000000 0.4000000 0.0000000 0.5000000
## 163 0.6666667 0.2500000 1.0000000 0.5000000 0.6000000
## 164 0.1428571 0.1250000 0.2857143 0.0000000 0.4285714
## 165 0.5000000 0.4000000 0.5000000 0.6666667 0.3333333
## 166 0.0000000 0.0000000 0.1666667 0.0000000 0.3333333
## 167 1.0000000 0.4166667 0.3333333 0.6000000 0.2000000
## 168 0.0000000 0.1250000 0.2000000 0.3333333 0.2500000
## 169 0.0000000 0.2500000 0.0000000 0.1666667 0.0000000
## 170 1.0000000 0.3333333 0.5000000 0.5000000 0.2500000
## 171 0.0000000 0.4285714 0.5000000 0.6666667 0.5000000
## 172 0.4000000 0.3333333 0.4000000 0.4285714 0.1666667
## 173 0.6000000 0.5000000 0.6666667 0.5000000 0.8750000
## 174 0.2000000 0.0000000 0.3333333 0.0000000 0.0000000
## 175 0.5000000 0.6666667 0.2857143 0.4000000 0.4285714
## 176 0.2500000 0.6000000 1.0000000 1.0000000 0.5714286
## 177 0.4285714 0.2500000 0.3333333 0.5000000 0.6666667
## 178 1.0000000 0.6000000 0.5000000 0.6666667 0.2000000
```

```
## 179 0.5000000 0.0000000 0.6666667 0.6000000 0.6000000
## 180 0.5000000 0.0000000 0.6666667 0.5000000 0.5000000
## 181 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 182 0.2000000 0.6666667 0.0000000 0.5000000 0.5000000
## 183 0.5000000 0.3333333 0.5000000 0.0000000 1.0000000
## 184 1.0000000 0.3333333 0.7500000 0.6000000 0.4000000
## 185 0.6666667 0.7500000 0.6666667 0.5000000 0.3333333
## 186 0.1428571 0.3333333 0.2000000 0.0000000 0.0000000
## 187 0.3333333 0.0000000 0.5000000 0.5000000 0.4000000
## 188 0.3333333 0.2500000 0.2500000 0.2857143 0.0000000
## 189 0.3333333 0.0000000 0.5000000 0.4000000 0.3333333
## 190 0.8000000 0.6000000 0.5000000 0.5714286 0.5000000
## 191 0.1666667 0.2500000 0.5000000 0.5000000 0.3333333
## 192 0.5000000 0.4000000 0.0000000 0.1666667 0.2000000
## 193 0.1666667 0.2500000 0.0000000 0.0000000 0.1666667
## 194 0.0000000 0.2500000 1.0000000 0.2500000 0.3333333
## 195 0.5000000 0.5000000 0.7142857 0.6666667 0.5000000
## 196 0.2500000 0.0000000 0.0000000 0.0000000 0.0000000
## 197 0.8571429 1.0000000 0.6666667 1.0000000 0.5000000
## 198 0.2000000 0.1666667 0.0000000 0.5000000 0.0000000
## 199 0.5000000 0.1111111 0.1666667 0.2500000 0.0000000
## 200 0.2000000 0.4000000 0.2500000 0.2500000 0.5000000
## 201 0.5000000 0.0000000 0.0000000 0.0000000 0.2500000
## 202 0.8000000 0.8000000 0.3333333 0.8333333 0.8333333
## 203 0.0000000 0.2000000 0.0000000 0.0000000 0.4000000
## 204 0.4000000 0.5000000 0.8000000 0.5000000 0.5000000
## 205 0.4000000 0.5000000 0.3750000       NaN 0.5000000
## 206 0.0000000 0.5000000 0.0000000 0.3333333 0.2500000
## 207 0.3333333 0.7500000 0.8000000 1.0000000 0.5000000
## 208 0.6666667 1.0000000 0.6666667 1.0000000 0.2500000
## 209 1.0000000 0.8000000 0.3333333 0.2500000 0.4000000
## 210 0.0000000 0.1428571 0.2000000 0.0000000 0.3333333
## 211 0.3333333 0.0000000 0.2500000 0.5000000 0.3333333
## 212 0.2500000 0.3333333 0.0000000 0.4000000 0.5000000
## 213 0.0000000 1.0000000 0.2500000 0.0000000 0.3333333
## 214 0.3000000 0.3333333 0.0000000 0.5000000 0.4000000
## 215 0.0000000 0.5000000 0.5000000 0.5000000 0.2500000
## 216 0.5000000 0.5000000 0.0000000 0.5000000 0.0000000
## 217 0.6666667 0.3333333 0.5000000 0.0000000 0.0000000
## 218 0.3333333 0.6666667 0.5000000 0.5000000 0.2000000
## 219 0.7500000 0.3333333 0.6666667 0.6666667 0.7500000
## 220 0.5000000 0.3750000 0.6000000 1.0000000 0.4000000
## 221 0.5000000 1.0000000 0.5000000 0.2000000 0.0000000
## 222 0.4000000 0.4285714 0.4000000 0.2222222 0.3333333
## 223 0.0000000       NaN 0.2500000 0.0000000 0.1428571
## 224 0.6666667 0.5000000 0.4000000 0.5000000 0.0000000
## 225 0.6666667 1.0000000 0.6666667 1.0000000 0.3333333
## 226 1.0000000 1.0000000 1.0000000 0.8000000 0.6666667
## 227 0.6666667 0.7500000 0.5000000 0.7500000 0.5000000
## 228 0.0000000 0.1428571 0.0000000 0.2000000 0.2000000
## 229 0.2000000 0.0000000 0.1666667 0.0000000 0.0000000
## 230 0.5000000 0.5000000 0.6000000 1.0000000 1.0000000
## 231 0.0000000 0.5000000 0.0000000 0.1666667 1.0000000
## 232 0.6666667 1.0000000 0.7500000 0.2000000 0.3750000
## 233 0.1666667 0.4000000 0.2000000 0.5000000 0.2000000
## 234 1.0000000 0.5000000 0.5000000 0.7500000 0.6666667
## 235 0.0000000 0.3333333 0.2500000 0.1428571 0.1666667
## 236 1.0000000 0.2857143 0.2000000 0.3333333 0.4000000
```

```
## 237 0.0000000 0.0000000 0.0000000 0.0000000 0.1428571
## 238 0.3333333 0.0000000 0.0000000 0.0000000 0.2000000
## 239 0.6666667 0.0000000 0.2000000       NaN 0.5000000
## 240 0.0000000 0.5000000 0.2500000 0.1666667 0.5000000
## 241 0.0000000 0.0000000 0.2500000 0.2500000 0.0000000
## 242 0.2500000 0.2000000 0.0000000 0.0000000 0.0000000
## 243 0.5000000 0.6666667 0.0000000 0.3333333 0.5000000
## 244 0.5000000 0.2500000 0.6666667 1.0000000 0.5000000
## 245 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 246 0.3333333 0.0000000 0.0000000 0.0000000 0.3333333
## 247 0.3333333 0.0000000 0.0000000 0.0000000 0.0000000
## 248 0.4000000 0.6666667 1.0000000 0.6666667 1.0000000
## 249 0.7500000 0.6666667 0.7500000 0.5000000 0.5000000
## 250 0.5000000 0.3333333 0.6000000 0.6000000 0.6000000
## 251 0.5000000 0.5000000 0.0000000 0.2500000 0.7500000
## 252 0.0000000 0.0000000 0.0000000       NaN 0.0000000
## 253 0.0000000 0.2500000 0.0000000 0.0000000 0.0000000
## 254 0.0000000 0.2500000 0.2000000 0.2500000 0.3333333
## 255 0.4000000 0.5000000 0.4000000 1.0000000 0.5000000
## 256 0.5000000 0.3333333 0.4000000 0.5000000 0.3333333
## 257 0.0000000 0.5000000 0.2500000 0.2500000 1.0000000
## 258 0.4000000 0.2500000 0.4000000 0.2500000 0.3333333
## 259 0.0000000 0.4000000 0.5000000 0.0000000 0.2500000
## 260 0.5000000 0.5000000 0.0000000 0.2500000 0.3333333
## 261 0.2000000 0.5000000 0.0000000 0.2000000 0.2500000
## 262 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 263 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 264 0.2500000 0.2500000 0.2500000 0.2500000 0.2500000
## 265 0.5000000 0.1666667 0.2500000 0.2000000 0.5000000
## 266 0.0000000 0.3333333 0.2000000 0.2500000 0.2500000
## 267 0.3333333 0.5000000 0.5000000 0.0000000 0.3333333
## 268 1.0000000 0.4000000 0.4000000 0.4000000 0.5000000
## 269 0.3333333 0.5000000 0.2500000 0.5000000 0.1666667
## 270 0.3333333 0.5000000 0.1666667 0.2000000 0.2500000
## 271 0.2500000 0.2000000 0.3333333 0.2500000 0.3333333
## 272 0.0000000 0.2000000 0.2500000 0.0000000 0.2500000
## 273 0.0000000 0.0000000 0.3333333 0.3333333 0.2500000
## 274 0.3333333 0.2500000 0.2500000 0.3333333 0.3333333
## 275 0.4000000 0.0000000 0.4000000 0.6666667 0.3333333
## 276 0.4444444 0.4000000 0.3333333 0.4166667 0.5555556
## 277 0.8333333 0.5000000 0.5000000 0.5000000 0.4285714
## 278 0.4000000 0.5454545 0.6363636 0.4545455 0.6363636
## 279 0.0000000 0.3750000 0.5714286 0.4285714 0.3333333
## 280 1.0000000 0.7500000 0.8000000 1.0000000 1.0000000
## 281 0.5000000 0.3333333 0.0000000 0.0000000 0.0000000
## 282 0.6000000 0.3333333 0.6666667 1.0000000 0.0000000
## 283 0.2500000 0.0000000 0.0000000 0.1666667 0.0000000
## 284 0.8000000 0.4285714 0.2857143 0.3333333 0.1666667
## 285 0.0000000 0.4000000 0.3333333 0.0000000 0.5000000
## 286 0.5000000       NaN 0.0000000 0.0000000 0.0000000
## 287 0.6666667 0.3333333 0.6000000 0.5000000 0.5000000
## 288 0.3333333       NaN 0.2500000 0.3333333 0.5000000
## 289 0.0000000 0.6000000 0.0000000 0.5714286 0.5000000
## 290 0.2857143 0.3333333 0.2500000 0.3333333 0.0000000
## 291 0.0000000 0.2500000 0.2000000 0.0000000 0.0000000
## 292 0.1666667 0.5000000 0.1666667 0.5000000 0.0000000
## 293 0.7500000 1.0000000 0.3333333 0.6666667 1.0000000
## 294 1.0000000 0.6666667 0.5000000 1.0000000 0.7500000
```

```
## 295 0.5000000 0.5000000 1.0000000 0.6000000 1.0000000
## 296 0.4000000 0.5000000 0.3333333 0.5000000 0.0000000
## 297 0.5000000 0.3333333 0.6000000 0.1666667 0.4000000
## 298 0.7777778 0.7000000 1.0000000 0.7777778 0.8181818
## 299 1.0000000 0.5000000 0.5000000 1.0000000 0.3333333
## 300 0.3333333 0.5000000 0.0000000 1.0000000 0.0000000
##
## $specificity
##             1         2         3         4         5
## 1   0.8421053 0.9285714 0.8421053 0.8571429 0.8333333
## 2   0.9090909 0.9000000 1.0000000 0.9090909 1.0000000
## 3   1.0000000 0.9090909 1.0000000 1.0000000 0.9000000
## 4   1.0000000 1.0000000 0.9166667 0.8461538 1.0000000
## 5   1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 6   0.9000000 0.8000000 0.7000000 0.9000000 1.0000000
## 7   0.9090909 1.0000000 0.8333333 0.9090909 1.0000000
## 8   1.0000000 0.9000000 1.0000000 0.7857143 0.7500000
## 9   0.6000000 0.6666667 0.5384615 0.7272727 0.6923077
## 10  0.8888889 1.0000000 0.8888889 1.0000000 0.8461538
## 11  1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 12  0.7000000 0.7272727 0.6666667 0.7777778 1.0000000
## 13  0.8750000 1.0000000 0.8181818 0.9000000 0.7272727
## 14  0.9000000 0.9090909 0.8888889 1.0000000 0.8888889
## 15  0.7000000 0.7500000 0.6666667 0.8000000 0.7500000
## 16  0.8571429 1.0000000 0.8571429 1.0000000 0.7777778
## 17  0.8333333 0.9000000 0.8571429 0.9090909 0.8750000
## 18  0.9166667 0.8461538 0.9000000 0.8888889 0.9090909
## 19  0.6250000 0.4545455 0.3846154 0.3571429 0.6250000
## 20  0.8000000 0.8000000 1.0000000 1.0000000 1.0000000
## 21  0.8888889 0.6666667 0.8181818 0.7500000 0.8888889
## 22  0.7142857 0.6250000 0.7272727 0.9000000 0.7500000
## 23  1.0000000 0.9090909 1.0000000 1.0000000 0.8333333
## 24  0.5833333 0.5333333 0.6923077 0.6428571 0.7272727
## 25  1.0000000 0.8333333 0.9333333 0.9375000 0.9090909
## 26  0.9230769 0.8125000 0.9285714 0.7500000 0.8461538
## 27  1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 28  0.7777778 0.6923077 0.7272727 0.9090909 0.8181818
## 29  0.8000000 0.7692308 0.7857143 0.7857143 0.8461538
## 30  0.8571429 0.8750000 1.0000000 1.0000000 0.8571429
## 31  0.6666667 0.7000000 0.7500000 0.7500000 0.8571429
## 32  0.8333333 0.7000000 0.7500000 0.7500000 0.7272727
## 33  0.7272727 0.9000000 0.8181818 0.6923077 0.9000000
## 34  0.8571429 0.8000000 0.9090909 0.8750000 0.8571429
## 35  0.6666667 0.7272727 0.6428571 0.6666667 0.8000000
## 36  1.0000000 0.6250000 0.6666667 1.0000000 0.8888889
## 37  0.6000000 0.5000000 0.8333333 0.5000000 0.5454545
## 38  1.0000000 0.7500000 0.9000000 0.7500000 0.8571429
## 39  0.6666667 0.6363636 0.5833333 0.7000000 0.6428571
## 40  0.8181818 0.8750000 0.8888889 1.0000000 0.8750000
## 41  0.6666667 0.9000000 0.8000000 0.5833333 0.6363636
## 42  0.5833333 0.5333333 0.9000000 0.6428571 0.5454545
## 43  0.6428571 0.7272727 0.8461538 0.8333333 0.8181818
## 44  0.6250000 0.6000000 0.5000000 0.4545455 0.6923077
## 45  0.8750000 0.8888889 0.8888889 0.6666667 0.6428571
## 46  0.8181818 0.6923077 0.7142857 0.8333333 0.6250000
## 47  0.9090909 0.7142857 0.7142857 0.8461538 0.9230769
## 48  0.7142857 0.8333333 0.7272727 0.9000000 0.7857143
## 49  0.8888889 0.6923077 0.8333333 0.6428571 0.7500000
```

```
## 50  0.5000000 0.5833333 0.4444444 0.7272727 0.6000000
## 51  0.6000000 0.6666667 0.5000000 0.5714286 0.6428571
## 52  0.9285714 0.8571429 0.8125000 0.9000000 0.9166667
## 53  0.9090909 0.5625000 0.6428571 0.5833333 0.6153846
## 54  0.7142857 0.6000000 0.8571429 0.5384615 0.7142857
## 55  0.9000000 1.0000000 0.9090909 0.9000000 1.0000000
## 56  1.0000000 0.8461538 0.9090909 0.9230769 0.9230769
## 57  0.7272727 0.6153846 0.6923077 0.6666667 0.7500000
## 58  0.9000000 0.7272727 0.7500000 0.8000000 1.0000000
## 59  0.6363636 0.8888889 0.8181818 0.7777778 0.8571429
## 60  0.7692308 0.7333333 0.7333333 0.7272727 0.8571429
## 61  0.6666667 0.5833333 0.5384615 0.5833333 0.8888889
## 62  0.7692308 0.5714286 0.9090909 0.6000000 0.6153846
## 63  0.6875000 0.7142857 0.6666667 0.7857143 0.7272727
## 64  0.7647059 0.9285714 0.8571429 0.8571429 0.8125000
## 65  0.6153846 0.5625000 0.5555556 0.5625000 0.6428571
## 66  0.5000000 0.5000000 0.5000000 0.4666667 0.6923077
## 67  0.4666667 0.5294118 0.5000000 0.4666667 0.5833333
## 68  0.7777778 0.8888889 0.5454545 0.5333333 0.6250000
## 69  0.6923077 0.6153846 0.5555556 0.6000000 0.6153846
## 70  0.6363636 0.5000000 0.4615385 0.5000000 0.5714286
## 71  0.8181818 0.7857143 0.9000000 0.7777778 0.7777778
## 72  0.6666667 0.5833333 0.7000000 0.5833333 0.7272727
## 73  0.6666667 0.8888889 0.5555556 0.7500000 0.7500000
## 74  0.6428571 0.6363636 0.7142857 0.8181818 0.6666667
## 75  1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 76  0.7500000 0.5454545 0.4615385 0.5454545 0.5555556
## 77  0.6666667 0.6000000 0.5384615 0.7500000 0.7272727
## 78  0.6666667 0.5000000 0.7000000 0.4166667 0.6666667
## 79  0.9000000 0.9166667 0.9166667 0.8750000 0.8571429
## 80  0.6000000 0.5833333 0.6666667 0.7142857 0.5454545
## 81  0.5000000 0.6363636 0.5833333 0.5384615 0.5000000
## 82  0.6250000 0.6666667 0.6470588 0.7333333 0.6923077
## 83  0.5000000 0.5333333 0.5384615 0.5333333 0.5333333
## 84  0.8666667 0.8823529 0.8888889 0.8571429 1.0000000
## 85  0.9166667 0.8461538 0.8125000 0.9230769 0.8461538
## 86  0.5000000 0.6250000 0.5294118 0.5625000 0.5384615
## 87  0.5000000 0.5454545 0.4666667 0.4705882 0.6153846
## 88  0.5000000 0.8000000 0.6428571 0.6666667 0.5000000
## 89  0.7272727 0.7142857 0.7142857 0.5714286 0.5625000
## 90  0.6923077 0.6428571 0.6428571 0.5789474 0.6428571
## 91  0.5333333 0.6153846 0.6428571 0.8000000 0.5000000
## 92  0.5833333 0.6363636 0.5000000 0.5714286 0.6153846
## 93  0.6000000 0.6000000 0.5000000 0.6363636 0.6666667
## 94  0.8000000 1.0000000 0.9090909 0.8750000 0.7692308
## 95  0.5454545 0.5454545 0.5000000 0.7000000 0.7000000
## 96  0.5882353 0.6153846 0.5882353 0.5625000 0.5333333
## 97  0.8000000 0.7500000 0.5833333 0.8000000 0.6000000
## 98  0.6875000 0.6428571 0.7500000 0.5714286 0.6153846
## 99  0.5000000 0.6000000 0.5000000 0.4444444 0.5555556
## 100 0.5625000 0.6666667 0.6666667 0.5294118 0.6875000
## 101 0.7142857 0.6428571 0.8333333 0.6666667 0.6923077
## 102 0.7333333 0.8461538 0.6470588 0.7142857 0.7142857
## 103 0.7692308 0.6666667 0.7142857 0.5714286 0.7000000
## 104 0.4615385 0.5333333 0.5000000 0.5555556 0.4615385
## 105 0.6111111 0.8333333 0.6666667 0.6428571 0.6000000
## 106 0.7692308 0.6666667 0.7333333 0.6470588 0.7333333
## 107 0.6666667 0.6250000 0.8000000 0.6428571 0.7333333
```

```
## 108 0.6428571 0.6923077 0.6000000 0.5833333 0.6428571
## 109 0.5000000 0.5384615 0.6363636 0.3571429 0.3333333
## 110 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 111 0.6470588 0.7500000 0.6000000 0.6470588 0.6666667
## 112 0.6000000 0.5714286 0.5833333 0.5333333 0.6428571
## 113 0.6923077 0.5625000 0.6923077 0.6875000 0.5384615
## 114 0.8000000 0.8181818 0.8125000 0.7692308 0.9333333
## 115 0.5000000 0.6666667 0.7333333 0.5714286 0.7272727
## 116 0.9285714 0.9333333 1.0000000 1.0000000 1.0000000
## 117 0.4666667 0.5000000 0.5000000 0.5000000 0.4000000
## 118 0.4285714 0.2857143 0.4615385 0.4117647 0.4615385
## 119 0.8333333 0.9375000 0.8235294 0.8571429 1.0000000
## 120 0.9230769 0.9285714 0.9230769 0.8125000 0.8461538
## 121 0.7692308 0.6923077 0.7142857 0.7500000 0.7142857
## 122 0.5625000 0.4166667 0.5714286 0.6363636 0.6000000
## 123 0.6428571 0.6111111 0.5000000 0.5714286 0.5000000
## 124 0.7333333 0.8125000 0.7647059 0.7058824 0.7222222
## 125 0.9000000 0.9166667 0.8823529 0.8571429 0.8750000
## 126 0.6428571 0.6428571 0.6000000 0.5833333 0.6923077
## 127 0.6666667 0.5333333 0.5384615 0.5333333 0.5333333
## 128 0.5833333 0.5000000 0.5294118 0.4615385 0.5000000
## 129 0.6000000 0.4705882 0.5294118 0.5000000 0.5333333
## 130 0.5000000 0.5000000 0.6363636 0.6153846 0.6000000
## 131 0.5000000 0.7777778 0.5625000 0.6428571 0.8181818
## 132 0.6923077 0.5294118 0.6153846 0.5625000 0.5833333
## 133 0.7333333 0.7333333 0.7692308 1.0000000 0.7647059
## 134 0.8333333 0.8181818 0.7500000 0.7647059 0.7333333
## 135 0.5000000 0.5000000 0.5000000 0.5833333 0.4666667
## 136 0.6666667 0.6470588 0.6470588 0.6875000 0.7142857
## 137 0.5714286 0.6666667 0.6250000 0.6363636 0.5833333
## 138 0.6000000 0.7692308 0.6666667 0.7142857 0.6470588
## 139 0.8000000 0.7857143 0.7500000 0.8461538 0.8461538
## 140 0.8750000 0.8125000 0.8823529 0.8666667 0.8235294
## 141 0.6666667 0.6666667 0.6250000 0.6470588 0.6666667
## 142 0.6470588 0.6875000 0.6470588 0.7058824 0.6000000
## 143 0.7692308 0.8666667 0.9166667 0.9230769 0.9166667
## 144 0.6153846 0.5263158 0.5882353 0.5882353 0.4736842
## 145 0.7272727 0.8571429 0.8461538 0.8333333 0.8461538
## 146 0.7857143 0.8571429 0.8125000 0.9285714 0.8666667
## 147 0.7647059 0.7857143 0.8750000 0.8666667 0.8750000
## 148 0.6153846 0.6923077 0.5625000 0.6000000 0.5333333
## 149 0.7500000 0.5000000 0.5384615 0.6923077 0.6000000
## 150 0.8750000 0.9411765 0.9333333 0.9230769 1.0000000
## 151 0.7222222 0.8333333 0.8571429 0.8333333 0.8000000
## 152 0.8750000 0.8461538 0.9375000 0.8666667 0.8235294
## 153 0.6250000 0.6470588 0.5625000 0.6666667 0.5882353
## 154 0.9285714 0.8461538 0.8235294 0.8333333 0.9333333
## 155 0.8125000 0.8000000 0.8571429 0.8750000 0.7500000
## 156 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 157 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 158 0.5294118 0.7500000 0.6153846 0.5625000 0.5625000
## 159 0.5333333 0.6000000 0.6428571 0.5625000 0.4615385
## 160 0.9285714 0.8750000 0.8125000 0.8421053 0.8333333
## 161 0.9285714 0.9333333 0.7777778 0.9090909 0.7333333
## 162 0.7647059 0.8125000 0.8000000 0.7222222 0.7777778
## 163 0.8235294 0.7500000 0.8823529 0.8571429 0.8666667
## 164 0.7692308 0.7500000 0.8461538 0.7142857 0.9230769
## 165 0.8750000 0.8666667 0.8333333 0.8823529 0.8235294
```

```
## 166 0.8750000 0.8750000 0.9285714 0.8823529 1.0000000
## 167 0.7647059 0.7500000 0.6470588 0.7333333 0.6000000
## 168 0.8666667 0.9166667 0.9333333 1.0000000 0.9375000
## 169 0.9411765 1.0000000 0.9375000 1.0000000 0.9230769
## 170 0.7647059 0.6470588 0.7142857 0.6666667 0.6250000
## 171 0.7333333 0.9230769 0.9285714 1.0000000 0.8750000
## 172 0.8000000 0.7857143 0.8000000 0.8461538 0.7142857
## 173 0.5333333 0.5000000 0.5714286 0.5000000 0.7500000
## 174 0.9333333 0.8461538 0.9411765 0.8750000 0.8666667
## 175 0.6111111 0.8181818 0.5384615 0.6000000 0.6153846
## 176 0.6875000 0.8000000 0.7777778 0.8235294 0.8461538
## 177 1.0000000 0.9166667 0.9285714 0.9375000 0.9411765
## 178 0.6470588 0.6000000 0.5625000 0.5882353 0.4666667
## 179 0.6250000 0.5555556 0.7142857 0.6666667 0.6666667
## 180 0.9375000 0.8421053 0.9411765 0.8888889 0.9375000
## 181 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 182 0.6666667 0.7647059 0.6470588 0.7500000 0.7222222
## 183 0.7777778 0.7647059 0.8125000 0.7058824 0.8823529
## 184 0.9375000 0.7647059 0.8750000 0.8666667 0.8000000
## 185 0.9285714 0.8750000 0.8235294 0.7777778 0.7647059
## 186 1.0000000 1.0000000 1.0000000 0.9375000 0.9473684
## 187 0.7857143 0.7368421 0.8571429 0.8571429 0.8000000
## 188 0.8823529 0.8750000 0.8750000 0.9230769 0.8333333
## 189 0.7647059 0.7058824 0.8125000 0.8000000 0.7647059
## 190 0.7333333 0.6666667 0.6250000 0.6923077 0.6250000
## 191 0.7142857 0.7500000 0.7777778 0.7777778 0.7647059
## 192 0.8888889 0.9333333 0.8000000 0.8571429 0.8666667
## 193 1.0000000 1.0000000 0.9473684 0.9473684 1.0000000
## 194 0.6470588 0.6875000 0.7368421 0.6875000 0.7058824
## 195 0.6666667 0.6875000 0.8461538 0.7058824 0.7142857
## 196 1.0000000 0.9375000 0.9444444 0.9285714 0.9473684
## 197 0.8461538 0.8000000 0.6470588 0.6666667 0.6428571
## 198 0.9333333 0.9285714 0.8750000 0.9444444 0.8947368
## 199 0.9444444 0.9090909 0.9285714 0.9375000 0.8666667
## 200 0.9333333 1.0000000 1.0000000 0.9375000 0.9444444
## 201 0.9444444 0.8888889 0.8571429 0.8823529 0.9375000
## 202 0.7333333 0.7333333 0.5882353 0.7857143 0.7857143
## 203 0.6923077 0.8000000 0.7142857 0.7142857 0.8666667
## 204 0.8666667 0.8333333 1.0000000 0.8750000 0.8750000
## 205 0.9333333 0.8888889 1.0000000 0.8500000 0.8888889
## 206 0.8823529 0.9444444 0.8750000 0.9411765 0.9375000
## 207 0.7058824 0.8125000 0.8666667 0.8750000 0.7500000
## 208 0.9285714 0.7894737 0.8235294 0.7894737 0.7500000
## 209 0.8235294 0.8666667 0.7058824 0.6875000 0.8000000
## 210 0.9333333 1.0000000 1.0000000 0.9375000 1.0000000
## 211 0.9411765 0.8823529 0.9375000 0.9444444 0.9411765
## 212 0.8125000 0.8571429 0.7894737 0.8666667 0.8333333
## 213 0.7058824 0.8333333 0.7500000 0.7368421 0.7647059
## 214 1.0000000 0.9285714 0.7500000 1.0000000 0.9333333
## 215 0.7222222 0.8571429 0.7777778 0.7777778 0.7500000
## 216 0.9285714 0.9285714 0.7777778 0.8333333 0.7894737
## 217 0.8823529 0.8571429 0.8333333 0.6923077 0.7500000
## 218 0.7647059 0.8235294 0.8125000 0.9166667 0.7333333
## 219 0.8750000 0.7857143 0.8235294 0.8235294 0.8750000
## 220 0.7777778 0.8333333 0.8666667 0.7894737 0.8000000
## 221 0.8888889 0.9444444 0.9375000 0.8666667 0.8125000
## 222 0.9333333 1.0000000 0.9333333 0.9090909 0.8823529
## 223 0.9411765 0.9500000 1.0000000 0.9444444 1.0000000
```

```
## 224 0.8823529 0.9285714 0.8666667 0.8750000 0.7894737
## 225 0.8823529 0.9411765 0.8823529 0.8888889 0.8235294
## 226 0.8235294 0.8235294 0.7777778 0.8666667 0.8571429
## 227 0.7647059 0.8125000 0.8333333 0.8125000 0.7222222
## 228 0.9411765 1.0000000 0.9411765 1.0000000 1.0000000
## 229 1.0000000 0.9333333 1.0000000 0.9444444 0.9411765
## 230 0.8333333 0.8333333 0.9333333 0.9411765 0.8888889
## 231 0.7368421 0.7777778 0.7368421 0.7142857 0.7894737
## 232 0.9285714 0.8823529 0.8750000 0.7333333 0.8333333
## 233 0.7857143 0.8666667 0.8000000 0.8333333 0.8000000
## 234 0.9444444 0.9375000 0.9375000 1.0000000 0.9411765
## 235 0.9411765 1.0000000 1.0000000 1.0000000 1.0000000
## 236 0.9444444 0.9230769 0.8666667 0.8823529 0.9333333
## 237 0.8823529 0.8823529 0.8888889 0.8750000 0.9230769
## 238 1.0000000 0.9411765 0.9411765 0.9444444 1.0000000
## 239 0.9411765 0.8333333 0.8666667 0.8500000 0.8888889
## 240 0.8888889 1.0000000 0.9375000 0.9285714 0.9444444
## 241 0.9375000 0.9333333 1.0000000 1.0000000 0.9375000
## 242 1.0000000 1.0000000 0.9333333 0.9285714 0.9444444
## 243 0.8888889 0.9411765 0.8421053 0.8823529 0.8888889
## 244 0.8888889 0.8750000 0.9411765 0.8947368 0.8888889
## 245 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 246 1.0000000 0.9411765 0.9375000 0.9473684 1.0000000
## 247 1.0000000 0.9411765 0.9411765 0.9411765 0.9444444
## 248 0.9333333 0.9411765 0.9444444 0.9411765 0.9444444
## 249 0.9375000 0.8823529 0.9375000 0.8333333 0.8333333
## 250 0.9375000 0.9285714 1.0000000 1.0000000 1.0000000
## 251 0.8888889 0.8888889 0.8333333 0.8750000 1.0000000
## 252 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 253 0.9473684 1.0000000 0.9444444 0.9473684 0.9444444
## 254 0.9375000 1.0000000 1.0000000 1.0000000 1.0000000
## 255 1.0000000 1.0000000 1.0000000 0.9473684 0.9444444
## 256 1.0000000 0.9411765 1.0000000 1.0000000 0.9411765
## 257 0.7647059 0.9285714 0.8125000 0.8125000 0.8421053
## 258 1.0000000 0.9375000 1.0000000 0.9375000 0.9411765
## 259 0.8823529 1.0000000 1.0000000 0.8823529 0.9375000
## 260 1.0000000 0.9444444 0.8888889 0.9375000 1.0000000
## 261 0.9333333 0.9444444 0.8571429 0.9333333 0.9375000
## 262 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 263 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 264 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 265 0.9375000 0.8571429 0.8750000 0.8666667 0.9375000
## 266 0.9444444 1.0000000 1.0000000 1.0000000 1.0000000
## 267 1.0000000 1.0000000 1.0000000 0.8947368 1.0000000
## 268 1.0000000 1.0000000 1.0000000 1.0000000 0.9444444
## 269 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 270 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 271 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 272 0.9411765 1.0000000 1.0000000 0.9333333 1.0000000
## 273 0.8888889 0.8823529 0.9411765 1.0000000 0.9375000
## 274 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 275 1.0000000 0.8888889 1.0000000 1.0000000 0.9411765
## 276 0.8181818 0.8000000 0.7272727 0.8750000 0.9090909
## 277 0.7857143 0.6666667 0.6250000 0.6250000 0.6153846
## 278 0.7000000 0.8888889 1.0000000 0.7777778 1.0000000
## 279 0.5882353 0.6666667 0.7692308 0.6923077 0.6428571
## 280 0.4736842 0.5000000 0.5333333 0.5294118 0.4736842
## 281 1.0000000 1.0000000 0.9375000 0.9444444 0.9411765
```

```
## 282 0.7333333 0.6428571 0.7058824 0.7647059 0.6315789
## 283 0.9375000 0.8823529 0.8888889 0.9285714 0.8571429
## 284 0.8666667 0.7692308 0.6923077 0.7058824 0.6428571
## 285 0.8125000 0.9333333 0.8823529 0.8000000 0.9375000
## 286 0.8888889 0.8500000 0.8000000 0.8125000 0.8235294
## 287 0.9285714 0.7857143 0.8666667 0.8125000 0.8125000
## 288 0.8823529 0.8500000 0.8750000 0.8823529 0.8888889
## 289 0.7777778 0.9333333 0.7777778 1.0000000 0.8750000
## 290 1.0000000 0.9411765 0.9375000 0.9411765 0.8888889
## 291 0.8333333 0.8750000 0.8666667 0.8333333 0.8421053
## 292 0.8571429 0.9375000 0.8571429 0.8888889 0.8333333
## 293 0.9375000 0.9411765 0.8235294 1.0000000 1.0000000
## 294 0.8421053 0.8823529 0.8750000 0.9411765 0.9375000
## 295 0.8333333 0.8750000 0.8888889 0.9333333 0.8888889
## 296 0.9333333 0.8888889 0.9285714 0.8888889 0.8333333
## 297 0.9375000 0.9285714 1.0000000 0.8571429 0.9333333
## 298 0.7272727 0.7000000 0.6666667 0.7272727 0.8888889
## 299 1.0000000 0.9444444 1.0000000 1.0000000 0.9411765
## 300 0.9411765 0.9444444 0.8947368 0.9473684 0.8947368
##
## $kappa
##               1           2           3           4           5
## 1   -0.08108108  0.30555556 -0.08108108  0.02777778 -0.13636364
## 2    0.25531915  0.20000000  0.40000000  0.25531915  0.33962264
## 3    0.57894737  0.36842105  0.36363636  0.36363636  0.30000000
## 4    0.42857143  0.42857143  0.44444444  0.29411765  0.57894737
## 5    0.16666667  0.13793103  0.16666667  0.20000000  0.20000000
## 6    0.80000000  0.60000000  0.40000000  0.80000000  0.70000000
## 7    0.36842105  0.36363636  0.22222222  0.36842105  0.50000000
## 8    0.36363636  0.30000000  0.42857143  0.12500000  0.00000000
## 9    0.30000000  0.40000000  0.10000000  0.50000000  0.50000000
## 10   0.23809524  0.36363636  0.23809524  0.30434783  0.29411765
## 11   0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 12   0.60000000  0.70588235  0.48979592  0.69387755  0.78260870
## 13   0.60000000  0.90000000  0.70000000  0.80000000  0.50000000
## 14   0.50000000  0.58762887  0.41747573  0.61165049  0.41747573
## 15   0.50000000  0.48979592  0.39393939  0.70000000  0.48979592
## 16   0.50000000  0.60000000  0.50000000  0.50000000  0.50000000
## 17   0.34782609  0.40000000  0.19642857  0.47916667  0.25925926
## 18   0.68085106  0.56043956  0.50000000  0.41747573  0.58762887
## 19   0.66666667  0.42857143  0.30434783  0.25000000  0.66666667
## 20   0.30000000  0.30000000  0.52830189  0.37500000  0.44954128
## 21   0.50980392  0.11764706  0.48979592  0.23076923  0.50980392
## 22   0.08256881 -0.03773585  0.17525773  0.50000000  0.15094340
## 23   0.33962264  0.25531915  0.40000000  0.28571429  0.09090909
## 24   0.20000000  0.10000000  0.50000000  0.40000000  0.50000000
## 25   0.63414634  0.09090909  0.57142857  0.68750000  0.25531915
## 26   0.65909091  0.47368421  0.76190476  0.21052632  0.43181818
## 27   0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 28   0.22330097  0.12087912  0.17525773  0.58762887  0.38144330
## 29   0.40000000  0.46808511  0.56521739  0.56521739  0.68085106
## 30   0.19642857  0.25925926  0.68750000  0.60000000  0.19642857
## 31   0.30000000  0.40000000  0.40000000  0.40000000  0.50000000
## 32   0.47916667  0.50000000  0.48979592  0.70588235  0.60396040
## 33   0.17525773  0.50000000  0.38144330  0.12087912  0.50000000
## 34   0.26605505  0.30000000  0.58762887  0.33962264  0.26605505
## 35   0.40000000  0.50000000  0.40000000  0.40000000  0.60000000
## 36   0.70588235  0.03846154  0.16666667  0.52830189  0.50980392
```

```
## 37   0.50000000  0.33962264  0.65909091  0.30000000  0.41747573
## 38   0.30434783  0.25531915  0.50000000  0.15094340  0.26605505
## 39   0.30000000  0.30000000  0.20000000  0.40000000  0.40000000
## 40   0.70000000  0.60000000  0.70000000  0.90000000  0.60000000
## 41   0.50980392  0.90000000  0.70000000  0.31372549  0.40594059
## 42   0.20000000  0.10000000  0.80000000  0.40000000  0.10000000
## 43   0.13043478  0.28571429  0.68085106  0.58333333  0.48979592
## 44   0.40000000  0.30000000  0.00000000 -0.10000000  0.50000000
## 45   0.60000000  0.70000000  0.70000000  0.30000000  0.40000000
## 46   0.48979592  0.25531915  0.34782609  0.58333333  0.09090909
## 47   0.47916667  0.04761905  0.04761905  0.43181818  0.65909091
## 48   0.34782609  0.58333333  0.28571429  0.60000000  0.56521739
## 49   0.50980392  0.25531915  0.58333333  0.13043478  0.37500000
## 50   0.23076923  0.42307692  0.08163265  0.70588235  0.40000000
## 51   0.42857143  0.50980392  0.13461538  0.32692308  0.51923077
## 52   0.62500000  0.37500000  0.28571429  0.30000000  0.44444444
## 53   0.79797980  0.04255319  0.27083333  0.08163265  0.17525773
## 54   0.46808511  0.40000000  0.68085106  0.33962264  0.46808511
## 55   0.30000000  0.57894737  0.36842105  0.30000000  0.66666667
## 56   0.63414634  0.14634146  0.25531915  0.39024390  0.39024390
## 57   0.39393939  0.17525773  0.38144330  0.28571429  0.48979592
## 58   0.60000000  0.28571429  0.37500000  0.40000000  0.70588235
## 59   0.40594059  0.79797980  0.80198020  0.59595960  0.58762887
## 60   0.20454545  0.12500000  0.12500000  0.06250000  0.52380952
## 61   0.30000000  0.20000000  0.10000000  0.20000000  0.70000000
## 62   0.58762887  0.06250000  0.79797980  0.15789474  0.17525773
## 63   0.46808511  0.47916667  0.36842105  0.68750000  0.39393939
## 64   0.30555556  0.76190476  0.52380952  0.52380952  0.47368421
## 65   0.30000000  0.20000000  0.20000000  0.20000000  0.40000000
## 66   0.15094340  0.13461538  0.15094340  0.04761905  0.61165049
## 67   0.04761905  0.25233645  0.13461538  0.04761905  0.31372549
## 68   0.59595960  0.79797980  0.20792079  0.23809524  0.28571429
## 69   0.38144330  0.17525773  0.00990099  0.15789474  0.17525773
## 70   0.50980392  0.23076923  0.15094340  0.25925926  0.44444444
## 71   0.27083333  0.28571429  0.40000000  0.13461538  0.13461538
## 72   0.40000000  0.20000000  0.40000000  0.20000000  0.50000000
## 73   0.50980392  0.79797980  0.19191919  0.48979592  0.48979592
## 74   0.27083333  0.19191919  0.47916667  0.59595960  0.28571429
## 75   0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 76   0.78260870  0.51923077  0.37500000  0.51923077  0.47916667
## 77   0.48979592  0.40000000  0.33962264  0.58333333  0.70588235
## 78   0.50980392  0.13461538  0.50000000 -0.07843137  0.39393939
## 79   0.00000000  0.04761905  0.04761905 -0.15384615 -0.17647059
## 80  -0.17647059 -0.17021277  0.04255319  0.20454545 -0.23711340
## 81   0.25925926  0.50980392  0.42307692  0.33962264  0.23076923
## 82   0.09090909  0.22222222  0.18604651  0.44444444  0.25531915
## 83   0.28571429  0.36363636  0.33962264  0.36363636  0.36363636
## 84  -0.16666667 -0.13636364 -0.11111111 -0.17647059  0.41176471
## 85   0.18604651 -0.01265823 -0.20689655  0.24050633 -0.01265823
## 86   0.00000000  0.40000000  0.10000000  0.20000000  0.10000000
## 87   0.15094340  0.20792079  0.04761905  0.06542056  0.41747573
## 88   0.00000000  0.60000000  0.40000000  0.40000000  0.00000000
## 89   0.28571429  0.34782609  0.34782609 -0.08695652 -0.13636364
## 90   0.38144330  0.27083333  0.27083333  0.12087912  0.27083333
## 91   0.10000000  0.30000000  0.40000000  0.60000000  0.00000000
## 92   0.31372549  0.40594059  0.11764706  0.32692308  0.41747573
## 93   0.40000000  0.40000000  0.25925926  0.50980392  0.61538462
## 94   0.20000000  0.68750000  0.47916667  0.25925926  0.20454545
```

```
## 95   0.31372549  0.31372549  0.20000000  0.60000000  0.60000000
## 96   0.30000000  0.30000000  0.30000000  0.20000000  0.10000000
## 97   0.30000000  0.25531915 -0.17021277  0.30000000 -0.10000000
## 98   0.46808511  0.27083333  0.48979592  0.06250000  0.17525773
## 99   0.15094340  0.42857143  0.16666667 -0.01851852  0.19191919
## 100 -0.13636364  0.28571429  0.22222222 -0.27906977  0.31818182
## 101  0.20454545 -0.02272727  0.46808511  0.05882353  0.12087912
## 102  0.44444444  0.68085106  0.18604651  0.34782609  0.34782609
## 103  0.46808511  0.16666667  0.34782609 -0.08695652  0.20000000
## 104  0.15094340  0.36363636  0.23076923  0.28571429  0.15094340
## 105 -0.18421053  0.46808511  0.05882353 -0.02272727 -0.17647059
## 106  0.34065934  0.05882353  0.29411765 -0.01265823  0.29411765
## 107 -0.12500000 -0.31578947  0.37500000 -0.19047619  0.12500000
## 108  0.40000000  0.50000000  0.30000000  0.20000000  0.40000000
## 109  0.13461538  0.22330097  0.40594059 -0.25000000 -0.33333333
## 110  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 111  0.18604651  0.54545455  0.00000000  0.18604651  0.22222222
## 112  0.20000000  0.20000000  0.20000000  0.10000000  0.40000000
## 113  0.25531915 -0.13636364  0.25531915  0.31818182 -0.17021277
## 114 -0.23076923 -0.07526882 -0.20689655 -0.26582278  0.38461538
## 115 -0.20000000  0.16666667  0.44444444 -0.08695652  0.28571429
## 116 -0.09375000 -0.09090909  0.27272727  0.21875000  0.34782609
## 117  0.04761905  0.15094340  0.13461538  0.15094340 -0.14285714
## 118  0.19642857 -0.16071429  0.26605505  0.17355372  0.26605505
## 119 -0.04651163  0.48275862 -0.17647059  0.02777778  0.58333333
## 120  0.24050633  0.30555556  0.24050633 -0.20689655 -0.01265823
## 121  0.20454545 -0.02272727  0.04761905  0.21052632  0.04761905
## 122  0.33962264 -0.07843137  0.32692308  0.40594059  0.30000000
## 123  0.27083333  0.23913043 -0.19565217  0.06250000 -0.14583333
## 124  0.12500000  0.47368421  0.30555556  0.02777778  0.11764706
## 125  0.00000000  0.04761905 -0.13636364 -0.17647059 -0.15384615
## 126  0.13043478  0.13043478  0.00000000 -0.04166667  0.25531915
## 127  0.50980392  0.23809524  0.22330097  0.23809524  0.23809524
## 128  0.31372549  0.15094340  0.25233645  0.02912621  0.16666667
## 129  0.30000000 -0.10000000  0.10000000  0.00000000  0.10000000
## 130  0.00000000  0.00000000  0.30000000  0.30000000  0.30000000
## 131  0.00000000  0.50000000  0.20000000  0.40000000  0.70000000
## 132  0.50000000  0.10000000  0.30000000  0.20000000  0.20000000
## 133 -0.06666667 -0.06666667  0.05882353  0.57894737  0.07692308
## 134  0.22222222  0.15789474  0.00000000  0.07692308 -0.06666667
## 135  0.16666667  0.15094340  0.11764706  0.31372549  0.04761905
## 136  0.16666667  0.18604651  0.18604651  0.31818182  0.34782609
## 137  0.06250000  0.36842105  0.25531915  0.19191919  0.08163265
## 138 -0.17647059  0.34065934  0.04255319  0.20454545 -0.01265823
## 139  0.00000000 -0.05263158 -0.13636364  0.14634146  0.14634146
## 140  0.13793103 -0.20689655  0.21568627  0.07692308 -0.17647059
## 141  0.28571429  0.22222222  0.09090909  0.18604651  0.28571429
## 142  0.18604651  0.31818182  0.18604651  0.41860465  0.00000000
## 143 -0.09756098  0.28571429  0.31818182  0.39024390  0.31818182
## 144  0.30000000  0.10000000  0.30000000  0.30000000 -0.10000000
## 145 -0.05263158  0.37500000  0.29411765  0.22222222  0.29411765
## 146  0.12500000  0.37500000  0.28571429  0.62500000  0.46666667
## 147 -0.20689655 -0.05263158  0.37500000  0.28571429  0.37500000
## 148  0.04255319  0.25531915 -0.13636364  0.00000000 -0.22222222
## 149  0.60000000  0.00000000  0.10000000  0.50000000  0.30000000
## 150 -0.15384615  0.31818182  0.16666667  0.07894737  0.41176471
## 151  0.11764706  0.34782609  0.52380952  0.34782609  0.37500000
## 152  0.37500000  0.14634146  0.68750000  0.28571429  0.13793103
```

```
## 153  0.25531915  0.35483871  0.04255319  0.36842105  0.13978495
## 154  0.30555556 -0.01265823 -0.17647059 -0.04651163  0.38461538
## 155  0.28571429  0.20000000  0.37500000  0.57142857  0.00000000
## 156  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 157  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 158 -0.07526882  0.48979592  0.17525773  0.04255319  0.04255319
## 159 -0.05263158  0.15789474  0.27083333  0.04255319 -0.23711340
## 160  0.30555556  0.13793103 -0.20689655 -0.08108108 -0.13636364
## 161  0.47368421  0.57142857 -0.15384615  0.25531915 -0.28571429
## 162  0.07692308  0.28571429  0.20000000 -0.16666667  0.16666667
## 163  0.38461538  0.00000000  0.69230769  0.37500000  0.46666667
## 164 -0.09756098 -0.13636364  0.14634146 -0.31578947  0.39024390
## 165  0.37500000  0.28571429  0.23076923  0.48275862  0.13793103
## 166 -0.15384615 -0.15384615  0.11764706 -0.13636364  0.41176471
## 167  0.49367089  0.15094340 -0.01265823  0.29411765 -0.17647059
## 168 -0.16666667  0.04761905  0.16666667  0.41176471  0.23076923
## 169 -0.08108108  0.34782609 -0.08695652  0.21875000 -0.09589041
## 170  0.49367089 -0.01265823  0.20454545  0.07894737 -0.09756098
## 171 -0.28571429  0.39024390  0.47368421  0.73684211  0.37500000
## 172  0.20000000  0.12500000  0.20000000  0.29411765 -0.12500000
## 173  0.10000000  0.00000000  0.20000000  0.00000000  0.60000000
## 174  0.16666667 -0.18421053  0.31818182 -0.15384615 -0.16666667
## 175  0.04761905  0.48979592 -0.17021277  0.00000000  0.04255319
## 176 -0.05263158  0.37500000  0.41176471  0.58333333  0.43181818
## 177  0.49367089  0.18604651  0.30555556  0.48275862  0.60784314
## 178  0.35483871  0.15789474  0.04255319  0.13978495 -0.26315789
## 179  0.09090909 -0.19047619  0.34782609  0.22222222  0.22222222
## 180  0.48275862 -0.08108108  0.60784314  0.31818182  0.48275862
## 181  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 182 -0.12500000  0.30555556 -0.25000000  0.21052632  0.11764706
## 183  0.16666667  0.07692308  0.28571429 -0.23076923  0.69230769
## 184  0.85714286  0.07692308  0.57142857  0.46666667  0.20000000
## 185  0.62500000  0.57142857  0.38461538  0.16666667  0.07692308
## 186  0.17808219  0.45945946  0.27272727 -0.08695652 -0.05263158
## 187  0.12500000 -0.09090909  0.37500000  0.37500000  0.20000000
## 188  0.21568627  0.13793103  0.13793103  0.24050633 -0.13636364
## 189  0.07692308 -0.23076923  0.28571429  0.20000000  0.07692308
## 190  0.44444444  0.22222222  0.09090909  0.25531915  0.09090909
## 191 -0.12500000  0.00000000  0.16666667  0.16666667  0.07692308
## 192  0.31818182  0.38461538 -0.23076923  0.02777778  0.07692308
## 193  0.21875000  0.34782609 -0.05263158 -0.05263158  0.21875000
## 194 -0.25000000 -0.05263158  0.21875000 -0.05263158  0.02777778
## 195  0.07894737  0.14634146  0.56043956  0.24050633  0.20454545
## 196  0.34782609 -0.08695652 -0.07142857 -0.09375000 -0.05263158
## 197  0.68085106  0.66666667  0.18604651  0.28571429  0.13043478
## 198  0.16666667  0.11764706 -0.15384615  0.44444444 -0.07142857
## 199  0.44444444  0.02173913  0.11764706  0.23076923 -0.16666667
## 200  0.16666667  0.50000000  0.28571429  0.23076923  0.44444444
## 201  0.44444444 -0.11111111 -0.17647059 -0.13636364  0.23076923
## 202  0.44444444  0.44444444 -0.04651163  0.56521739  0.56521739
## 203 -0.34146341  0.00000000 -0.31578947 -0.31578947  0.28571429
## 204  0.28571429  0.23076923  0.85714286  0.37500000  0.37500000
## 205  0.38461538  0.31818182  0.41860465  0.00000000  0.31818182
## 206 -0.13636364  0.44444444 -0.15384615  0.31818182  0.23076923
## 207  0.02777778  0.47368421  0.62500000  0.73684211  0.21052632
## 208  0.62500000  0.27272727  0.38461538  0.27272727  0.00000000
## 209  0.58333333  0.62500000  0.02777778 -0.05263158  0.20000000
## 210 -0.09090909  0.17808219  0.27272727 -0.08695652  0.45945946
```

```
## 211  0.31818182 -0.13636364  0.23076923  0.44444444  0.31818182
## 212  0.06250000  0.21052632 -0.08695652  0.28571429  0.23076923
## 213 -0.23076923  0.50000000  0.00000000 -0.09090909  0.07692308
## 214  0.30000000  0.30555556 -0.27906977  0.58333333  0.38461538
## 215 -0.16666667  0.37500000  0.16666667  0.16666667  0.00000000
## 216  0.47368421  0.47368421 -0.15384615  0.23076923 -0.08695652
## 217  0.48275862  0.21052632  0.23076923 -0.34146341 -0.25000000
## 218  0.07692308  0.38461538  0.28571429  0.44444444 -0.06666667
## 219  0.57142857  0.12500000  0.38461538  0.38461538  0.57142857
## 220  0.16666667  0.22222222  0.46666667  0.27272727  0.20000000
## 221  0.31818182  0.77272727  0.48275862  0.07692308 -0.20689655
## 222  0.38461538  0.49367089  0.38461538  0.13978495  0.21568627
## 223 -0.08108108  0.00000000  0.34782609 -0.07142857  0.17808219
## 224  0.48275862  0.47368421  0.28571429  0.37500000 -0.08695652
## 225  0.48275862  0.82758621  0.48275862  0.61538462  0.13793103
## 226  0.58333333  0.58333333  0.41176471  0.62500000  0.52380952
## 227  0.30555556  0.47368421  0.34782609  0.47368421  0.11764706
## 228 -0.08108108  0.17808219 -0.08108108  0.27272727  0.27272727
## 229  0.27272727 -0.09090909  0.21875000 -0.07142857 -0.08108108
## 230  0.23076923  0.23076923  0.57142857  0.82758621  0.61538462
## 231 -0.09090909  0.16666667 -0.09090909 -0.12500000  0.27272727
## 232  0.62500000  0.69230769  0.57142857 -0.06666667  0.22222222
## 233 -0.05263158  0.28571429  0.00000000  0.23076923  0.00000000
## 234  0.77272727  0.48275862  0.48275862  0.82758621  0.60784314
## 235 -0.08108108  0.45945946  0.34782609  0.17808219  0.21875000
## 236  0.77272727  0.24050633  0.07692308  0.21568627  0.38461538
## 237 -0.13636364 -0.13636364 -0.11111111 -0.15384615  0.07894737
## 238  0.45945946 -0.08108108 -0.08108108 -0.07142857  0.27272727
## 239  0.60784314 -0.13636364  0.07692308  0.00000000  0.31818182
## 240 -0.11111111  0.61538462  0.23076923  0.11764706  0.44444444
## 241 -0.08695652 -0.09090909  0.34782609  0.34782609 -0.08695652
## 242  0.34782609  0.27272727 -0.09090909 -0.09375000 -0.07142857
## 243  0.31818182  0.60784314 -0.08108108  0.21568627  0.31818182
## 244  0.31818182  0.13793103  0.60784314  0.45945946  0.31818182
## 245  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 246  0.45945946 -0.08108108 -0.08695652 -0.05263158  0.45945946
## 247  0.45945946 -0.08108108 -0.08108108 -0.08108108 -0.07142857
## 248  0.38461538  0.60784314  0.77272727  0.60784314  0.77272727
## 249  0.68750000  0.48275862  0.68750000  0.23076923  0.23076923
## 250  0.48275862  0.30555556  0.69230769  0.69230769  0.69230769
## 251  0.31818182  0.31818182 -0.13636364  0.13793103  0.82758621
## 252  0.00000000  0.00000000  0.00000000         NaN  0.00000000
## 253 -0.05263158  0.34782609 -0.07142857 -0.05263158 -0.07142857
## 254 -0.08695652  0.34782609  0.27272727  0.34782609  0.45945946
## 255  0.50000000  0.61538462  0.50000000  0.64285714  0.44444444
## 256  0.61538462  0.31818182  0.50000000  0.61538462  0.31818182
## 257 -0.20689655  0.47368421  0.06250000  0.06250000  0.34782609
## 258  0.50000000  0.23076923  0.50000000  0.23076923  0.31818182
## 259 -0.13636364  0.50000000  0.61538462 -0.13636364  0.23076923
## 260  0.61538462  0.44444444 -0.11111111  0.23076923  0.41176471
## 261  0.16666667  0.44444444 -0.17647059  0.16666667  0.23076923
## 262  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 263  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 264  0.34782609  0.34782609  0.34782609  0.34782609  0.34782609
## 265  0.48275862  0.02777778  0.13793103  0.07692308  0.48275862
## 266 -0.07142857  0.45945946  0.27272727  0.34782609  0.34782609
## 267  0.41176471  0.61538462  0.61538462 -0.07142857  0.41176471
## 268  1.00000000  0.50000000  0.50000000  0.50000000  0.44444444
```

```
## 269  0.45945946  0.64285714  0.34782609  0.64285714  0.21875000
## 270  0.45945946  0.64285714  0.21875000  0.27272727  0.34782609
## 271  0.34782609  0.27272727  0.45945946  0.34782609  0.45945946
## 272 -0.08108108  0.27272727  0.34782609 -0.09090909  0.34782609
## 273 -0.11111111 -0.13636364  0.31818182  0.41176471  0.23076923
## 274  0.45945946  0.34782609  0.34782609  0.45945946  0.45945946
## 275  0.50000000 -0.11111111  0.50000000  0.77272727  0.31818182
## 276  0.27083333  0.20000000  0.06250000  0.25925926  0.47916667
## 277  0.56521739  0.16666667  0.09090909  0.09090909  0.04255319
## 278  0.10000000  0.41747573  0.61165049  0.22330097  0.61165049
## 279 -0.26582278  0.04255319  0.34065934  0.12087912 -0.02272727
## 280  0.08256881  0.15094340  0.23809524  0.25233645  0.08256881
## 281  0.64285714  0.45945946 -0.08695652 -0.07142857 -0.08108108
## 282  0.29411765 -0.02272727  0.24050633  0.49367089 -0.09589041
## 283  0.23076923 -0.13636364 -0.11111111  0.11764706 -0.17647059
## 284  0.62500000  0.20454545 -0.02272727  0.02777778 -0.19047619
## 285 -0.20689655  0.38461538  0.21568627 -0.23076923  0.48275862
## 286  0.31818182  0.00000000 -0.23076923 -0.20689655 -0.17647059
## 287  0.62500000  0.12500000  0.46666667  0.28571429  0.28571429
## 288  0.21568627  0.00000000  0.13793103  0.21568627  0.31818182
## 289 -0.15384615  0.57142857 -0.15384615  0.63414634  0.37500000
## 290  0.34210526  0.31818182  0.23076923  0.31818182 -0.11111111
## 291 -0.13636364  0.13793103  0.07692308 -0.13636364 -0.08108108
## 292  0.02777778  0.48275862  0.02777778  0.31818182 -0.13636364
## 293  0.68750000  0.82758621  0.13793103  0.73684211  1.00000000
## 294  0.34782609  0.48275862  0.37500000  0.82758621  0.68750000
## 295  0.23076923  0.37500000  0.61538462  0.57142857  0.61538462
## 296  0.38461538  0.31818182  0.30555556  0.31818182 -0.13636364
## 297  0.48275862  0.30555556  0.69230769  0.02777778  0.38461538
## 298  0.50000000  0.40000000  0.50000000  0.50000000  0.70000000
## 299  1.00000000  0.44444444  0.61538462  1.00000000  0.31818182
## 300  0.31818182  0.44444444 -0.07142857  0.64285714 -0.07142857
##
## $TSS
##              1           2           3           4           5
## 1   -0.15789474  0.26190476 -0.15789474  0.02380952 -0.16666667
## 2    0.24242424  0.20000000  0.40000000  0.24242424  0.36363636
## 3    0.55555556  0.35353535  0.41666667  0.41666667  0.30000000
## 4    0.45454545  0.45454545  0.41666667  0.27472527  0.55555556
## 5    0.18181818  0.16666667  0.18181818  0.20000000  0.20000000
## 6    0.80000000  0.60000000  0.40000000  0.80000000  0.76923077
## 7    0.35353535  0.41666667  0.20833333  0.35353535  0.50000000
## 8    0.41666667  0.30000000  0.45454545  0.11904762  0.00000000
## 9    0.40000000  0.41666667  0.10989011  0.50505051  0.54945055
## 10   0.25252525  0.41666667  0.25252525  0.38461538  0.27472527
## 11   0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 12   0.60000000  0.72727273  0.48484848  0.68686869  0.85714286
## 13   0.62500000  0.90909091  0.70707071  0.80000000  0.50505051
## 14   0.50000000  0.57575758  0.43434343  0.63636364  0.43434343
## 15   0.50000000  0.50000000  0.39393939  0.70000000  0.50000000
## 16   0.54945055  0.71428571  0.54945055  0.66666667  0.50505051
## 17   0.33333333  0.40000000  0.24175824  0.46464646  0.29166667
## 18   0.66666667  0.56043956  0.50000000  0.43434343  0.57575758
## 19   0.62500000  0.45454545  0.38461538  0.35714286  0.62500000
## 20   0.30000000  0.30000000  0.58333333  0.50000000  0.53846154
## 21   0.52525253  0.12121212  0.48484848  0.25000000  0.52525253
## 22   0.09890110 -0.04166667  0.17171717  0.50000000  0.16666667
## 23   0.36363636  0.24242424  0.40000000  0.33333333  0.08333333
```

```
## 24   0.20833333  0.13333333  0.54945055  0.47619048  0.50505051
## 25   0.57142857  0.08333333  0.53333333  0.68750000  0.24242424
## 26   0.63736264  0.56250000  0.76190476  0.25000000  0.41758242
## 27   0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 28   0.23232323  0.12087912  0.17171717  0.57575758  0.37373737
## 29   0.40000000  0.48351648  0.61904762  0.61904762  0.70329670
## 30   0.24175824  0.29166667  0.66666667  0.60000000  0.24175824
## 31   0.30303030  0.40000000  0.41666667  0.41666667  0.54945055
## 32   0.54761905  0.50000000  0.50000000  0.75000000  0.61616162
## 33   0.17171717  0.50000000  0.37373737  0.12087912  0.50000000
## 34   0.31868132  0.30000000  0.57575758  0.37500000  0.31868132
## 35   0.41666667  0.50505051  0.47619048  0.41666667  0.60000000
## 36   0.72727273  0.04166667  0.16666667  0.61538462  0.52525253
## 37   0.50000000  0.37500000  0.69047619  0.30000000  0.43434343
## 38   0.46666667  0.25000000  0.50000000  0.16666667  0.31868132
## 39   0.30303030  0.30303030  0.20833333  0.40000000  0.47619048
## 40   0.70707071  0.62500000  0.70707071  0.90909091  0.62500000
## 41   0.54166667  0.90000000  0.70000000  0.33333333  0.41414141
## 42   0.20833333  0.13333333  0.80000000  0.47619048  0.10101010
## 43   0.14285714  0.28282828  0.70329670  0.58333333  0.48484848
## 44   0.62500000  0.40000000  0.00000000 -0.10101010  0.54945055
## 45   0.62500000  0.70707071  0.70707071  0.30303030  0.47619048
## 46   0.48484848  0.26373626  0.38095238  0.58333333  0.12500000
## 47   0.46464646  0.04761905  0.04761905  0.41758242  0.63736264
## 48   0.38095238  0.58333333  0.28282828  0.60000000  0.61904762
## 49   0.52525253  0.26373626  0.58333333  0.14285714  0.37500000
## 50   0.25000000  0.45833333  0.08080808  0.72727273  0.40000000
## 51   0.60000000  0.54166667  0.16666667  0.40476190  0.64285714
## 52   0.59523810  0.35714286  0.31250000  0.30000000  0.41666667
## 53   0.79797980  0.06250000  0.30952381  0.08333333  0.18681319
## 54   0.48351648  0.40000000  0.70329670  0.39560440  0.48351648
## 55   0.30000000  0.55555556  0.35353535  0.30000000  0.62500000
## 56   0.57142857  0.13186813  0.24242424  0.35164835  0.35164835
## 57   0.39393939  0.18681319  0.40659341  0.29166667  0.50000000
## 58   0.60000000  0.28282828  0.37500000  0.40000000  0.72727273
## 59   0.41414141  0.79797980  0.81818182  0.59595960  0.62637363
## 60   0.19780220  0.13333333  0.13333333  0.06060606  0.52380952
## 61   0.30303030  0.20833333  0.10989011  0.20833333  0.70707071
## 62   0.62637363  0.07142857  0.79797980  0.20000000  0.18681319
## 63   0.68750000  0.54761905  0.46666667  0.78571429  0.39393939
## 64   0.43137255  0.76190476  0.52380952  0.52380952  0.56250000
## 65   0.32967033  0.31250000  0.55555556  0.31250000  0.47619048
## 66   0.25000000  0.16666667  0.25000000  0.06666667  0.69230769
## 67   0.06666667  0.52941176  0.16666667  0.06666667  0.33333333
## 68   0.59595960  0.79797980  0.21212121  0.33333333  0.29166667
## 69   0.40659341  0.18681319  0.01010101  0.20000000  0.18681319
## 70   0.52525253  0.25000000  0.17582418  0.33333333  0.57142857
## 71   0.26262626  0.28571429  0.40000000  0.14141414  0.14141414
## 72   0.41666667  0.20833333  0.40000000  0.20833333  0.50505051
## 73   0.54166667  0.79797980  0.19191919  0.50000000  0.50000000
## 74   0.30952381  0.19191919  0.54761905  0.59595960  0.29166667
## 75   0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 76   0.75000000  0.54545455  0.46153846  0.54545455  0.46464646
## 77   0.48484848  0.40000000  0.39560440  0.58333333  0.72727273
## 78   0.54166667  0.16666667  0.50000000 -0.08333333  0.39393939
## 79   0.00000000  0.04166667  0.04166667 -0.12500000 -0.14285714
## 80  -0.20000000 -0.16666667  0.04166667  0.21428571 -0.23232323
## 81   0.33333333  0.52525253  0.45833333  0.39560440  0.25000000
```

```
## 82   0.12500000  0.26666667  0.31372549  0.53333333  0.26373626
## 83   0.50000000  0.53333333  0.39560440  0.53333333  0.53333333
## 84  -0.13333333 -0.11764706 -0.11111111 -0.14285714  0.33333333
## 85   0.16666667 -0.01098901 -0.18750000  0.20879121 -0.01098901
## 86   0.00000000  0.62500000  0.19607843  0.31250000  0.10989011
## 87   0.25000000  0.21212121  0.06666667  0.13725490  0.47252747
## 88   0.00000000  0.60000000  0.47619048  0.41666667  0.00000000
## 89   0.28282828  0.38095238  0.38095238 -0.09523810 -0.18750000
## 90   0.40659341  0.30952381  0.30952381  0.57894737  0.30952381
## 91   0.13333333  0.32967033  0.47619048  0.60000000  0.00000000
## 92   0.33333333  0.41414141  0.12500000  0.40476190  0.47252747
## 93   0.40000000  0.40000000  0.33333333  0.52525253  0.66666667
## 94   0.20000000  0.66666667  0.46464646  0.29166667  0.19780220
## 95   0.32323232  0.32323232  0.20000000  0.60000000  0.60000000
## 96   0.58823529  0.32967033  0.58823529  0.31250000  0.13333333
## 97   0.30000000  0.25000000 -0.16666667  0.30000000 -0.10000000
## 98   0.68750000  0.30952381  0.50000000  0.07142857  0.18681319
## 99   0.25000000  0.60000000  0.50000000 -0.05555556  0.19191919
## 100 -0.18750000  0.66666667  0.26666667 -0.47058824  0.43750000
## 101  0.21428571 -0.02380952  0.45833333  0.06666667  0.12087912
## 102  0.53333333  0.70329670  0.31372549  0.38095238  0.38095238
## 103  0.48351648  0.16666667  0.38095238 -0.09523810  0.20000000
## 104  0.17582418  0.53333333  0.25000000  0.28282828  0.17582418
## 105 -0.38888889  0.45833333  0.06666667 -0.02380952 -0.20000000
## 106  0.34065934  0.06666667  0.33333333 -0.01960784  0.33333333
## 107 -0.13333333 -0.37500000  0.40000000 -0.19047619  0.13333333
## 108  0.47619048  0.54945055  0.40000000  0.20833333  0.47619048
## 109  0.16666667  0.25274725  0.41414141 -0.30952381 -0.46666667
## 110  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 111  0.31372549  0.75000000  0.00000000  0.31372549  0.26666667
## 112  0.20000000  0.23809524  0.20833333  0.13333333  0.47619048
## 113  0.26373626 -0.18750000  0.26373626  0.43750000 -0.17582418
## 114 -0.20000000 -0.07070707 -0.18750000 -0.23076923  0.33333333
## 115 -0.20000000  0.16666667  0.53333333 -0.09523810  0.28282828
## 116 -0.07142857 -0.06666667  0.20000000  0.16666667  0.25000000
## 117  0.06666667  0.25000000  0.16666667  0.25000000 -0.20000000
## 118  0.26190476 -0.21428571  0.31868132  0.41176471  0.31868132
## 119 -0.04166667  0.43750000 -0.17647059  0.02380952  0.50000000
## 120  0.20879121  0.26190476  0.20879121 -0.18750000 -0.01098901
## 121  0.19780220 -0.02197802  0.04761905  0.25000000  0.04761905
## 122  0.56250000 -0.08333333  0.40476190  0.41414141  0.30000000
## 123  0.30952381  0.61111111 -0.50000000  0.07142857 -0.16666667
## 124  0.13333333  0.56250000  0.43137255  0.03921569  0.22222222
## 125         NaN  0.04166667 -0.11764706 -0.14285714 -0.12500000
## 126  0.14285714  0.14285714  0.00000000 -0.04166667  0.26373626
## 127  0.54166667  0.33333333  0.25274725  0.33333333  0.33333333
## 128  0.33333333  0.25000000  0.52941176  0.03296703  0.50000000
## 129  0.40000000 -0.19607843  0.19607843  0.00000000  0.13333333
## 130  0.00000000  0.00000000  0.30303030  0.32967033  0.40000000
## 131  0.00000000  0.50505051  0.31250000  0.47619048  0.70707071
## 132  0.54945055  0.19607843  0.32967033  0.31250000  0.20833333
## 133 -0.06666667 -0.06666667  0.05494505  0.55555556  0.09803922
## 134  0.20833333  0.15151515  0.00000000  0.09803922 -0.06666667
## 135  0.50000000  0.25000000  0.12500000  0.33333333  0.06666667
## 136  0.16666667  0.31372549  0.31372549  0.43750000  0.38095238
## 137  0.07142857  0.46666667  0.37500000  0.19191919  0.08333333
## 138 -0.20000000  0.34065934  0.04166667  0.21428571 -0.01960784
## 139  0.00000000 -0.04761905 -0.12500000  0.13186813  0.13186813
```

```
## 140  0.12500000 -0.18750000  0.21568627  0.06666667 -0.17647059
## 141  0.66666667  0.26666667  0.12500000  0.31372549  0.66666667
## 142  0.31372549  0.43750000  0.31372549  0.70588235         NaN
## 143 -0.08791209  0.26666667  0.29166667  0.35164835  0.29166667
## 144  0.32967033  0.52631579  0.58823529  0.58823529 -0.52631579
## 145 -0.05050505  0.35714286  0.27472527  0.20833333  0.27472527
## 146  0.11904762  0.35714286  0.31250000  0.59523810  0.46666667
## 147 -0.23529412 -0.04761905  0.37500000  0.26666667  0.37500000
## 148  0.04395604  0.26373626 -0.18750000  0.00000000 -0.26666667
## 149  0.62500000  0.00000000  0.10989011  0.54945055  0.40000000
## 150 -0.12500000  0.27450980  0.13333333  0.06593407  0.33333333
## 151  0.22222222  0.33333333  0.52380952  0.33333333  0.40000000
## 152  0.37500000  0.13186813  0.68750000  0.26666667  0.15686275
## 153  0.37500000  0.64705882  0.06250000  0.46666667  0.25490196
## 154  0.26190476 -0.01098901 -0.17647059 -0.04166667  0.33333333
## 155  0.31250000  0.20000000  0.35714286  0.62500000  0.00000000
## 156  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 157  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 158 -0.13725490  0.50000000  0.18681319  0.06250000  0.06250000
## 159 -0.06666667  0.20000000  0.30952381  0.06250000 -0.25274725
## 160  0.26190476  0.12500000 -0.18750000 -0.15789474 -0.16666667
## 161  0.42857143  0.53333333 -0.22222222  0.24242424 -0.26666667
## 162  0.09803922  0.31250000  0.20000000 -0.27777778  0.27777778
## 163  0.49019608  0.00000000  0.88235294  0.35714286  0.46666667
## 164 -0.08791209 -0.12500000  0.13186813 -0.28571429  0.35164835
## 165  0.37500000  0.26666667  0.33333333  0.54901961  0.15686275
## 166 -0.12500000 -0.12500000  0.09523810 -0.11764706  0.33333333
## 167  0.76470588  0.16666667 -0.01960784  0.33333333 -0.20000000
## 168 -0.13333333  0.04166667  0.13333333  0.33333333  0.18750000
## 169 -0.05882353  0.25000000 -0.06250000  0.16666667 -0.07692308
## 170  0.76470588 -0.01960784  0.21428571  0.16666667 -0.12500000
## 171 -0.26666667  0.35164835  0.42857143  0.66666667  0.37500000
## 172  0.20000000  0.11904762  0.20000000  0.27472527 -0.11904762
## 173  0.13333333  0.00000000  0.23809524  0.00000000  0.62500000
## 174  0.13333333 -0.15384615  0.27450980 -0.12500000 -0.13333333
## 175  0.11111111  0.48484848 -0.17582418  0.00000000  0.04395604
## 176 -0.06250000  0.40000000  0.77777778  0.82352941  0.41758242
## 177  0.42857143  0.16666667  0.26190476  0.43750000  0.60784314
## 178  0.64705882  0.20000000  0.06250000  0.25490196 -0.33333333
## 179  0.12500000 -0.44444444  0.38095238  0.26666667  0.26666667
## 180  0.43750000 -0.15789474  0.60784314  0.38888889  0.43750000
## 181  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 182 -0.13333333  0.43137255 -0.35294118  0.25000000  0.22222222
## 183  0.27777778  0.09803922  0.31250000 -0.29411765  0.88235294
## 184  0.93750000  0.09803922  0.62500000  0.46666667  0.20000000
## 185  0.59523810  0.62500000  0.49019608  0.27777778  0.09803922
## 186  0.14285714  0.33333333  0.20000000 -0.06250000 -0.05263158
## 187  0.11904762 -0.26315789  0.35714286  0.35714286  0.20000000
## 188  0.21568627  0.12500000  0.12500000  0.20879121 -0.16666667
## 189  0.09803922 -0.29411765  0.31250000  0.20000000  0.09803922
## 190  0.53333333  0.26666667  0.12500000  0.26373626  0.12500000
## 191 -0.11904762  0.00000000  0.27777778  0.27777778  0.09803922
## 192  0.38888889  0.33333333 -0.20000000  0.02380952  0.06666667
## 193  0.16666667  0.25000000 -0.05263158 -0.05263158  0.16666667
## 194 -0.35294118 -0.06250000  0.73684211 -0.06250000  0.03921569
## 195  0.16666667  0.18750000  0.56043956  0.37254902  0.21428571
## 196  0.25000000 -0.06250000 -0.05555556 -0.07142857 -0.05263158
## 197  0.70329670  0.80000000  0.31372549  0.66666667  0.14285714
```

```
## 198  0.13333333  0.09523810 -0.12500000  0.44444444 -0.10526316
## 199  0.44444444  0.02020202  0.09523810  0.18750000 -0.13333333
## 200  0.13333333  0.40000000  0.25000000  0.18750000  0.44444444
## 201  0.44444444 -0.11111111 -0.14285714 -0.11764706  0.18750000
## 202  0.53333333  0.53333333 -0.07843137  0.61904762  0.61904762
## 203 -0.30769231  0.00000000 -0.28571429 -0.28571429  0.26666667
## 204  0.26666667  0.33333333  0.80000000  0.37500000  0.37500000
## 205  0.33333333  0.38888889  0.37500000         NaN  0.38888889
## 206 -0.11764706  0.44444444 -0.12500000  0.27450980  0.18750000
## 207  0.03921569  0.56250000  0.66666667  0.87500000  0.25000000
## 208  0.59523810  0.78947368  0.49019608  0.78947368  0.00000000
## 209  0.82352941  0.66666667  0.03921569 -0.06250000  0.20000000
## 210 -0.06666667  0.14285714  0.20000000 -0.06250000  0.33333333
## 211  0.27450980 -0.11764706  0.18750000  0.44444444  0.27450980
## 212  0.06250000  0.19047619 -0.21052632  0.26666667  0.33333333
## 213 -0.29411765  0.83333333  0.00000000 -0.26315789  0.09803922
## 214  0.30000000  0.26190476 -0.25000000  0.50000000  0.33333333
## 215 -0.27777778  0.35714286  0.27777778  0.27777778  0.00000000
## 216  0.42857143  0.42857143 -0.22222222  0.33333333 -0.21052632
## 217  0.54901961  0.19047619  0.33333333 -0.30769231 -0.25000000
## 218  0.09803922  0.49019608  0.31250000  0.41666667 -0.06666667
## 219  0.62500000  0.11904762  0.49019608  0.49019608  0.62500000
## 220  0.27777778  0.20833333  0.46666667  0.78947368  0.20000000
## 221  0.38888889  0.94444444  0.43750000  0.06666667 -0.18750000
## 222  0.33333333  0.42857143  0.33333333  0.13131313  0.21568627
## 223 -0.05882353         NaN  0.25000000 -0.05555556  0.14285714
## 224  0.54901961  0.42857143  0.26666667  0.37500000 -0.21052632
## 225  0.54901961  0.94117647  0.54901961  0.88888889  0.15686275
## 226  0.82352941  0.82352941  0.77777778  0.66666667  0.52380952
## 227  0.43137255  0.56250000  0.33333333  0.56250000  0.22222222
## 228 -0.05882353  0.14285714 -0.05882353  0.20000000  0.20000000
## 229  0.20000000 -0.06666667  0.16666667 -0.05555556 -0.05882353
## 230  0.33333333  0.33333333  0.53333333  0.94117647  0.88888889
## 231 -0.26315789  0.27777778 -0.26315789 -0.11904762  0.78947368
## 232  0.59523810  0.88235294  0.62500000 -0.06666667  0.20833333
## 233 -0.04761905  0.26666667  0.00000000  0.33333333  0.00000000
## 234  0.94444444  0.43750000  0.43750000  0.75000000  0.60784314
## 235 -0.05882353  0.33333333  0.25000000  0.14285714  0.16666667
## 236  0.94444444  0.20879121  0.06666667  0.21568627  0.33333333
## 237 -0.11764706 -0.11764706 -0.11111111 -0.12500000  0.06593407
## 238  0.33333333 -0.05882353 -0.05882353 -0.05555556  0.20000000
## 239  0.60784314 -0.16666667  0.06666667         NaN  0.38888889
## 240 -0.11111111  0.50000000  0.18750000  0.09523810  0.44444444
## 241 -0.06250000 -0.06666667  0.25000000  0.25000000 -0.06250000
## 242  0.25000000  0.20000000 -0.06666667 -0.07142857 -0.05555556
## 243  0.38888889  0.60784314 -0.15789474  0.21568627  0.38888889
## 244  0.38888889  0.12500000  0.60784314  0.89473684  0.38888889
## 245  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 246  0.33333333 -0.05882353 -0.06250000 -0.05263158  0.33333333
## 247  0.33333333 -0.05882353 -0.05882353 -0.05882353 -0.05555556
## 248  0.33333333  0.60784314  0.94444444  0.60784314  0.94444444
## 249  0.68750000  0.54901961  0.68750000  0.33333333  0.33333333
## 250  0.43750000  0.26190476  0.60000000  0.60000000  0.60000000
## 251  0.38888889  0.38888889 -0.16666667  0.12500000  0.75000000
## 252  0.00000000  0.00000000  0.00000000         NaN  0.00000000
## 253 -0.05263158  0.25000000 -0.05555556 -0.05263158 -0.05555556
## 254 -0.06250000  0.25000000  0.20000000  0.25000000  0.33333333
## 255  0.40000000  0.50000000  0.40000000  0.94736842  0.44444444
```

```
## 256  0.50000000  0.27450980  0.40000000  0.50000000  0.27450980
## 257 -0.23529412  0.42857143  0.06250000  0.06250000  0.84210526
## 258  0.40000000  0.18750000  0.40000000  0.18750000  0.27450980
## 259 -0.11764706  0.40000000  0.50000000 -0.11764706  0.18750000
## 260  0.50000000  0.44444444 -0.11111111  0.18750000  0.33333333
## 261  0.13333333  0.44444444 -0.14285714  0.13333333  0.18750000
## 262  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 263  0.00000000  0.00000000  0.00000000  0.00000000  0.00000000
## 264  0.25000000  0.25000000  0.25000000  0.25000000  0.25000000
## 265  0.43750000  0.02380952  0.12500000  0.06666667  0.43750000
## 266 -0.05555556  0.33333333  0.20000000  0.25000000  0.25000000
## 267  0.33333333  0.50000000  0.50000000 -0.10526316  0.33333333
## 268  1.00000000  0.40000000  0.40000000  0.40000000  0.44444444
## 269  0.33333333  0.50000000  0.25000000  0.50000000  0.16666667
## 270  0.33333333  0.50000000  0.16666667  0.20000000  0.25000000
## 271  0.25000000  0.20000000  0.33333333  0.25000000  0.33333333
## 272 -0.05882353  0.20000000  0.25000000 -0.06666667  0.25000000
## 273 -0.11111111 -0.11764706  0.27450980  0.33333333  0.18750000
## 274  0.33333333  0.25000000  0.25000000  0.33333333  0.33333333
## 275  0.40000000 -0.11111111  0.40000000  0.66666667  0.27450980
## 276  0.26262626  0.20000000  0.06060606  0.29166667  0.46464646
## 277  0.61904762  0.16666667  0.12500000  0.12500000  0.04395604
## 278  0.10000000  0.43434343  0.63636364  0.23232323  0.63636364
## 279 -0.41176471  0.04166667  0.34065934  0.12087912 -0.02380952
## 280  0.47368421  0.25000000  0.33333333  0.52941176  0.47368421
## 281  0.50000000  0.33333333 -0.06250000 -0.05555556 -0.05882353
## 282  0.33333333 -0.02380952  0.37254902  0.76470588 -0.36842105
## 283  0.18750000 -0.11764706 -0.11111111  0.09523810 -0.14285714
## 284  0.66666667  0.19780220 -0.02197802  0.03921569 -0.19047619
## 285 -0.18750000  0.33333333  0.21568627 -0.20000000  0.43750000
## 286  0.38888889         NaN -0.20000000 -0.18750000 -0.17647059
## 287  0.59523810  0.11904762  0.46666667  0.31250000  0.31250000
## 288  0.21568627         NaN  0.12500000  0.21568627  0.38888889
## 289 -0.22222222  0.53333333 -0.22222222  0.57142857  0.37500000
## 290  0.28571429  0.27450980  0.18750000  0.27450980 -0.11111111
## 291 -0.16666667  0.12500000  0.06666667 -0.16666667 -0.15789474
## 292  0.02380952  0.43750000  0.02380952  0.38888889 -0.16666667
## 293  0.68750000  0.94117647  0.15686275  0.66666667  1.00000000
## 294  0.84210526  0.54901961  0.37500000  0.94117647  0.68750000
## 295  0.33333333  0.37500000  0.88888889  0.53333333  0.88888889
## 296  0.33333333  0.38888889  0.26190476  0.38888889 -0.16666667
## 297  0.43750000  0.26190476  0.60000000  0.02380952  0.33333333
## 298  0.50505051  0.40000000  0.66666667  0.50505051  0.70707071
## 299  1.00000000  0.44444444  0.50000000  1.00000000  0.27450980
## 300  0.27450980  0.44444444 -0.10526316  0.94736842 -0.10526316
##
## $similarity
##             1         2         3         4         5
## 1   0.0000000 0.4444444 0.0000000 0.2222222 0.0000000
## 2   0.4615385 0.4285714 0.5714286 0.4615385 0.5333333
## 3   0.7142857 0.5714286 0.5882353 0.5882353 0.5333333
## 4   0.6250000 0.6250000 0.6153846 0.5000000 0.7142857
## 5   0.3076923 0.2857143 0.3076923 0.3333333 0.3333333
## 6   0.9000000 0.8000000 0.7000000 0.9000000 0.8695652
## 7   0.5714286 0.5882353 0.4615385 0.5714286 0.6666667
## 8   0.5882353 0.5333333 0.6250000 0.3636364 0.3529412
## 9   0.5333333 0.6666667 0.4705882 0.7368421 0.7058824
## 10  0.5000000 0.5882353 0.5000000 0.5555556 0.5000000
```

```
## 11  0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 12  0.8181818 0.8571429 0.7826087 0.8695652 0.9230769
## 13  0.8181818 0.9523810 0.8421053 0.9000000 0.7368421
## 14  0.7058824 0.7500000 0.6666667 0.7777778 0.6666667
## 15  0.7619048 0.7826087 0.7272727 0.8571429 0.7826087
## 16  0.7826087 0.8333333 0.7826087 0.8000000 0.7619048
## 17  0.5714286 0.6250000 0.5263158 0.6666667 0.5555556
## 18  0.8000000 0.7142857 0.7058824 0.6666667 0.7500000
## 19  0.8888889 0.7500000 0.6363636 0.5714286 0.8888889
## 20  0.5882353 0.5882353 0.7368421 0.6666667 0.7000000
## 21  0.7368421 0.5263158 0.7058824 0.6000000 0.7368421
## 22  0.5000000 0.4210526 0.5000000 0.7058824 0.5263158
## 23  0.5333333 0.4615385 0.5714286 0.5000000 0.3333333
## 24  0.5555556 0.4000000 0.7058824 0.6250000 0.7368421
## 25  0.7272727 0.3333333 0.6666667 0.7500000 0.4615385
## 26  0.7692308 0.6000000 0.8333333 0.4000000 0.6153846
## 27  0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 28  0.5555556 0.4285714 0.5000000 0.7500000 0.6250000
## 29  0.6666667 0.6666667 0.7142857 0.7142857 0.8000000
## 30  0.5263158 0.5555556 0.8000000 0.7500000 0.5263158
## 31  0.6666667 0.7000000 0.7272727 0.7272727 0.7826087
## 32  0.8000000 0.7619048 0.7826087 0.8421053 0.8000000
## 33  0.5000000 0.7058824 0.6250000 0.4285714 0.7058824
## 34  0.6000000 0.5882353 0.7500000 0.6315789 0.6000000
## 35  0.6666667 0.7368421 0.6250000 0.6666667 0.8000000
## 36  0.8421053 0.5000000 0.5000000 0.7619048 0.7368421
## 37  0.7826087 0.6666667 0.8888889 0.6956522 0.7272727
## 38  0.6363636 0.5333333 0.7058824 0.5263158 0.6000000
## 39  0.6666667 0.6315789 0.5555556 0.7000000 0.6250000
## 40  0.8421053 0.8181818 0.8571429 0.9523810 0.8181818
## 41  0.7368421 0.9523810 0.8571429 0.6315789 0.7000000
## 42  0.5555556 0.4000000 0.9000000 0.6250000 0.5263158
## 43  0.4285714 0.5882353 0.8000000 0.7500000 0.7058824
## 44  0.5714286 0.5333333 0.3750000 0.4210526 0.7058824
## 45  0.8181818 0.8571429 0.8571429 0.6666667 0.6250000
## 46  0.7058824 0.5333333 0.5714286 0.7500000 0.3333333
## 47  0.6666667 0.3333333 0.3333333 0.6153846 0.7692308
## 48  0.5714286 0.7500000 0.5882353 0.7777778 0.7142857
## 49  0.7368421 0.5333333 0.7500000 0.4285714 0.6250000
## 50  0.6000000 0.7000000 0.6086957 0.8571429 0.7272727
## 51  0.6250000 0.7368421 0.4705882 0.5882353 0.7058824
## 52  0.7272727 0.5454545 0.4444444 0.5333333 0.6153846
## 53  0.8888889 0.3076923 0.5333333 0.4705882 0.5000000
## 54  0.8000000 0.7272727 0.8800000 0.6315789 0.8000000
## 55  0.5333333 0.7142857 0.5714286 0.5333333 0.7692308
## 56  0.7272727 0.3636364 0.4615385 0.5454545 0.5454545
## 57  0.6666667 0.5000000 0.6250000 0.5882353 0.7058824
## 58  0.7777778 0.5882353 0.6250000 0.6666667 0.8421053
## 59  0.7000000 0.9090909 0.9000000 0.8181818 0.8333333
## 60  0.4615385 0.3636364 0.3636364 0.4000000 0.6666667
## 61  0.6666667 0.5555556 0.4705882 0.5555556 0.8571429
## 62  0.7500000 0.4000000 0.8888889 0.4285714 0.5000000
## 63  0.6153846 0.6666667 0.5714286 0.8000000 0.6666667
## 64  0.4444444 0.8333333 0.6666667 0.6666667 0.6000000
## 65  0.5882353 0.4285714 0.3333333 0.4285714 0.6250000
## 66  0.4000000 0.4705882 0.4000000 0.3750000 0.7777778
## 67  0.3750000 0.4285714 0.4705882 0.3750000 0.6315789
## 68  0.8181818 0.9090909 0.6000000 0.5000000 0.6956522
```

```
## 69  0.6250000 0.5000000 0.5000000 0.4285714 0.5000000
## 70  0.7619048 0.6000000 0.5263158 0.5555556 0.6666667
## 71  0.5333333 0.5000000 0.6250000 0.4705882 0.4705882
## 72  0.6666667 0.5555556 0.7000000 0.5555556 0.7368421
## 73  0.7368421 0.9090909 0.6363636 0.7826087 0.7826087
## 74  0.5333333 0.5555556 0.6666667 0.7777778 0.5882353
## 75  0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 76  0.9230769 0.7826087 0.6666667 0.7826087 0.8000000
## 77  0.7826087 0.7272727 0.6315789 0.8333333 0.8571429
## 78  0.7368421 0.4705882 0.7619048 0.4210526 0.7272727
## 79  0.1666667 0.2000000 0.2000000 0.0000000 0.0000000
## 80  0.1666667 0.2666667 0.4000000 0.4615385 0.2500000
## 81  0.5555556 0.7619048 0.7000000 0.6315789 0.6000000
## 82  0.3333333 0.4615385 0.3636364 0.6153846 0.5333333
## 83  0.5000000 0.5882353 0.6315789 0.5882353 0.5882353
## 84  0.0000000 0.0000000 0.0000000 0.0000000 0.5000000
## 85  0.3636364 0.2000000 0.0000000 0.4000000 0.2000000
## 86  0.2857143 0.5714286 0.3076923 0.4285714 0.4705882
## 87  0.4000000 0.6000000 0.3750000 0.2857143 0.6666667
## 88  0.5000000 0.8000000 0.6250000 0.6666667 0.4444444
## 89  0.5882353 0.5714286 0.5714286 0.2857143 0.1666667
## 90  0.6250000 0.5333333 0.5333333 0.2000000 0.5333333
## 91  0.4000000 0.5882353 0.6250000 0.8000000 0.3750000
## 92  0.6315789 0.7000000 0.5263158 0.5882353 0.6666667
## 93  0.7272727 0.7272727 0.5555556 0.7619048 0.8000000
## 94  0.5000000 0.8000000 0.6666667 0.5555556 0.4615385
## 95  0.6666667 0.6666667 0.6363636 0.8181818 0.8181818
## 96  0.4615385 0.5882353 0.4615385 0.4285714 0.4000000
## 97  0.5882353 0.5333333 0.2666667 0.5882353 0.3529412
## 98  0.6153846 0.5333333 0.7058824 0.4000000 0.5000000
## 99  0.4000000 0.6250000 0.3076923 0.1538462 0.6363636
## 100 0.1666667 0.4000000 0.4615385 0.0000000 0.5000000
## 101 0.4615385 0.3076923 0.6666667 0.3333333 0.4285714
## 102 0.6153846 0.8000000 0.3636364 0.5714286 0.5714286
## 103 0.6666667 0.5000000 0.5714286 0.2857143 0.5555556
## 104 0.5263158 0.5882353 0.6000000 0.6956522 0.5263158
## 105 0.0000000 0.6666667 0.3333333 0.3076923 0.1666667
## 106 0.5714286 0.3333333 0.5000000 0.2000000 0.5000000
## 107 0.1818182 0.0000000 0.5454545 0.1666667 0.3636364
## 108 0.6250000 0.7058824 0.5333333 0.5555556 0.6250000
## 109 0.4705882 0.5555556 0.7000000 0.2352941 0.1250000
## 110 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 111 0.3636364 0.6666667 0.3076923 0.3636364 0.4615385
## 112 0.6000000 0.5000000 0.5555556 0.4000000 0.6250000
## 113 0.5333333 0.1666667 0.5333333 0.5000000 0.2666667
## 114 0.0000000 0.1666667 0.0000000 0.0000000 0.5000000
## 115 0.3333333 0.5000000 0.6153846 0.2857143 0.5882353
## 116 0.0000000 0.0000000 0.3333333 0.2857143 0.4000000
## 117 0.3750000 0.4000000 0.4705882 0.4000000 0.2500000
## 118 0.5263158 0.3157895 0.6000000 0.3750000 0.6000000
## 119 0.1818182 0.5714286 0.0000000 0.2222222 0.6666667
## 120 0.4000000 0.4444444 0.4000000 0.0000000 0.2000000
## 121 0.4615385 0.3076923 0.3333333 0.4000000 0.3333333
## 122 0.5333333 0.4210526 0.5882353 0.7000000 0.6666667
## 123 0.5333333 0.3636364 0.0000000 0.4000000 0.2666667
## 124 0.3636364 0.6000000 0.4444444 0.2222222 0.2500000
## 125 0.0000000 0.2000000 0.0000000 0.0000000 0.0000000
## 126 0.4285714 0.4285714 0.3076923 0.3750000 0.5333333
```

```
## 127 0.7368421 0.5000000 0.5555556 0.5000000 0.5000000
## 128 0.6315789 0.4000000 0.4285714 0.4444444 0.3076923
## 129 0.5333333 0.1538462 0.3076923 0.2857143 0.4000000
## 130 0.4444444 0.4444444 0.6315789 0.5882353 0.5333333
## 131 0.3750000 0.7619048 0.4285714 0.6250000 0.8421053
## 132 0.7058824 0.3076923 0.5882353 0.4285714 0.5555556
## 133 0.2000000 0.2000000 0.3333333 0.7142857 0.2500000
## 134 0.4615385 0.4285714 0.3076923 0.2500000 0.2000000
## 135 0.3076923 0.4000000 0.5263158 0.6315789 0.3750000
## 136 0.5000000 0.3636364 0.3636364 0.5000000 0.5714286
## 137 0.4000000 0.5714286 0.4615385 0.5555556 0.4705882
## 138 0.1666667 0.5714286 0.4000000 0.4615385 0.2000000
## 139 0.2222222 0.2000000 0.1666667 0.3636364 0.3636364
## 140 0.2857143 0.0000000 0.3333333 0.2500000 0.0000000
## 141 0.4000000 0.4615385 0.3333333 0.3636364 0.4000000
## 142 0.3636364 0.5000000 0.3636364 0.5454545 0.0000000
## 143 0.1818182 0.4444444 0.5000000 0.5454545 0.5000000
## 144 0.5882353 0.1818182 0.4615385 0.4615385 0.0000000
## 145 0.2857143 0.5454545 0.5000000 0.4615385 0.5000000
## 146 0.3636364 0.5454545 0.4444444 0.7272727 0.6000000
## 147 0.0000000 0.2000000 0.5000000 0.4444444 0.5000000
## 148 0.4000000 0.5333333 0.1666667 0.3076923 0.1538462
## 149 0.7777778 0.3750000 0.4705882 0.7058824 0.5333333
## 150 0.0000000 0.4000000 0.2857143 0.2222222 0.5000000
## 151 0.2500000 0.5714286 0.6666667 0.5714286 0.5454545
## 152 0.5000000 0.3636364 0.7500000 0.4444444 0.2857143
## 153 0.4615385 0.5000000 0.3076923 0.5714286 0.3333333
## 154 0.4444444 0.2000000 0.0000000 0.1818182 0.5000000
## 155 0.4444444 0.4000000 0.5454545 0.6666667 0.2222222
## 156 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 157 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 158 0.1666667 0.7058824 0.5000000 0.3076923 0.3076923
## 159 0.2857143 0.4285714 0.5333333 0.3076923 0.2500000
## 160 0.4444444 0.2857143 0.0000000 0.0000000 0.0000000
## 161 0.6000000 0.6666667 0.0000000 0.4615385 0.0000000
## 162 0.2500000 0.4444444 0.4000000 0.0000000 0.2857143
## 163 0.5000000 0.2222222 0.7500000 0.5454545 0.6000000
## 164 0.1818182 0.1666667 0.3636364 0.0000000 0.5454545
## 165 0.5000000 0.4444444 0.3333333 0.5714286 0.2857143
## 166 0.0000000 0.0000000 0.2500000 0.0000000 0.5000000
## 167 0.6000000 0.5263158 0.2000000 0.5000000 0.1666667
## 168 0.0000000 0.2000000 0.2857143 0.5000000 0.3333333
## 169 0.0000000 0.4000000 0.0000000 0.2857143 0.0000000
## 170 0.6000000 0.2000000 0.4615385 0.2222222 0.1818182
## 171 0.0000000 0.5454545 0.6000000 0.8000000 0.5000000
## 172 0.4000000 0.3636364 0.4000000 0.5000000 0.1818182
## 173 0.4000000 0.3750000 0.5000000 0.1666667 0.7777778
## 174 0.2857143 0.0000000 0.4000000 0.0000000 0.0000000
## 175 0.2000000 0.7058824 0.2666667 0.3076923 0.4000000
## 176 0.2000000 0.5454545 0.5000000 0.6666667 0.6153846
## 177 0.6000000 0.3636364 0.4444444 0.5714286 0.6666667
## 178 0.5000000 0.4285714 0.3076923 0.3333333 0.1428571
## 179 0.3333333 0.0000000 0.5714286 0.4615385 0.4615385
## 180 0.5714286 0.0000000 0.6666667 0.4000000 0.5714286
## 181 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 182 0.1818182 0.4444444 0.0000000 0.4000000 0.2500000
## 183 0.2857143 0.2500000 0.4444444 0.0000000 0.7500000
## 184 0.8888889 0.2500000 0.6666667 0.6000000 0.4000000
```

```
## 185 0.7272727 0.6666667 0.5000000 0.2857143 0.2500000
## 186 0.2500000 0.5000000 0.3333333 0.0000000 0.0000000
## 187 0.3636364 0.0000000 0.5454545 0.5454545 0.4000000
## 188 0.3333333 0.2857143 0.2857143 0.4000000 0.0000000
## 189 0.2500000 0.0000000 0.4444444 0.4000000 0.2500000
## 190 0.6153846 0.4615385 0.3333333 0.5333333 0.3333333
## 191 0.1818182 0.2222222 0.2857143 0.2857143 0.2500000
## 192 0.4000000 0.5000000 0.0000000 0.2222222 0.2500000
## 193 0.2857143 0.4000000 0.0000000 0.0000000 0.2857143
## 194 0.0000000 0.2000000 0.2857143 0.2000000 0.2222222
## 195 0.2222222 0.3636364 0.7142857 0.4000000 0.4615385
## 196 0.4000000 0.0000000 0.0000000 0.0000000 0.0000000
## 197 0.8000000 0.7692308 0.3636364 0.4000000 0.4285714
## 198 0.2857143 0.2500000 0.0000000 0.5000000 0.0000000
## 199 0.5000000 0.1818182 0.2500000 0.3333333 0.0000000
## 200 0.2857143 0.5714286 0.4000000 0.3333333 0.5000000
## 201 0.5000000 0.0000000 0.0000000 0.0000000 0.3333333
## 202 0.6153846 0.6153846 0.1818182 0.7142857 0.7142857
## 203 0.0000000 0.2222222 0.0000000 0.0000000 0.4444444
## 204 0.4444444 0.3333333 0.8888889 0.5000000 0.5000000
## 205 0.5000000 0.4000000 0.5454545 0.0000000 0.4000000
## 206 0.0000000 0.5000000 0.0000000 0.4000000 0.3333333
## 207 0.2222222 0.6000000 0.7272727 0.8000000 0.4000000
## 208 0.7272727 0.3333333 0.5000000 0.3333333 0.2222222
## 209 0.6666667 0.7272727 0.2222222 0.2000000 0.5000000
## 210 0.0000000 0.2500000 0.3333333 0.0000000 0.5000000
## 211 0.4000000 0.0000000 0.3333333 0.5000000 0.4000000
## 212 0.2500000 0.4000000 0.0000000 0.4444444 0.3333333
## 213 0.0000000 0.5714286 0.2222222 0.0000000 0.2500000
## 214 0.4615385 0.4444444 0.0000000 0.6666667 0.5000000
## 215 0.0000000 0.5454545 0.2857143 0.2857143 0.2222222
## 216 0.6000000 0.6000000 0.0000000 0.3333333 0.0000000
## 217 0.5714286 0.4000000 0.3333333 0.0000000 0.0000000
## 218 0.2500000 0.5000000 0.4444444 0.6153846 0.2000000
## 219 0.6666667 0.3636364 0.5000000 0.5000000 0.6666667
## 220 0.2857143 0.4615385 0.6000000 0.3333333 0.4000000
## 221 0.4000000 0.8000000 0.5714286 0.2500000 0.0000000
## 222 0.5000000 0.6000000 0.5000000 0.3333333 0.3333333
## 223 0.0000000 0.0000000 0.4000000 0.0000000 0.2500000
## 224 0.5714286 0.6000000 0.4444444 0.5000000 0.0000000
## 225 0.5714286 0.8571429 0.5714286 0.6666667 0.2857143
## 226 0.6666667 0.6666667 0.5000000 0.7272727 0.6666667
## 227 0.4444444 0.6000000 0.5714286 0.6000000 0.2500000
## 228 0.0000000 0.2500000 0.0000000 0.3333333 0.3333333
## 229 0.3333333 0.0000000 0.2857143 0.0000000 0.0000000
## 230 0.3333333 0.3333333 0.6666667 0.8571429 0.6666667
## 231 0.0000000 0.2857143 0.0000000 0.1818182 0.3333333
## 232 0.7272727 0.7500000 0.6666667 0.2000000 0.4615385
## 233 0.2000000 0.4444444 0.2222222 0.3333333 0.2222222
## 234 0.8000000 0.5714286 0.5714286 0.8571429 0.6666667
## 235 0.0000000 0.5000000 0.4000000 0.2500000 0.2857143
## 236 0.8000000 0.4000000 0.2500000 0.3333333 0.5000000
## 237 0.0000000 0.0000000 0.0000000 0.0000000 0.2222222
## 238 0.5000000 0.0000000 0.0000000 0.0000000 0.3333333
## 239 0.6666667 0.0000000 0.2500000 0.0000000 0.4000000
## 240 0.0000000 0.6666667 0.3333333 0.2500000 0.5000000
## 241 0.0000000 0.0000000 0.4000000 0.4000000 0.0000000
## 242 0.4000000 0.3333333 0.0000000 0.0000000 0.0000000
```

```
## 243 0.4000000 0.6666667 0.0000000 0.3333333 0.4000000
## 244 0.4000000 0.2857143 0.6666667 0.5000000 0.4000000
## 245 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 246 0.5000000 0.0000000 0.0000000 0.0000000 0.5000000
## 247 0.5000000 0.0000000 0.0000000 0.0000000 0.0000000
## 248 0.5000000 0.6666667 0.8000000 0.6666667 0.8000000
## 249 0.7500000 0.5714286 0.7500000 0.3333333 0.3333333
## 250 0.5714286 0.4444444 0.7500000 0.7500000 0.7500000
## 251 0.4000000 0.4000000 0.0000000 0.2857143 0.8571429
## 252 0.0000000 0.0000000 0.0000000       NaN 0.0000000
## 253 0.0000000 0.4000000 0.0000000 0.0000000 0.0000000
## 254 0.0000000 0.4000000 0.3333333 0.4000000 0.5000000
## 255 0.5714286 0.6666667 0.5714286 0.6666667 0.5000000
## 256 0.6666667 0.4000000 0.5714286 0.6666667 0.4000000
## 257 0.0000000 0.6000000 0.2500000 0.2500000 0.4000000
## 258 0.5714286 0.3333333 0.5714286 0.3333333 0.4000000
## 259 0.0000000 0.5714286 0.6666667 0.0000000 0.3333333
## 260 0.6666667 0.5000000 0.0000000 0.3333333 0.5000000
## 261 0.2857143 0.5000000 0.0000000 0.2857143 0.3333333
## 262 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 263 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
## 264 0.4000000 0.4000000 0.4000000 0.4000000 0.4000000
## 265 0.5714286 0.2222222 0.2857143 0.2500000 0.5714286
## 266 0.0000000 0.5000000 0.3333333 0.4000000 0.4000000
## 267 0.5000000 0.6666667 0.6666667 0.0000000 0.5000000
## 268 1.0000000 0.5714286 0.5714286 0.5714286 0.5000000
## 269 0.5000000 0.6666667 0.4000000 0.6666667 0.2857143
## 270 0.5000000 0.6666667 0.2857143 0.3333333 0.4000000
## 271 0.4000000 0.3333333 0.5000000 0.4000000 0.5000000
## 272 0.0000000 0.3333333 0.4000000 0.0000000 0.4000000
## 273 0.0000000 0.0000000 0.4000000 0.5000000 0.3333333
## 274 0.5000000 0.4000000 0.4000000 0.5000000 0.5000000
## 275 0.5714286 0.0000000 0.5714286 0.8000000 0.4000000
## 276 0.5333333 0.5000000 0.4000000 0.5555556 0.6666667
## 277 0.7142857 0.5000000 0.3333333 0.3333333 0.4000000
## 278 0.4705882 0.6666667 0.7777778 0.5555556 0.7777778
## 279 0.0000000 0.4000000 0.5714286 0.4285714 0.3076923
## 280 0.1666667 0.4000000 0.5000000 0.4285714 0.1666667
## 281 0.6666667 0.5000000 0.0000000 0.0000000 0.0000000
## 282 0.5000000 0.3076923 0.4000000 0.6000000 0.0000000
## 283 0.3333333 0.0000000 0.0000000 0.2500000 0.0000000
## 284 0.7272727 0.4615385 0.3076923 0.2222222 0.1666667
## 285 0.0000000 0.5000000 0.3333333 0.0000000 0.5714286
## 286 0.4000000 0.0000000 0.0000000 0.0000000 0.0000000
## 287 0.7272727 0.3636364 0.6000000 0.4444444 0.4444444
## 288 0.3333333 0.0000000 0.2857143 0.3333333 0.4000000
## 289 0.0000000 0.6666667 0.0000000 0.7272727 0.5000000
## 290 0.4444444 0.4000000 0.3333333 0.4000000 0.0000000
## 291 0.0000000 0.2857143 0.2500000 0.0000000 0.0000000
## 292 0.2222222 0.5714286 0.2222222 0.4000000 0.0000000
## 293 0.7500000 0.8571429 0.2857143 0.8000000 1.0000000
## 294 0.4000000 0.5714286 0.5000000 0.8571429 0.7500000
## 295 0.3333333 0.5000000 0.6666667 0.6666667 0.6666667
## 296 0.5000000 0.4000000 0.4444444 0.4000000 0.0000000
## 297 0.5714286 0.4444444 0.7500000 0.2222222 0.5000000
## 298 0.7368421 0.7000000 0.6666667 0.7368421 0.8571429
## 299 1.0000000 0.5000000 0.6666667 1.0000000 0.4000000
## 300 0.4000000 0.5000000 0.0000000 0.6666667 0.0000000
```

```
##
## $Jaccard
##              1          2          3          4          5
## 1   0.00000000 0.28571429 0.00000000 0.12500000 0.00000000
## 2   0.30000000 0.27272727 0.40000000 0.30000000 0.36363636
## 3   0.55555556 0.40000000 0.41666667 0.41666667 0.36363636
## 4   0.45454545 0.45454545 0.44444444 0.33333333 0.55555556
## 5   0.18181818 0.16666667 0.18181818 0.20000000 0.20000000
## 6   0.81818182 0.66666667 0.53846154 0.81818182 0.76923077
## 7   0.40000000 0.41666667 0.30000000 0.40000000 0.50000000
## 8   0.41666667 0.36363636 0.45454545 0.22222222 0.21428571
## 9   0.36363636 0.50000000 0.30769231 0.58333333 0.54545455
## 10  0.33333333 0.41666667 0.33333333 0.38461538 0.33333333
## 11  0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 12  0.69230769 0.75000000 0.64285714 0.76923077 0.85714286
## 13  0.69230769 0.90909091 0.72727273 0.81818182 0.58333333
## 14  0.54545455 0.60000000 0.50000000 0.63636364 0.50000000
## 15  0.61538462 0.64285714 0.57142857 0.75000000 0.64285714
## 16  0.64285714 0.71428571 0.64285714 0.66666667 0.61538462
## 17  0.40000000 0.45454545 0.35714286 0.50000000 0.38461538
## 18  0.66666667 0.55555556 0.54545455 0.50000000 0.60000000
## 19  0.80000000 0.60000000 0.46666667 0.40000000 0.80000000
## 20  0.41666667 0.41666667 0.58333333 0.50000000 0.53846154
## 21  0.58333333 0.35714286 0.54545455 0.42857143 0.58333333
## 22  0.33333333 0.26666667 0.33333333 0.54545455 0.35714286
## 23  0.36363636 0.30000000 0.40000000 0.33333333 0.20000000
## 24  0.38461538 0.25000000 0.54545455 0.45454545 0.58333333
## 25  0.57142857 0.20000000 0.50000000 0.60000000 0.30000000
## 26  0.62500000 0.42857143 0.71428571 0.25000000 0.44444444
## 27  0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 28  0.38461538 0.27272727 0.33333333 0.60000000 0.45454545
## 29  0.50000000 0.50000000 0.55555556 0.55555556 0.66666667
## 30  0.35714286 0.38461538 0.66666667 0.60000000 0.35714286
## 31  0.50000000 0.53846154 0.57142857 0.57142857 0.64285714
## 32  0.66666667 0.61538462 0.64285714 0.72727273 0.66666667
## 33  0.33333333 0.54545455 0.45454545 0.27272727 0.54545455
## 34  0.42857143 0.41666667 0.60000000 0.46153846 0.42857143
## 35  0.50000000 0.58333333 0.45454545 0.50000000 0.66666667
## 36  0.72727273 0.33333333 0.33333333 0.61538462 0.58333333
## 37  0.64285714 0.50000000 0.80000000 0.53333333 0.57142857
## 38  0.46666667 0.36363636 0.54545455 0.35714286 0.42857143
## 39  0.50000000 0.46153846 0.38461538 0.53846154 0.45454545
## 40  0.72727273 0.69230769 0.75000000 0.90909091 0.69230769
## 41  0.58333333 0.90909091 0.75000000 0.46153846 0.53846154
## 42  0.38461538 0.25000000 0.81818182 0.45454545 0.35714286
## 43  0.27272727 0.41666667 0.66666667 0.60000000 0.54545455
## 44  0.40000000 0.36363636 0.23076923 0.26666667 0.54545455
## 45  0.69230769 0.75000000 0.75000000 0.50000000 0.45454545
## 46  0.54545455 0.36363636 0.40000000 0.60000000 0.20000000
## 47  0.50000000 0.20000000 0.20000000 0.44444444 0.62500000
## 48  0.40000000 0.60000000 0.41666667 0.63636364 0.55555556
## 49  0.58333333 0.36363636 0.60000000 0.27272727 0.45454545
## 50  0.42857143 0.53846154 0.43750000 0.75000000 0.57142857
## 51  0.45454545 0.58333333 0.30769231 0.41666667 0.54545455
## 52  0.57142857 0.37500000 0.28571429 0.36363636 0.44444444
## 53  0.80000000 0.18181818 0.36363636 0.30769231 0.33333333
## 54  0.66666667 0.57142857 0.78571429 0.46153846 0.66666667
## 55  0.36363636 0.55555556 0.40000000 0.36363636 0.62500000
```

```
## 56  0.57142857 0.22222222 0.30000000 0.37500000 0.37500000
## 57  0.50000000 0.33333333 0.45454545 0.41666667 0.54545455
## 58  0.63636364 0.41666667 0.45454545 0.50000000 0.72727273
## 59  0.53846154 0.83333333 0.81818182 0.69230769 0.71428571
## 60  0.30000000 0.22222222 0.22222222 0.25000000 0.50000000
## 61  0.50000000 0.38461538 0.30769231 0.38461538 0.75000000
## 62  0.60000000 0.25000000 0.80000000 0.27272727 0.33333333
## 63  0.44444444 0.50000000 0.40000000 0.66666667 0.50000000
## 64  0.28571429 0.71428571 0.50000000 0.50000000 0.42857143
## 65  0.41666667 0.27272727 0.20000000 0.27272727 0.45454545
## 66  0.25000000 0.30769231 0.25000000 0.23076923 0.63636364
## 67  0.23076923 0.27272727 0.30769231 0.23076923 0.46153846
## 68  0.69230769 0.83333333 0.42857143 0.33333333 0.53333333
## 69  0.45454545 0.33333333 0.33333333 0.27272727 0.33333333
## 70  0.61538462 0.42857143 0.35714286 0.38461538 0.50000000
## 71  0.36363636 0.33333333 0.45454545 0.30769231 0.30769231
## 72  0.50000000 0.38461538 0.53846154 0.38461538 0.58333333
## 73  0.58333333 0.83333333 0.46666667 0.64285714 0.64285714
## 74  0.36363636 0.38461538 0.50000000 0.63636364 0.41666667
## 75  0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 76  0.85714286 0.64285714 0.50000000 0.64285714 0.66666667
## 77  0.64285714 0.57142857 0.46153846 0.71428571 0.75000000
## 78  0.58333333 0.30769231 0.61538462 0.26666667 0.57142857
## 79  0.09090909 0.11111111 0.11111111 0.00000000 0.00000000
## 80  0.09090909 0.15384615 0.25000000 0.30000000 0.14285714
## 81  0.38461538 0.61538462 0.53846154 0.46153846 0.42857143
## 82  0.20000000 0.30000000 0.22222222 0.44444444 0.36363636
## 83  0.33333333 0.41666667 0.46153846 0.41666667 0.41666667
## 84  0.00000000 0.00000000 0.00000000 0.00000000 0.33333333
## 85  0.22222222 0.11111111 0.00000000 0.25000000 0.11111111
## 86  0.16666667 0.40000000 0.18181818 0.27272727 0.30769231
## 87  0.25000000 0.42857143 0.23076923 0.16666667 0.50000000
## 88  0.33333333 0.66666667 0.45454545 0.50000000 0.28571429
## 89  0.41666667 0.40000000 0.40000000 0.16666667 0.09090909
## 90  0.45454545 0.36363636 0.36363636 0.11111111 0.36363636
## 91  0.25000000 0.41666667 0.45454545 0.66666667 0.23076923
## 92  0.46153846 0.53846154 0.35714286 0.41666667 0.50000000
## 93  0.57142857 0.57142857 0.38461538 0.61538462 0.66666667
## 94  0.33333333 0.66666667 0.50000000 0.38461538 0.30000000
## 95  0.50000000 0.50000000 0.46666667 0.69230769 0.69230769
## 96  0.30000000 0.41666667 0.30000000 0.27272727 0.25000000
## 97  0.41666667 0.36363636 0.15384615 0.41666667 0.21428571
## 98  0.44444444 0.36363636 0.54545455 0.25000000 0.33333333
## 99  0.25000000 0.45454545 0.18181818 0.08333333 0.46666667
## 100 0.09090909 0.25000000 0.30000000 0.00000000 0.33333333
## 101 0.30000000 0.18181818 0.50000000 0.20000000 0.27272727
## 102 0.44444444 0.66666667 0.22222222 0.40000000 0.40000000
## 103 0.50000000 0.33333333 0.40000000 0.16666667 0.38461538
## 104 0.35714286 0.41666667 0.42857143 0.53333333 0.35714286
## 105 0.00000000 0.50000000 0.20000000 0.18181818 0.09090909
## 106 0.40000000 0.20000000 0.33333333 0.11111111 0.33333333
## 107 0.10000000 0.00000000 0.37500000 0.09090909 0.22222222
## 108 0.45454545 0.54545455 0.36363636 0.38461538 0.45454545
## 109 0.30769231 0.38461538 0.53846154 0.13333333 0.06666667
## 110 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 111 0.22222222 0.50000000 0.18181818 0.22222222 0.30000000
## 112 0.42857143 0.33333333 0.38461538 0.25000000 0.45454545
## 113 0.36363636 0.09090909 0.36363636 0.33333333 0.15384615
```

```
## 114 0.00000000 0.09090909 0.00000000 0.00000000 0.33333333
## 115 0.20000000 0.33333333 0.44444444 0.16666667 0.41666667
## 116 0.00000000 0.00000000 0.20000000 0.16666667 0.25000000
## 117 0.23076923 0.25000000 0.30769231 0.25000000 0.14285714
## 118 0.35714286 0.18750000 0.42857143 0.23076923 0.42857143
## 119 0.10000000 0.40000000 0.00000000 0.12500000 0.50000000
## 120 0.25000000 0.28571429 0.25000000 0.00000000 0.11111111
## 121 0.30000000 0.18181818 0.20000000 0.25000000 0.20000000
## 122 0.36363636 0.26666667 0.41666667 0.53846154 0.50000000
## 123 0.36363636 0.22222222 0.00000000 0.25000000 0.15384615
## 124 0.22222222 0.42857143 0.28571429 0.12500000 0.14285714
## 125 0.00000000 0.11111111 0.00000000 0.00000000 0.00000000
## 126 0.27272727 0.27272727 0.18181818 0.23076923 0.36363636
## 127 0.58333333 0.33333333 0.38461538 0.33333333 0.33333333
## 128 0.46153846 0.25000000 0.27272727 0.28571429 0.18181818
## 129 0.36363636 0.08333333 0.18181818 0.16666667 0.25000000
## 130 0.28571429 0.28571429 0.46153846 0.41666667 0.36363636
## 131 0.23076923 0.61538462 0.27272727 0.45454545 0.72727273
## 132 0.54545455 0.18181818 0.41666667 0.27272727 0.38461538
## 133 0.11111111 0.11111111 0.20000000 0.55555556 0.14285714
## 134 0.30000000 0.27272727 0.18181818 0.14285714 0.11111111
## 135 0.18181818 0.25000000 0.35714286 0.46153846 0.23076923
## 136 0.33333333 0.22222222 0.22222222 0.33333333 0.40000000
## 137 0.25000000 0.40000000 0.30000000 0.38461538 0.30769231
## 138 0.09090909 0.40000000 0.25000000 0.30000000 0.11111111
## 139 0.12500000 0.11111111 0.09090909 0.22222222 0.22222222
## 140 0.16666667 0.00000000 0.20000000 0.14285714 0.00000000
## 141 0.25000000 0.30000000 0.20000000 0.22222222 0.25000000
## 142 0.22222222 0.33333333 0.22222222 0.37500000 0.00000000
## 143 0.10000000 0.28571429 0.33333333 0.37500000 0.33333333
## 144 0.41666667 0.10000000 0.30000000 0.30000000 0.00000000
## 145 0.16666667 0.37500000 0.33333333 0.30000000 0.33333333
## 146 0.22222222 0.37500000 0.28571429 0.57142857 0.42857143
## 147 0.00000000 0.11111111 0.33333333 0.28571429 0.33333333
## 148 0.25000000 0.36363636 0.09090909 0.18181818 0.08333333
## 149 0.63636364 0.23076923 0.30769231 0.54545455 0.36363636
## 150 0.00000000 0.25000000 0.16666667 0.12500000 0.33333333
## 151 0.14285714 0.40000000 0.50000000 0.40000000 0.37500000
## 152 0.33333333 0.22222222 0.60000000 0.28571429 0.16666667
## 153 0.30000000 0.33333333 0.18181818 0.40000000 0.20000000
## 154 0.28571429 0.11111111 0.00000000 0.10000000 0.33333333
## 155 0.28571429 0.25000000 0.37500000 0.50000000 0.12500000
## 156 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 157 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 158 0.09090909 0.54545455 0.33333333 0.18181818 0.18181818
## 159 0.16666667 0.27272727 0.36363636 0.18181818 0.14285714
## 160 0.28571429 0.16666667 0.00000000 0.00000000 0.00000000
## 161 0.42857143 0.50000000 0.00000000 0.30000000 0.00000000
## 162 0.14285714 0.28571429 0.25000000 0.00000000 0.16666667
## 163 0.33333333 0.12500000 0.60000000 0.37500000 0.42857143
## 164 0.10000000 0.09090909 0.22222222 0.00000000 0.37500000
## 165 0.33333333 0.28571429 0.20000000 0.40000000 0.16666667
## 166 0.00000000 0.00000000 0.14285714 0.00000000 0.33333333
## 167 0.42857143 0.35714286 0.11111111 0.33333333 0.09090909
## 168 0.00000000 0.11111111 0.16666667 0.33333333 0.20000000
## 169 0.00000000 0.25000000 0.00000000 0.16666667 0.00000000
## 170 0.42857143 0.11111111 0.30000000 0.12500000 0.10000000
## 171 0.00000000 0.37500000 0.42857143 0.66666667 0.33333333
```

```
## 172 0.25000000 0.22222222 0.25000000 0.33333333 0.10000000
## 173 0.25000000 0.23076923 0.33333333 0.09090909 0.63636364
## 174 0.16666667 0.00000000 0.25000000 0.00000000 0.00000000
## 175 0.11111111 0.54545455 0.15384615 0.18181818 0.25000000
## 176 0.11111111 0.37500000 0.33333333 0.50000000 0.44444444
## 177 0.42857143 0.22222222 0.28571429 0.40000000 0.50000000
## 178 0.33333333 0.27272727 0.18181818 0.20000000 0.07692308
## 179 0.20000000 0.00000000 0.40000000 0.30000000 0.30000000
## 180 0.40000000 0.00000000 0.50000000 0.25000000 0.40000000
## 181 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 182 0.10000000 0.28571429 0.00000000 0.25000000 0.14285714
## 183 0.16666667 0.14285714 0.28571429 0.00000000 0.60000000
## 184 0.80000000 0.14285714 0.50000000 0.42857143 0.25000000
## 185 0.57142857 0.50000000 0.33333333 0.16666667 0.14285714
## 186 0.14285714 0.33333333 0.20000000 0.00000000 0.00000000
## 187 0.22222222 0.00000000 0.37500000 0.37500000 0.25000000
## 188 0.20000000 0.16666667 0.16666667 0.25000000 0.00000000
## 189 0.14285714 0.00000000 0.28571429 0.25000000 0.14285714
## 190 0.44444444 0.30000000 0.20000000 0.36363636 0.20000000
## 191 0.10000000 0.12500000 0.16666667 0.16666667 0.14285714
## 192 0.25000000 0.33333333 0.00000000 0.12500000 0.14285714
## 193 0.16666667 0.25000000 0.00000000 0.00000000 0.16666667
## 194 0.00000000 0.11111111 0.16666667 0.11111111 0.12500000
## 195 0.12500000 0.22222222 0.55555556 0.25000000 0.30000000
## 196 0.25000000 0.00000000 0.00000000 0.00000000 0.00000000
## 197 0.66666667 0.62500000 0.22222222 0.25000000 0.27272727
## 198 0.16666667 0.14285714 0.00000000 0.33333333 0.00000000
## 199 0.33333333 0.10000000 0.14285714 0.20000000 0.00000000
## 200 0.16666667 0.40000000 0.25000000 0.20000000 0.33333333
## 201 0.33333333 0.00000000 0.00000000 0.00000000 0.20000000
## 202 0.44444444 0.44444444 0.10000000 0.55555556 0.55555556
## 203 0.00000000 0.12500000 0.00000000 0.00000000 0.28571429
## 204 0.28571429 0.20000000 0.80000000 0.33333333 0.33333333
## 205 0.33333333 0.25000000 0.37500000 0.00000000 0.25000000
## 206 0.00000000 0.33333333 0.00000000 0.25000000 0.20000000
## 207 0.12500000 0.42857143 0.57142857 0.66666667 0.25000000
## 208 0.57142857 0.20000000 0.33333333 0.20000000 0.12500000
## 209 0.50000000 0.57142857 0.12500000 0.11111111 0.33333333
## 210 0.00000000 0.14285714 0.20000000 0.00000000 0.33333333
## 211 0.25000000 0.00000000 0.20000000 0.33333333 0.25000000
## 212 0.14285714 0.25000000 0.00000000 0.28571429 0.20000000
## 213 0.00000000 0.40000000 0.12500000 0.00000000 0.14285714
## 214 0.30000000 0.28571429 0.00000000 0.50000000 0.33333333
## 215 0.00000000 0.37500000 0.16666667 0.16666667 0.12500000
## 216 0.42857143 0.42857143 0.00000000 0.20000000 0.00000000
## 217 0.40000000 0.25000000 0.20000000 0.00000000 0.00000000
## 218 0.14285714 0.33333333 0.28571429 0.44444444 0.11111111
## 219 0.50000000 0.22222222 0.33333333 0.33333333 0.50000000
## 220 0.16666667 0.30000000 0.42857143 0.20000000 0.25000000
## 221 0.25000000 0.66666667 0.40000000 0.14285714 0.00000000
## 222 0.33333333 0.42857143 0.33333333 0.20000000 0.20000000
## 223 0.00000000 0.00000000 0.25000000 0.00000000 0.14285714
## 224 0.40000000 0.42857143 0.28571429 0.33333333 0.00000000
## 225 0.40000000 0.75000000 0.40000000 0.50000000 0.16666667
## 226 0.50000000 0.50000000 0.33333333 0.57142857 0.50000000
## 227 0.28571429 0.42857143 0.40000000 0.42857143 0.14285714
## 228 0.00000000 0.14285714 0.00000000 0.20000000 0.20000000
## 229 0.20000000 0.00000000 0.16666667 0.00000000 0.00000000
```

```
## 230 0.20000000 0.20000000 0.50000000 0.75000000 0.50000000
## 231 0.00000000 0.16666667 0.00000000 0.10000000 0.20000000
## 232 0.57142857 0.60000000 0.50000000 0.11111111 0.30000000
## 233 0.11111111 0.28571429 0.12500000 0.20000000 0.12500000
## 234 0.66666667 0.40000000 0.40000000 0.75000000 0.50000000
## 235 0.00000000 0.33333333 0.25000000 0.14285714 0.16666667
## 236 0.66666667 0.25000000 0.14285714 0.20000000 0.33333333
## 237 0.00000000 0.00000000 0.00000000 0.00000000 0.12500000
## 238 0.33333333 0.00000000 0.00000000 0.00000000 0.20000000
## 239 0.50000000 0.00000000 0.14285714 0.00000000 0.25000000
## 240 0.00000000 0.50000000 0.20000000 0.14285714 0.33333333
## 241 0.00000000 0.00000000 0.25000000 0.25000000 0.00000000
## 242 0.25000000 0.20000000 0.00000000 0.00000000 0.00000000
## 243 0.25000000 0.50000000 0.00000000 0.20000000 0.25000000
## 244 0.25000000 0.16666667 0.50000000 0.33333333 0.25000000
## 245 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 246 0.33333333 0.00000000 0.00000000 0.00000000 0.33333333
## 247 0.33333333 0.00000000 0.00000000 0.00000000 0.00000000
## 248 0.33333333 0.50000000 0.66666667 0.50000000 0.66666667
## 249 0.60000000 0.40000000 0.60000000 0.20000000 0.20000000
## 250 0.40000000 0.28571429 0.60000000 0.60000000 0.60000000
## 251 0.25000000 0.25000000 0.00000000 0.16666667 0.75000000
## 252 0.00000000 0.00000000 0.00000000        NaN 0.00000000
## 253 0.00000000 0.25000000 0.00000000 0.00000000 0.00000000
## 254 0.00000000 0.25000000 0.20000000 0.25000000 0.33333333
## 255 0.40000000 0.50000000 0.40000000 0.50000000 0.33333333
## 256 0.50000000 0.25000000 0.40000000 0.50000000 0.25000000
## 257 0.00000000 0.42857143 0.14285714 0.14285714 0.25000000
## 258 0.40000000 0.20000000 0.40000000 0.20000000 0.25000000
## 259 0.00000000 0.40000000 0.50000000 0.00000000 0.20000000
## 260 0.50000000 0.33333333 0.00000000 0.20000000 0.33333333
## 261 0.16666667 0.33333333 0.00000000 0.16666667 0.20000000
## 262 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 263 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
## 264 0.25000000 0.25000000 0.25000000 0.25000000 0.25000000
## 265 0.40000000 0.12500000 0.16666667 0.14285714 0.40000000
## 266 0.00000000 0.33333333 0.20000000 0.25000000 0.25000000
## 267 0.33333333 0.50000000 0.50000000 0.00000000 0.33333333
## 268 1.00000000 0.40000000 0.40000000 0.40000000 0.33333333
## 269 0.33333333 0.50000000 0.25000000 0.50000000 0.16666667
## 270 0.33333333 0.50000000 0.16666667 0.20000000 0.25000000
## 271 0.25000000 0.20000000 0.33333333 0.25000000 0.33333333
## 272 0.00000000 0.20000000 0.25000000 0.00000000 0.25000000
## 273 0.00000000 0.00000000 0.25000000 0.33333333 0.20000000
## 274 0.33333333 0.25000000 0.25000000 0.33333333 0.33333333
## 275 0.40000000 0.00000000 0.40000000 0.66666667 0.25000000
## 276 0.36363636 0.33333333 0.25000000 0.38461538 0.50000000
## 277 0.55555556 0.33333333 0.20000000 0.20000000 0.25000000
## 278 0.30769231 0.50000000 0.63636364 0.38461538 0.63636364
## 279 0.00000000 0.25000000 0.40000000 0.27272727 0.18181818
## 280 0.09090909 0.25000000 0.33333333 0.27272727 0.09090909
## 281 0.50000000 0.33333333 0.00000000 0.00000000 0.00000000
## 282 0.33333333 0.18181818 0.25000000 0.42857143 0.00000000
## 283 0.20000000 0.00000000 0.00000000 0.14285714 0.00000000
## 284 0.57142857 0.30000000 0.18181818 0.12500000 0.09090909
## 285 0.00000000 0.33333333 0.20000000 0.00000000 0.40000000
## 286 0.25000000 0.00000000 0.00000000 0.00000000 0.00000000
## 287 0.57142857 0.22222222 0.42857143 0.28571429 0.28571429
```

```
## 288 0.20000000 0.00000000 0.16666667 0.20000000 0.25000000
## 289 0.00000000 0.50000000 0.00000000 0.57142857 0.33333333
## 290 0.28571429 0.25000000 0.20000000 0.25000000 0.00000000
## 291 0.00000000 0.16666667 0.14285714 0.00000000 0.00000000
## 292 0.12500000 0.40000000 0.12500000 0.25000000 0.00000000
## 293 0.60000000 0.75000000 0.16666667 0.66666667 1.00000000
## 294 0.25000000 0.40000000 0.33333333 0.75000000 0.60000000
## 295 0.20000000 0.33333333 0.50000000 0.50000000 0.50000000
## 296 0.33333333 0.25000000 0.28571429 0.25000000 0.00000000
## 297 0.40000000 0.28571429 0.60000000 0.12500000 0.33333333
## 298 0.58333333 0.53846154 0.50000000 0.58333333 0.75000000
## 299 1.00000000 0.33333333 0.50000000 1.00000000 0.25000000
## 300 0.25000000 0.33333333 0.00000000 0.50000000 0.00000000
```

3.2 Spatial Predictions and Projections

3.2.1 ESM Ensemble of Small Models

```
library(biomod2)
```

```
## Loading required package: raster

##
## Attaching package: 'raster'

## The following objects are masked from 'package:ape':
##
##     rotate, zoom

## Loading required package: reshape

## Loading required package: ggplot2

## biomod2 3.3-7 loaded.
##
## Type browseVignettes(package='biomod2') to access directly biomod2 vignettes.
```

```
path.wd<-getwd()
```

```
# species
# occurrences
xy <- inv[,1:2]
head(xy)
```

```
##        x      y
## 1 142.25 -10.25
## 2 142.25 -10.75
## 3 131.25 -11.25
## 4 132.25 -11.25
## 5 142.25 -11.25
## 6 142.75 -11.25
```

```r
sp_occ <- inv[11]

# env
current <- inv[3:7]
head(current)
```

```
##      aetpet    gdd      p      pet     stdp
## 1 0.3180346 7965.1 1595.7 1950.320 137.8134
## 2 0.2807616 7888.9 1693.7 1991.475 156.3950
## 3 0.2638533 8165.3 1595.0 2179.968 127.0621
## 4 0.2790938 8195.6 1346.0 1919.897 114.7686
## 5 0.3030646 7858.1 1711.1 1795.255 158.3286
## 6 0.3217786 7888.5 1711.1 1788.220 151.8030
```

```r
## BIOMOD
setwd(path.wd)
t1 <- Sys.time()
sp<-1
```

```r
### Formating the data with the BIOMOD_FormatingData() function form the package biomod2

myBiomodData <- BIOMOD_FormatingData( resp.var = as.numeric(sp_occ[,sp]),
                                      expl.var = current,
                                      resp.xy = xy,
                                      resp.name = colnames(sp_occ)[sp])
```

```
##
## -=-=-=-=-=-=-=-=-=-=-=-= species_occ Data Formating -=-=-=-=-=-=-=-=-=-=-=-=
##
##  Response variable name was converted into species.occ
## > No pseudo absences selection !
##       ! No data has been set aside for modeling evaluation
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
```

```r
myBiomodOption <- Print_Default_ModelingOptions()
```

```
##
##  Defaut modeling options. copy, change what you want paste it as arg to BIOMOD_ModelingOptions
##
##
## -=-=-=-=-=-=-=-=-=-=-=-=  'BIOMOD.Model.Options'  -=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## GLM = list( type = 'quadratic',
##             interaction.level = 0,
##             myFormula = NULL,
##             test = 'AIC',
##             family = binomial(link = 'logit'),
##             mustart = 0.5,
##             control = glm.control(epsilon = 1e-08, maxit = 50
## , trace = FALSE) ),
##
##
## GBM = list( distribution = 'bernoulli',
##             n.trees = 2500,
##             interaction.depth = 7,
```

```
##             n.minobsinnode = 5,
##             shrinkage = 0.001,
##             bag.fraction = 0.5,
##             train.fraction = 1,
##             cv.folds = 3,
##             keep.data = FALSE,
##             verbose = FALSE,
##             perf.method = 'cv'),
##
## GAM = list( algo = 'GAM_mgcv',
##             type = 's_smoother',
##             k = -1,
##             interaction.level = 0,
##             myFormula = NULL,
##             family = binomial(link = 'logit'),
##             method = 'GCV.Cp',
##             optimizer = c('outer','newton'),
##             select = FALSE,
##             knots = NULL,
##             paraPen = NULL,
##             control = list(nthreads = 1, irls.reg = 0, epsilon = 1e-07
## , maxit = 200, trace = FALSE, mgcv.tol = 1e-07, mgcv.half = 15
## , rank.tol = 1.49011611938477e-08
## , nlm = list(ndigit=7, gradtol=1e-06, stepmax=2, steptol=1e-04, iterlim=200, check.analyticals=0)
## , optim = list(factr=1e+07)
## , newton = list(conv.tol=1e-06, maxNstep=5, maxSstep=2, maxHalf=30, use.svd=0)
## , outerPIsteps = 0, idLinksBases = TRUE, scalePenalty = TRUE
## , keepData = FALSE, scale.est = fletcher, edge.correct = FALSE) ),
##
##
## CTA = list( method = 'class',
##             parms = 'default',
##             cost = NULL,
##             control = list(xval = 5, minbucket = 5, minsplit = 5
## , cp = 0.001, maxdepth = 25) ),
##
##
## ANN = list( NbCV = 5,
##             size = NULL,
##             decay = NULL,
##             rang = 0.1,
##             maxit = 200),
##
## SRE = list( quant = 0.025),
##
## FDA = list( method = 'mars',
##             add_args = NULL),
##
## MARS = list( type = 'simple',
##              interaction.level = 0,
##              myFormula = NULL,
##              nk = NULL,
##              penalty = 2,
##              thresh = 0.001,
##              nprune = NULL,
##              pmethod = 'backward'),
##
## RF = list( do.classif = TRUE,
```

```
##            ntree = 500,
##            mtry = 'default',
##            nodesize = 5,
##            maxnodes = NULL),
##
## MAXENT.Phillips = list( path_to_maxent.jar = 'C:/Users/obroenni/AppData/Local/Temp/RtmpAdePXV/Rbu
##                memory_allocated = 512,
##                background_data_dir = 'default',
##                maximumbackground = 'default',
##                maximumiterations = 200,
##                visible = FALSE,
##                linear = TRUE,
##                quadratic = TRUE,
##                product = TRUE,
##                threshold = TRUE,
##                hinge = TRUE,
##                lq2lqptthreshold = 80,
##                l2lqthreshold = 10,
##                hingethreshold = 15,
##                beta_threshold = -1,
##                beta_categorical = -1,
##                beta_lqp = -1,
##                beta_hinge = -1,
##                betamultiplier = 1,
##                defaultprevalence = 0.5),
##
## MAXENT.Tsuruoka = list( l1_regularizer = 0,
##                         l2_regularizer = 0,
##                         use_sgd = FALSE,
##                         set_heldout = 0,
##                         verbose = FALSE)
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
```

```
myBiomodOption@GLM$test = 'none'
myBiomodOption@GBM$interaction.depth = 2
```

```
### Calibration of simple bivariate models
my.ESM <- ecospat.ESM.Modeling( data=myBiomodData,
                                models=c('GLM','RF'),
                                models.options=myBiomodOption,
                                NbRunEval=1,
                                DataSplit=70,
                                weighting.score=c("AUC"),
                                parallel=F)
```

```
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
```

```
##
## -=-=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.1 Modeling Summary -=-=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( aetpet gdd )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.1_AllData
##
##
## -=-=-=-=-=-=-=- ESM.BIOMOD.1_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.1 ~ 1 + aetpet + I(aetpet^2) + gdd + I(gdd^2)
## <environment: 0x0000000024b4a798>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=-=- ESM.BIOMOD.1_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.1 ~ 1 + aetpet + I(aetpet^2) + gdd + I(gdd^2)
## <environment: 0x0000000022c9f918>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred


##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
```

```
##
## -=-=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.2 Modeling Summary -=-=-=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( aetpet p )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.2_AllData
##
##
## -=-=-=-=-=-=-=- ESM.BIOMOD.2_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.2 ~ 1 + aetpet + I(aetpet^2) + p + I(p^2)
## <environment: 0x0000000020f9f3b8>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=-=- ESM.BIOMOD.2_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.2 ~ 1 + aetpet + I(aetpet^2) + p + I(p^2)
## <environment: 0x00000000206883a8>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
```

```
##
## -=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.3 Modeling Summary -=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( aetpet pet )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.3_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.3_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.3 ~ 1 + aetpet + I(aetpet^2) + pet + I(pet^2)
## <environment: 0x000000001fe1be88>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred


##
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.3_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.3 ~ 1 + aetpet + I(aetpet^2) + pet + I(pet^2)
## <environment: 0x0000000020416e50>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: algorithm did not converge

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred


##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
```

```
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
##
## -=-=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.4 Modeling Summary -=-=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( aetpet stdp )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.4_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.4_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.4 ~ 1 + aetpet + I(aetpet^2) + stdp + I(stdp^2)
## <environment: 0x000000001db13e20>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.4_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.4 ~ 1 + aetpet + I(aetpet^2) + stdp + I(stdp^2)
## <environment: 0x000000001e073120>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
```

```
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
##
## -=-=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.5 Modeling Summary -=-=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( gdd p )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.5_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.5_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.5 ~ 1 + gdd + I(gdd^2) + p + I(p^2)
## <environment: 0x000000001fe25f30>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

##
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.5_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.5 ~ 1 + gdd + I(gdd^2) + p + I(p^2)
## <environment: 0x000000001e98dcf0>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

##
##  Evaluating Model stuff...
```

```
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
##
## -=-=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.6 Modeling Summary -=-=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( gdd pet )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.6_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.6_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.6 ~ 1 + gdd + I(gdd^2) + pet + I(pet^2)
## <environment: 0x0000000020b2ba60>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.6_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.6 ~ 1 + gdd + I(gdd^2) + pet + I(pet^2)
## <environment: 0x000000001ffa3a38>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: algorithm did not converge

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
##
## -=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.7 Modeling Summary -=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( gdd stdp )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.7_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.7_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.7 ~ 1 + gdd + I(gdd^2) + stdp + I(stdp^2)
## <environment: 0x0000000025dedf10>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.7_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.7 ~ 1 + gdd + I(gdd^2) + stdp + I(stdp^2)
## <environment: 0x00000000242ea6a8>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
##
## -=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.8 Modeling Summary -=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( p pet )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.8_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.8_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.8 ~ 1 + p + I(p^2) + pet + I(pet^2)
## <environment: 0x00000000208f1008>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.8_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.8 ~ 1 + p + I(p^2) + pet + I(pet^2)
## <environment: 0x00000000266dbd78>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
##
## -=-=-=-=-=-=-=-=-= ESM.BIOMOD.9 Modeling Summary -=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( p stdp )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.9_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.9_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.9 ~ 1 + p + I(p^2) + stdp + I(stdp^2)
## <environment: 0x0000000020cb5d98>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.9_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.9 ~ 1 + p + I(p^2) + stdp + I(stdp^2)
## <environment: 0x0000000023f361c8>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## Loading required library...
##
## Checking Models arguments...
##
## ! User defined data-split table was given -> NbRunEval, DataSplit and do.full.models argument wil
## Creating suitable Workdir...
##
##  > Automatic weights creation to rise a 0.5 prevalence
##
##
## -=-=-=-=-=-=-=-=-=-= ESM.BIOMOD.10 Modeling Summary -=-=-=-=-=-=-=-=-=-=
##
##  2  environmental variables ( pet stdp )
## Number of evaluation repetitions : 2
## Models selected : GLM RF
##
## Total number of model runs : 4
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##
## -=-=-=- Run :  ESM.BIOMOD.10_AllData
##
##
## -=-=-=-=-=-=- ESM.BIOMOD.10_AllData_RUN1
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.10 ~ 1 + pet + I(pet^2) + stdp + I(stdp^2)
## <environment: 0x0000000020789220>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...
##  Evaluating Model stuff...
##
## -=-=-=-=-=-=- ESM.BIOMOD.10_AllData_RUN2
##
## Model=GLM ( quadratic with no interaction )
##  No stepwise procedure
##  ! You might be confronted to models convergence issues !
##  selected formula : ESM.BIOMOD.10 ~ 1 + pet + I(pet^2) + stdp + I(stdp^2)
## <environment: 0x00000000266dc3d0>
##
##  Model scaling...
##  Evaluating Model stuff...
## Model=Breiman and Cutler's random forests for classification and regression
##  Model scaling...

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
```

```
##
##  Evaluating Model stuff...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
```

```
### Evaluation and average of simple bivariate models to ESMs
my.ESM_EF <- ecospat.ESM.EnsembleModeling(my.ESM,weighting.score=c("SomersD"),threshold=0)
```

```
### Projection of simple bivariate models into new space
my.ESM_proj_current <- ecospat.ESM.Projection(ESM.modeling.output=my.ESM,
                                              new.env=current)
```

```
##
## -=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.1_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.1_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.2_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.2_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.3_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.3_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.4_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.4_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.5_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.5_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.6_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.6_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.7_AllData_RUN2_GLM ...
```

```
##  > Projecting ESM.BIOMOD.7_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.8_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.8_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.9_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.9_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Do Models Projections -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
##
##      ! 'do.stack' arg is always set as TRUE for data.frame/matrix dataset
##  > Projecting ESM.BIOMOD.10_AllData_RUN2_GLM ...
##  > Projecting ESM.BIOMOD.10_AllData_RUN2_RF ...
## -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-= Done -=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=
```

```
### Projection of calibrated ESMs into new space
my.ESM_EFproj_current <- ecospat.ESM.EnsembleProjection(ESM.prediction.output=my.ESM_proj_current,
                                                        ESM.EnsembleModeling.output=my.ESM_EF)
```

3.3 Spatial prediction of communities

Input data for the first argument (proba) as data frame of rough probabilities from SDMs for all species in columns in the considered sites in rows.

```
proba <- ecospat.testData[,73:92]
```

Input data for the second argument (sr) as data frame with richness value in the first column and sites.

```
sr <- as.data.frame(rowSums(proba))
```

3.4 SESAM framework with *ecospat.SESAM.prr()*

```
ecospat.SESAM.prr(proba, sr)
```

```
## [1] "test.prr, processing row 1"
## [1] "test.prr, processing row 2"
## [1] "test.prr, processing row 3"
## [1] "test.prr, processing row 4"
## [1] "test.prr, processing row 5"
## [1] "test.prr, processing row 6"
## [1] "test.prr, processing row 7"
## [1] "test.prr, processing row 8"
## [1] "test.prr, processing row 9"
## [1] "test.prr, processing row 10"
```

```
## [1] "test.prr, processing row 11"
## [1] "test.prr, processing row 12"
## [1] "test.prr, processing row 13"
## [1] "test.prr, processing row 14"
## [1] "test.prr, processing row 15"
## [1] "test.prr, processing row 16"
## [1] "test.prr, processing row 17"
## [1] "test.prr, processing row 18"
## [1] "test.prr, processing row 19"
## [1] "test.prr, processing row 20"
## [1] "test.prr, processing row 21"
## [1] "test.prr, processing row 22"
## [1] "test.prr, processing row 23"
## [1] "test.prr, processing row 24"
## [1] "test.prr, processing row 25"
## [1] "test.prr, processing row 26"
## [1] "test.prr, processing row 27"
## [1] "test.prr, processing row 28"
## [1] "test.prr, processing row 29"
## [1] "test.prr, processing row 30"
## [1] "test.prr, processing row 31"
## [1] "test.prr, processing row 32"
## [1] "test.prr, processing row 33"
## [1] "test.prr, processing row 34"
## [1] "test.prr, processing row 35"
## [1] "test.prr, processing row 36"
## [1] "test.prr, processing row 37"
## [1] "test.prr, processing row 38"
## [1] "test.prr, processing row 39"
## [1] "test.prr, processing row 40"
## [1] "test.prr, processing row 41"
## [1] "test.prr, processing row 42"
## [1] "test.prr, processing row 43"
## [1] "test.prr, processing row 44"
## [1] "test.prr, processing row 45"
## [1] "test.prr, processing row 46"
## [1] "test.prr, processing row 47"
## [1] "test.prr, processing row 48"
## [1] "test.prr, processing row 49"
## [1] "test.prr, processing row 50"
## [1] "test.prr, processing row 51"
## [1] "test.prr, processing row 52"
## [1] "test.prr, processing row 53"
## [1] "test.prr, processing row 54"
## [1] "test.prr, processing row 55"
## [1] "test.prr, processing row 56"
## [1] "test.prr, processing row 57"
## [1] "test.prr, processing row 58"
## [1] "test.prr, processing row 59"
## [1] "test.prr, processing row 60"
## [1] "test.prr, processing row 61"
## [1] "test.prr, processing row 62"
## [1] "test.prr, processing row 63"
## [1] "test.prr, processing row 64"
## [1] "test.prr, processing row 65"
## [1] "test.prr, processing row 66"
## [1] "test.prr, processing row 67"
## [1] "test.prr, processing row 68"
```

```
## [1] "test.prr, processing row 69"
## [1] "test.prr, processing row 70"
## [1] "test.prr, processing row 71"
## [1] "test.prr, processing row 72"
## [1] "test.prr, processing row 73"
## [1] "test.prr, processing row 74"
## [1] "test.prr, processing row 75"
## [1] "test.prr, processing row 76"
## [1] "test.prr, processing row 77"
## [1] "test.prr, processing row 78"
## [1] "test.prr, processing row 79"
## [1] "test.prr, processing row 80"
## [1] "test.prr, processing row 81"
## [1] "test.prr, processing row 82"
## [1] "test.prr, processing row 83"
## [1] "test.prr, processing row 84"
## [1] "test.prr, processing row 85"
## [1] "test.prr, processing row 86"
## [1] "test.prr, processing row 87"
## [1] "test.prr, processing row 88"
## [1] "test.prr, processing row 89"
## [1] "test.prr, processing row 90"
## [1] "test.prr, processing row 91"
## [1] "test.prr, processing row 92"
## [1] "test.prr, processing row 93"
## [1] "test.prr, processing row 94"
## [1] "test.prr, processing row 95"
## [1] "test.prr, processing row 96"
## [1] "test.prr, processing row 97"
## [1] "test.prr, processing row 98"
## [1] "test.prr, processing row 99"
## [1] "test.prr, processing row 100"
## [1] "test.prr, processing row 101"
## [1] "test.prr, processing row 102"
## [1] "test.prr, processing row 103"
## [1] "test.prr, processing row 104"
## [1] "test.prr, processing row 105"
## [1] "test.prr, processing row 106"
## [1] "test.prr, processing row 107"
## [1] "test.prr, processing row 108"
## [1] "test.prr, processing row 109"
## [1] "test.prr, processing row 110"
## [1] "test.prr, processing row 111"
## [1] "test.prr, processing row 112"
## [1] "test.prr, processing row 113"
## [1] "test.prr, processing row 114"
## [1] "test.prr, processing row 115"
## [1] "test.prr, processing row 116"
## [1] "test.prr, processing row 117"
## [1] "test.prr, processing row 118"
## [1] "test.prr, processing row 119"
## [1] "test.prr, processing row 120"
## [1] "test.prr, processing row 121"
## [1] "test.prr, processing row 122"
## [1] "test.prr, processing row 123"
## [1] "test.prr, processing row 124"
## [1] "test.prr, processing row 125"
## [1] "test.prr, processing row 126"
```

```
## [1] "test.prr, processing row 127"
## [1] "test.prr, processing row 128"
## [1] "test.prr, processing row 129"
## [1] "test.prr, processing row 130"
## [1] "test.prr, processing row 131"
## [1] "test.prr, processing row 132"
## [1] "test.prr, processing row 133"
## [1] "test.prr, processing row 134"
## [1] "test.prr, processing row 135"
## [1] "test.prr, processing row 136"
## [1] "test.prr, processing row 137"
## [1] "test.prr, processing row 138"
## [1] "test.prr, processing row 139"
## [1] "test.prr, processing row 140"
## [1] "test.prr, processing row 141"
## [1] "test.prr, processing row 142"
## [1] "test.prr, processing row 143"
## [1] "test.prr, processing row 144"
## [1] "test.prr, processing row 145"
## [1] "test.prr, processing row 146"
## [1] "test.prr, processing row 147"
## [1] "test.prr, processing row 148"
## [1] "test.prr, processing row 149"
## [1] "test.prr, processing row 150"
## [1] "test.prr, processing row 151"
## [1] "test.prr, processing row 152"
## [1] "test.prr, processing row 153"
## [1] "test.prr, processing row 154"
## [1] "test.prr, processing row 155"
## [1] "test.prr, processing row 156"
## [1] "test.prr, processing row 157"
## [1] "test.prr, processing row 158"
## [1] "test.prr, processing row 159"
## [1] "test.prr, processing row 160"
## [1] "test.prr, processing row 161"
## [1] "test.prr, processing row 162"
## [1] "test.prr, processing row 163"
## [1] "test.prr, processing row 164"
## [1] "test.prr, processing row 165"
## [1] "test.prr, processing row 166"
## [1] "test.prr, processing row 167"
## [1] "test.prr, processing row 168"
## [1] "test.prr, processing row 169"
## [1] "test.prr, processing row 170"
## [1] "test.prr, processing row 171"
## [1] "test.prr, processing row 172"
## [1] "test.prr, processing row 173"
## [1] "test.prr, processing row 174"
## [1] "test.prr, processing row 175"
## [1] "test.prr, processing row 176"
## [1] "test.prr, processing row 177"
## [1] "test.prr, processing row 178"
## [1] "test.prr, processing row 179"
## [1] "test.prr, processing row 180"
## [1] "test.prr, processing row 181"
## [1] "test.prr, processing row 182"
## [1] "test.prr, processing row 183"
## [1] "test.prr, processing row 184"
```

```
## [1] "test.prr, processing row 185"
## [1] "test.prr, processing row 186"
## [1] "test.prr, processing row 187"
## [1] "test.prr, processing row 188"
## [1] "test.prr, processing row 189"
## [1] "test.prr, processing row 190"
## [1] "test.prr, processing row 191"
## [1] "test.prr, processing row 192"
## [1] "test.prr, processing row 193"
## [1] "test.prr, processing row 194"
## [1] "test.prr, processing row 195"
## [1] "test.prr, processing row 196"
## [1] "test.prr, processing row 197"
## [1] "test.prr, processing row 198"
## [1] "test.prr, processing row 199"
## [1] "test.prr, processing row 200"
## [1] "test.prr, processing row 201"
## [1] "test.prr, processing row 202"
## [1] "test.prr, processing row 203"
## [1] "test.prr, processing row 204"
## [1] "test.prr, processing row 205"
## [1] "test.prr, processing row 206"
## [1] "test.prr, processing row 207"
## [1] "test.prr, processing row 208"
## [1] "test.prr, processing row 209"
## [1] "test.prr, processing row 210"
## [1] "test.prr, processing row 211"
## [1] "test.prr, processing row 212"
## [1] "test.prr, processing row 213"
## [1] "test.prr, processing row 214"
## [1] "test.prr, processing row 215"
## [1] "test.prr, processing row 216"
## [1] "test.prr, processing row 217"
## [1] "test.prr, processing row 218"
## [1] "test.prr, processing row 219"
## [1] "test.prr, processing row 220"
## [1] "test.prr, processing row 221"
## [1] "test.prr, processing row 222"
## [1] "test.prr, processing row 223"
## [1] "test.prr, processing row 224"
## [1] "test.prr, processing row 225"
## [1] "test.prr, processing row 226"
## [1] "test.prr, processing row 227"
## [1] "test.prr, processing row 228"
## [1] "test.prr, processing row 229"
## [1] "test.prr, processing row 230"
## [1] "test.prr, processing row 231"
## [1] "test.prr, processing row 232"
## [1] "test.prr, processing row 233"
## [1] "test.prr, processing row 234"
## [1] "test.prr, processing row 235"
## [1] "test.prr, processing row 236"
## [1] "test.prr, processing row 237"
## [1] "test.prr, processing row 238"
## [1] "test.prr, processing row 239"
## [1] "test.prr, processing row 240"
## [1] "test.prr, processing row 241"
## [1] "test.prr, processing row 242"
```

```
## [1] "test.prr, processing row 243"
## [1] "test.prr, processing row 244"
## [1] "test.prr, processing row 245"
## [1] "test.prr, processing row 246"
## [1] "test.prr, processing row 247"
## [1] "test.prr, processing row 248"
## [1] "test.prr, processing row 249"
## [1] "test.prr, processing row 250"
## [1] "test.prr, processing row 251"
## [1] "test.prr, processing row 252"
## [1] "test.prr, processing row 253"
## [1] "test.prr, processing row 254"
## [1] "test.prr, processing row 255"
## [1] "test.prr, processing row 256"
## [1] "test.prr, processing row 257"
## [1] "test.prr, processing row 258"
## [1] "test.prr, processing row 259"
## [1] "test.prr, processing row 260"
## [1] "test.prr, processing row 261"
## [1] "test.prr, processing row 262"
## [1] "test.prr, processing row 263"
## [1] "test.prr, processing row 264"
## [1] "test.prr, processing row 265"
## [1] "test.prr, processing row 266"
## [1] "test.prr, processing row 267"
## [1] "test.prr, processing row 268"
## [1] "test.prr, processing row 269"
## [1] "test.prr, processing row 270"
## [1] "test.prr, processing row 271"
## [1] "test.prr, processing row 272"
## [1] "test.prr, processing row 273"
## [1] "test.prr, processing row 274"
## [1] "test.prr, processing row 275"
## [1] "test.prr, processing row 276"
## [1] "test.prr, processing row 277"
## [1] "test.prr, processing row 278"
## [1] "test.prr, processing row 279"
## [1] "test.prr, processing row 280"
## [1] "test.prr, processing row 281"
## [1] "test.prr, processing row 282"
## [1] "test.prr, processing row 283"
## [1] "test.prr, processing row 284"
## [1] "test.prr, processing row 285"
## [1] "test.prr, processing row 286"
## [1] "test.prr, processing row 287"
## [1] "test.prr, processing row 288"
## [1] "test.prr, processing row 289"
## [1] "test.prr, processing row 290"
## [1] "test.prr, processing row 291"
## [1] "test.prr, processing row 292"
## [1] "test.prr, processing row 293"
## [1] "test.prr, processing row 294"
## [1] "test.prr, processing row 295"
## [1] "test.prr, processing row 296"
## [1] "test.prr, processing row 297"
## [1] "test.prr, processing row 298"
## [1] "test.prr, processing row 299"
## [1] "test.prr, processing row 300"
```

```
##     glm_Agrostis_capillaris glm_Leontodon_hispidus_sl
## 1                         0                         1
## 2                         1                         0
## 3                         1                         0
## 4                         1                         0
## 5                         1                         0
## 6                         1                         0
## 7                         1                         0
## 8                         1                         0
## 9                         1                         0
## 10                        0                         0
## 11                        1                         0
## 12                        1                         0
## 13                        1                         0
## 14                        1                         0
## 15                        1                         0
## 16                        0                         0
## 17                        1                         0
## 18                        1                         0
## 19                        0                         0
## 20                        1                         0
## 21                        1                         0
## 22                        1                         0
## 23                        1                         0
## 24                        0                         0
## 25                        1                         0
## 26                        1                         0
## 27                        1                         0
## 28                        1                         0
## 29                        1                         0
## 30                        1                         0
## 31                        1                         0
## 32                        1                         0
## 33                        1                         0
## 34                        1                         0
## 35                        1                         0
## 36                        1                         0
## 37                        0                         0
## 38                        1                         1
## 39                        1                         0
## 40                        1                         0
## 41                        1                         0
## 42                        1                         0
## 43                        1                         0
## 44                        0                         0
## 45                        1                         0
## 46                        1                         0
## 47                        0                         0
## 48                        1                         0
## 49                        1                         0
## 50                        1                         0
## 51                        0                         0
## 52                        1                         0
## 53                        1                         1
## 54                        1                         1
## 55                        1                         0
## 56                        1                         0
## 57                        1                         1
```

```
## 58                   1                   1
## 59                   1                   0
## 60                   1                   0
## 61                   0                   0
## 62                   0                   0
## 63                   1                   0
## 64                   1                   0
## 65                   1                   0
## 66                   1                   0
## 67                   1                   1
## 68                   0                   0
## 69                   1                   0
## 70                   1                   1
## 71                   1                   1
## 72                   1                   1
## 73                   1                   1
## 74                   1                   1
## 75                   1                   0
## 76                   0                   0
## 77                   1                   1
## 78                   1                   1
## 79                   1                   1
## 80                   1                   0
## 81                   1                   1
## 82                   1                   1
## 83                   1                   0
## 84                   1                   0
## 85                   1                   1
## 86                   1                   1
## 87                   1                   1
## 88                   1                   1
## 89                   1                   1
## 90                   1                   0
## 91                   1                   0
## 92                   1                   1
## 93                   1                   1
## 94                   1                   1
## 95                   1                   1
## 96                   1                   0
## 97                   1                   1
## 98                   1                   0
## 99                   1                   1
## 100                  1                   0
## 101                  1                   1
## 102                  1                   1
## 103                  1                   1
## 104                  1                   1
## 105                  0                   0
## 106                  1                   0
## 107                  1                   1
## 108                  1                   1
## 109                  1                   1
## 110                  1                   1
## 111                  1                   1
## 112                  1                   1
## 113                  1                   1
## 114                  1                   1
## 115                  1                   1
```

```
## 116                    1                    1
## 117                    1                    1
## 118                    1                    1
## 119                    1                    1
## 120                    1                    0
## 121                    1                    1
## 122                    1                    1
## 123                    1                    1
## 124                    1                    0
## 125                    1                    1
## 126                    1                    1
## 127                    1                    1
## 128                    1                    1
## 129                    1                    1
## 130                    1                    1
## 131                    1                    1
## 132                    1                    1
## 133                    1                    1
## 134                    1                    1
## 135                    1                    1
## 136                    1                    1
## 137                    1                    1
## 138                    1                    1
## 139                    1                    1
## 140                    1                    1
## 141                    1                    1
## 142                    1                    0
## 143                    1                    1
## 144                    1                    1
## 145                    0                    1
## 146                    1                    1
## 147                    1                    1
## 148                    1                    1
## 149                    1                    1
## 150                    0                    1
## 151                    1                    1
## 152                    1                    1
## 153                    1                    1
## 154                    0                    1
## 155                    1                    1
## 156                    1                    1
## 157                    0                    1
## 158                    1                    1
## 159                    1                    1
## 160                    1                    1
## 161                    1                    1
## 162                    1                    1
## 163                    1                    1
## 164                    1                    1
## 165                    1                    1
## 166                    1                    1
## 167                    1                    1
## 168                    1                    1
## 169                    1                    1
## 170                    1                    1
## 171                    1                    1
## 172                    1                    1
## 173                    1                    1
```

```
## 174                1                1
## 175                1                1
## 176                1                1
## 177                1                0
## 178                1                1
## 179                1                1
## 180                1                1
## 181                1                1
## 182                1                1
## 183                1                1
## 184                1                1
## 185                1                1
## 186                0                1
## 187                1                1
## 188                1                1
## 189                0                1
## 190                1                1
## 191                1                1
## 192                0                1
## 193                0                1
## 194                1                1
## 195                1                1
## 196                1                1
## 197                1                1
## 198                0                1
## 199                1                1
## 200                0                1
## 201                1                1
## 202                1                1
## 203                1                1
## 204                0                1
## 205                1                1
## 206                1                1
## 207                0                0
## 208                1                1
## 209                1                1
## 210                0                1
## 211                1                0
## 212                0                1
## 213                0                1
## 214                1                1
## 215                1                1
## 216                0                1
## 217                1                1
## 218                1                1
## 219                0                1
## 220                0                1
## 221                0                1
## 222                1                1
## 223                1                0
## 224                1                1
## 225                0                1
## 226                0                1
## 227                0                1
## 228                0                0
## 229                0                1
## 230                0                1
## 231                0                1
```

```
## 232                0                1
## 233                0                1
## 234                0                1
## 235                0                0
## 236                0                1
## 237                0                1
## 238                0                0
## 239                0                1
## 240                0                1
## 241                0                0
## 242                0                0
## 243                0                1
## 244                0                1
## 245                0                1
## 246                0                1
## 247                0                0
## 248                0                0
## 249                0                1
## 250                0                1
## 251                0                1
## 252                0                1
## 253                0                0
## 254                0                0
## 255                0                0
## 256                0                1
## 257                0                0
## 258                0                0
## 259                0                0
## 260                0                0
## 261                0                0
## 262                0                0
## 263                0                0
## 264                0                0
## 265                0                0
## 266                0                0
## 267                0                0
## 268                0                0
## 269                0                0
## 270                0                0
## 271                0                0
## 272                0                0
## 273                0                0
## 274                0                0
## 275                0                1
## 276                1                1
## 277                1                0
## 278                1                1
## 279                1                1
## 280                1                1
## 281                1                1
## 282                1                1
## 283                1                0
## 284                1                1
## 285                1                1
## 286                1                1
## 287                0                1
## 288                0                1
## 289                0                1
```

```
## 290                         1                          1
## 291                         0                          1
## 292                         0                          1
## 293                         0                          1
## 294                         0                          1
## 295                         0                          1
## 296                         0                          0
## 297                         0                          0
## 298                         1                          0
## 299                         0                          0
## 300                         0                          0
##     glm_Dactylis_glomerata glm_Trifolium_repens_sstr
## 1                        1                         0
## 2                        1                         1
## 3                        1                         1
## 4                        1                         1
## 5                        1                         1
## 6                        1                         1
## 7                        1                         1
## 8                        1                         1
## 9                        1                         0
## 10                       1                         1
## 11                       1                         1
## 12                       1                         1
## 13                       1                         1
## 14                       1                         1
## 15                       1                         1
## 16                       1                         1
## 17                       1                         1
## 18                       1                         1
## 19                       1                         1
## 20                       1                         1
## 21                       1                         1
## 22                       1                         1
## 23                       1                         1
## 24                       1                         1
## 25                       1                         0
## 26                       1                         0
## 27                       1                         0
## 28                       1                         1
## 29                       1                         1
## 30                       1                         1
## 31                       1                         1
## 32                       1                         1
## 33                       1                         1
## 34                       1                         1
## 35                       1                         1
## 36                       1                         1
## 37                       1                         1
## 38                       1                         1
## 39                       1                         1
## 40                       1                         1
## 41                       1                         1
## 42                       1                         1
## 43                       1                         1
## 44                       1                         1
## 45                       1                         1
## 46                       1                         1
```

```
## 47                   1                   1
## 48                   1                   1
## 49                   1                   1
## 50                   1                   1
## 51                   1                   1
## 52                   1                   1
## 53                   1                   1
## 54                   1                   1
## 55                   1                   1
## 56                   1                   1
## 57                   1                   1
## 58                   1                   1
## 59                   1                   1
## 60                   1                   1
## 61                   1                   0
## 62                   1                   1
## 63                   1                   0
## 64                   1                   0
## 65                   1                   0
## 66                   1                   0
## 67                   1                   0
## 68                   1                   0
## 69                   1                   1
## 70                   1                   0
## 71                   1                   1
## 72                   1                   0
## 73                   1                   1
## 74                   1                   1
## 75                   1                   0
## 76                   1                   0
## 77                   1                   1
## 78                   1                   1
## 79                   1                   1
## 80                   1                   1
## 81                   1                   1
## 82                   0                   1
## 83                   1                   1
## 84                   0                   0
## 85                   1                   1
## 86                   0                   0
## 87                   1                   1
## 88                   1                   1
## 89                   1                   1
## 90                   1                   1
## 91                   1                   1
## 92                   1                   1
## 93                   1                   1
## 94                   1                   1
## 95                   1                   1
## 96                   1                   0
## 97                   1                   1
## 98                   1                   1
## 99                   1                   1
## 100                  1                   1
## 101                  1                   1
## 102                  1                   0
## 103                  1                   1
## 104                  1                   0
```

```
## 105                1                0
## 106                1                0
## 107                1                0
## 108                1                1
## 109                1                0
## 110                1                0
## 111                1                0
## 112                1                0
## 113                1                0
## 114                1                0
## 115                1                1
## 116                1                1
## 117                1                0
## 118                1                1
## 119                0                1
## 120                0                1
## 121                0                1
## 122                1                1
## 123                0                0
## 124                0                0
## 125                0                0
## 126                1                1
## 127                0                0
## 128                1                1
## 129                0                0
## 130                1                1
## 131                1                1
## 132                1                1
## 133                1                1
## 134                1                1
## 135                1                0
## 136                1                0
## 137                1                1
## 138                1                1
## 139                1                1
## 140                0                0
## 141                0                0
## 142                0                1
## 143                1                1
## 144                0                0
## 145                1                0
## 146                1                0
## 147                1                0
## 148                1                0
## 149                1                0
## 150                1                0
## 151                1                0
## 152                1                0
## 153                1                0
## 154                1                0
## 155                0                0
## 156                0                0
## 157                0                1
## 158                0                1
## 159                0                1
## 160                0                0
## 161                0                1
## 162                0                0
```

```
## 163                0                0
## 164                0                1
## 165                0                0
## 166                0                1
## 167                1                1
## 168                0                0
## 169                0                0
## 170                0                0
## 171                0                1
## 172                0                1
## 173                1                0
## 174                0                0
## 175                1                1
## 176                0                0
## 177                0                0
## 178                0                0
## 179                1                0
## 180                0                0
## 181                0                0
## 182                0                0
## 183                0                0
## 184                0                0
## 185                0                0
## 186                1                0
## 187                1                0
## 188                0                0
## 189                1                0
## 190                1                0
## 191                0                0
## 192                1                0
## 193                0                0
## 194                0                0
## 195                0                0
## 196                0                0
## 197                0                0
## 198                0                0
## 199                0                0
## 200                0                1
## 201                0                0
## 202                0                0
## 203                1                0
## 204                0                0
## 205                0                0
## 206                0                0
## 207                0                0
## 208                0                0
## 209                1                0
## 210                1                0
## 211                0                0
## 212                0                0
## 213                0                0
## 214                0                0
## 215                0                0
## 216                1                0
## 217                1                0
## 218                0                0
## 219                0                0
## 220                0                0
```

```
## 221                0                0
## 222                0                0
## 223                0                0
## 224                0                0
## 225                0                0
## 226                0                0
## 227                0                0
## 228                0                0
## 229                0                0
## 230                0                0
## 231                0                0
## 232                0                0
## 233                0                0
## 234                0                0
## 235                0                0
## 236                0                0
## 237                0                0
## 238                0                0
## 239                0                0
## 240                0                0
## 241                0                0
## 242                0                0
## 243                0                0
## 244                0                0
## 245                0                0
## 246                0                0
## 247                0                0
## 248                0                0
## 249                0                0
## 250                0                0
## 251                0                0
## 252                0                0
## 253                0                0
## 254                0                0
## 255                0                0
## 256                0                0
## 257                0                0
## 258                0                0
## 259                0                0
## 260                0                0
## 261                0                0
## 262                0                0
## 263                0                0
## 264                0                0
## 265                0                0
## 266                0                0
## 267                0                0
## 268                0                0
## 269                0                0
## 270                0                0
## 271                0                0
## 272                0                0
## 273                0                0
## 274                0                0
## 275                0                0
## 276                1                1
## 277                1                1
## 278                1                1
```

```
## 279                      1                       1
## 280                      0                       0
## 281                      0                       0
## 282                      0                       0
## 283                      0                       0
## 284                      0                       1
## 285                      0                       0
## 286                      0                       1
## 287                      0                       0
## 288                      0                       0
## 289                      0                       0
## 290                      0                       0
## 291                      0                       0
## 292                      0                       0
## 293                      0                       0
## 294                      0                       0
## 295                      0                       0
## 296                      0                       0
## 297                      0                       0
## 298                      1                       1
## 299                      0                       0
## 300                      0                       0
##     glm_Geranium_sylvaticum glm_Ranunculus_acris_sl glm_Prunella_vulgaris
## 1                         0                       0                     0
## 2                         1                       1                     1
## 3                         1                       1                     1
## 4                         1                       1                     1
## 5                         1                       1                     1
## 6                         1                       1                     1
## 7                         1                       1                     1
## 8                         1                       1                     1
## 9                         0                       1                     1
## 10                        0                       1                     1
## 11                        0                       1                     1
## 12                        0                       1                     1
## 13                        0                       1                     1
## 14                        1                       1                     1
## 15                        1                       1                     1
## 16                        1                       1                     1
## 17                        1                       1                     1
## 18                        0                       1                     1
## 19                        0                       1                     1
## 20                        1                       1                     0
## 21                        1                       1                     1
## 22                        1                       1                     1
## 23                        1                       1                     1
## 24                        0                       1                     1
## 25                        1                       1                     1
## 26                        0                       1                     1
## 27                        0                       1                     1
## 28                        1                       1                     1
## 29                        1                       1                     1
## 30                        1                       1                     1
## 31                        1                       1                     1
## 32                        1                       1                     1
## 33                        0                       1                     1
## 34                        1                       1                     0
## 35                        0                       1                     1
```

```
## 36  1  1  0
## 37  0  1  1
## 38  1  0  0
## 39  0  1  1
## 40  1  1  1
## 41  1  1  1
## 42  1  1  1
## 43  0  1  1
## 44  0  1  1
## 45  1  1  1
## 46  1  1  1
## 47  0  1  1
## 48  1  1  1
## 49  0  1  1
## 50  1  1  1
## 51  0  1  1
## 52  0  1  1
## 53  0  1  0
## 54  1  1  0
## 55  1  1  0
## 56  1  1  0
## 57  1  1  0
## 58  1  1  1
## 59  1  1  1
## 60  1  1  1
## 61  0  1  1
## 62  0  1  1
## 63  0  1  1
## 64  0  1  1
## 65  0  1  1
## 66  0  1  1
## 67  0  0  0
## 68  0  1  1
## 69  1  0  1
## 70  0  0  1
## 71  1  0  0
## 72  0  0  0
## 73  0  0  0
## 74  0  0  0
## 75  0  1  1
## 76  0  1  1
## 77  1  1  0
## 78  1  1  1
## 79  1  1  0
## 80  0  1  1
## 81  1  1  0
## 82  0  1  0
## 83  1  1  0
## 84  0  1  1
## 85  1  1  1
## 86  1  1  1
## 87  1  1  1
## 88  0  0  0
## 89  1  0  0
## 90  1  1  1
## 91  1  1  0
## 92  0  0  0
## 93  1  1  0
```

```
## 94                1                1                0
## 95                1                1                0
## 96                0                1                1
## 97                1                0                0
## 98                1                1                0
## 99                1                0                0
## 100               1                1                0
## 101               1                0                0
## 102               1                0                1
## 103               1                1                1
## 104               1                0                0
## 105               0                1                1
## 106               0                0                1
## 107               0                0                0
## 108               1                0                1
## 109               1                0                0
## 110               0                0                0
## 111               0                0                0
## 112               1                0                0
## 113               0                0                0
## 114               1                0                0
## 115               0                0                0
## 116               1                0                1
## 117               1                0                0
## 118               1                0                0
## 119               0                1                0
## 120               1                1                0
## 121               1                1                0
## 122               1                1                0
## 123               0                0                0
## 124               0                1                1
## 125               0                0                0
## 126               1                0                0
## 127               0                1                0
## 128               1                1                0
## 129               1                0                1
## 130               1                0                0
## 131               1                0                0
## 132               0                0                0
## 133               0                0                0
## 134               1                0                0
## 135               0                0                0
## 136               0                0                0
## 137               1                0                0
## 138               0                1                0
## 139               1                0                0
## 140               1                0                0
## 141               0                0                0
## 142               0                1                1
## 143               1                0                0
## 144               0                0                0
## 145               0                0                0
## 146               0                0                0
## 147               0                0                0
## 148               0                0                0
## 149               0                0                0
## 150               0                0                0
## 151               0                0                0
```

```
## 152                1                0                0
## 153                1                0                0
## 154                0                0                0
## 155                0                0                0
## 156                0                0                1
## 157                0                0                0
## 158                0                0                0
## 159                0                0                0
## 160                0                1                0
## 161                0                1                0
## 162                0                0                0
## 163                0                0                0
## 164                1                0                0
## 165                0                0                0
## 166                1                0                0
## 167                0                0                0
## 168                0                0                0
## 169                0                0                0
## 170                0                0                1
## 171                1                0                0
## 172                0                0                0
## 173                0                0                0
## 174                0                0                0
## 175                1                0                0
## 176                1                0                0
## 177                0                0                0
## 178                0                0                0
## 179                0                0                0
## 180                0                0                0
## 181                0                0                0
## 182                0                0                0
## 183                0                0                0
## 184                0                0                0
## 185                0                0                0
## 186                0                0                0
## 187                0                0                0
## 188                0                0                0
## 189                0                0                0
## 190                1                0                0
## 191                0                0                0
## 192                0                0                0
## 193                0                0                0
## 194                0                0                0
## 195                0                0                0
## 196                0                0                0
## 197                0                0                0
## 198                0                0                0
## 199                0                0                0
## 200                0                0                0
## 201                0                0                0
## 202                0                0                0
## 203                0                0                0
## 204                0                0                0
## 205                0                0                0
## 206                0                0                0
## 207                0                0                0
## 208                0                0                0
## 209                0                0                0
```

```
## 210  1  0  0
## 211  0  0  0
## 212  0  0  0
## 213  0  0  0
## 214  0  0  0
## 215  0  0  0
## 216  0  0  0
## 217  0  0  0
## 218  0  0  0
## 219  0  0  0
## 220  0  0  0
## 221  0  0  0
## 222  0  0  0
## 223  0  0  0
## 224  0  0  0
## 225  0  0  0
## 226  0  0  0
## 227  0  0  0
## 228  0  0  0
## 229  0  0  0
## 230  0  0  0
## 231  0  0  0
## 232  0  0  0
## 233  0  0  0
## 234  0  0  0
## 235  0  0  0
## 236  0  0  0
## 237  0  0  0
## 238  0  0  0
## 239  0  0  0
## 240  0  0  0
## 241  0  0  0
## 242  0  0  0
## 243  0  0  0
## 244  0  0  0
## 245  0  0  0
## 246  0  0  0
## 247  0  0  0
## 248  0  0  0
## 249  0  0  0
## 250  0  0  0
## 251  0  0  0
## 252  0  0  0
## 253  0  0  0
## 254  0  0  0
## 255  0  0  0
## 256  0  0  0
## 257  0  0  0
## 258  0  0  0
## 259  0  0  0
## 260  0  0  0
## 261  0  0  0
## 262  0  0  0
## 263  0  0  0
## 264  0  0  0
## 265  0  0  0
## 266  0  0  0
## 267  0  0  0
```

```
## 268                       0                       0                       0
## 269                       0                       0                       0
## 270                       0                       0                       0
## 271                       0                       0                       0
## 272                       0                       0                       0
## 273                       0                       0                       0
## 274                       0                       0                       0
## 275                       0                       0                       0
## 276                       1                       0                       0
## 277                       1                       1                       1
## 278                       1                       0                       0
## 279                       1                       0                       0
## 280                       1                       0                       1
## 281                       0                       0                       1
## 282                       0                       0                       0
## 283                       0                       0                       1
## 284                       0                       1                       0
## 285                       1                       0                       0
## 286                       0                       0                       0
## 287                       0                       0                       0
## 288                       0                       0                       0
## 289                       0                       0                       0
## 290                       0                       0                       0
## 291                       0                       0                       0
## 292                       0                       0                       0
## 293                       0                       0                       0
## 294                       0                       0                       0
## 295                       0                       0                       0
## 296                       0                       0                       0
## 297                       0                       0                       0
## 298                       1                       1                       1
## 299                       0                       0                       0
## 300                       0                       0                       0
##     glm_Veronica_chamaedrys glm_Taraxacum_officinale_aggr
## 1                         0                             0
## 2                         1                             1
## 3                         1                             1
## 4                         1                             1
## 5                         1                             1
## 6                         1                             1
## 7                         1                             0
## 8                         1                             1
## 9                         1                             0
## 10                        1                             1
## 11                        1                             0
## 12                        1                             1
## 13                        1                             1
## 14                        1                             1
## 15                        1                             1
## 16                        1                             1
## 17                        1                             1
## 18                        1                             1
## 19                        1                             1
## 20                        1                             1
## 21                        1                             1
## 22                        1                             1
## 23                        1                             1
## 24                        1                             0
```

```
## 25                1                 0
## 26                1                 0
## 27                0                 0
## 28                1                 0
## 29                1                 0
## 30                1                 1
## 31                1                 1
## 32                1                 1
## 33                1                 1
## 34                1                 1
## 35                1                 1
## 36                1                 1
## 37                1                 0
## 38                1                 1
## 39                1                 1
## 40                1                 1
## 41                1                 1
## 42                0                 1
## 43                1                 1
## 44                1                 1
## 45                1                 1
## 46                1                 1
## 47                1                 1
## 48                1                 1
## 49                1                 1
## 50                1                 1
## 51                1                 0
## 52                1                 1
## 53                1                 1
## 54                1                 1
## 55                1                 1
## 56                1                 1
## 57                1                 1
## 58                1                 1
## 59                1                 1
## 60                1                 0
## 61                1                 1
## 62                1                 0
## 63                1                 0
## 64                1                 0
## 65                0                 0
## 66                1                 0
## 67                1                 1
## 68                1                 0
## 69                0                 0
## 70                1                 0
## 71                1                 1
## 72                1                 1
## 73                1                 1
## 74                1                 1
## 75                1                 0
## 76                1                 1
## 77                1                 1
## 78                0                 1
## 79                0                 1
## 80                0                 1
## 81                0                 1
## 82                0                 1
```

```
## 83                   0                   1
## 84                   0                   0
## 85                   0                   0
## 86                   0                   0
## 87                   0                   0
## 88                   1                   1
## 89                   1                   0
## 90                   0                   0
## 91                   0                   1
## 92                   1                   1
## 93                   1                   1
## 94                   1                   1
## 95                   1                   1
## 96                   1                   0
## 97                   1                   0
## 98                   0                   1
## 99                   0                   0
## 100                  0                   1
## 101                  1                   0
## 102                  0                   0
## 103                  1                   0
## 104                  1                   0
## 105                  1                   0
## 106                  0                   0
## 107                  0                   0
## 108                  0                   0
## 109                  1                   0
## 110                  1                   0
## 111                  1                   0
## 112                  0                   0
## 113                  0                   0
## 114                  1                   0
## 115                  1                   0
## 116                  0                   0
## 117                  0                   0
## 118                  0                   1
## 119                  0                   1
## 120                  0                   1
## 121                  0                   1
## 122                  0                   1
## 123                  0                   0
## 124                  0                   0
## 125                  0                   0
## 126                  0                   0
## 127                  0                   0
## 128                  0                   1
## 129                  0                   0
## 130                  0                   1
## 131                  0                   1
## 132                  0                   0
## 133                  0                   1
## 134                  0                   1
## 135                  0                   0
## 136                  0                   0
## 137                  1                   0
## 138                  0                   1
## 139                  0                   0
## 140                  0                   0
```

```
## 141                    0                    0
## 142                    0                    0
## 143                    0                    1
## 144                    0                    0
## 145                    1                    0
## 146                    0                    0
## 147                    0                    0
## 148                    0                    0
## 149                    0                    0
## 150                    0                    0
## 151                    0                    0
## 152                    0                    0
## 153                    0                    0
## 154                    0                    0
## 155                    0                    0
## 156                    0                    0
## 157                    0                    0
## 158                    0                    1
## 159                    0                    0
## 160                    0                    0
## 161                    0                    1
## 162                    0                    0
## 163                    0                    0
## 164                    0                    1
## 165                    0                    0
## 166                    0                    0
## 167                    0                    0
## 168                    0                    0
## 169                    0                    0
## 170                    0                    0
## 171                    0                    0
## 172                    0                    1
## 173                    0                    0
## 174                    0                    0
## 175                    0                    1
## 176                    0                    0
## 177                    0                    0
## 178                    0                    0
## 179                    0                    0
## 180                    0                    0
## 181                    0                    0
## 182                    0                    0
## 183                    0                    0
## 184                    0                    0
## 185                    0                    0
## 186                    0                    0
## 187                    0                    0
## 188                    0                    0
## 189                    1                    0
## 190                    0                    0
## 191                    0                    0
## 192                    1                    0
## 193                    0                    0
## 194                    0                    0
## 195                    0                    0
## 196                    0                    0
## 197                    0                    0
## 198                    0                    0
```

```
## 199                    0                    0
## 200                    0                    0
## 201                    0                    0
## 202                    0                    0
## 203                    0                    1
## 204                    0                    0
## 205                    0                    0
## 206                    0                    0
## 207                    0                    0
## 208                    0                    0
## 209                    0                    0
## 210                    0                    0
## 211                    0                    0
## 212                    0                    0
## 213                    0                    0
## 214                    0                    0
## 215                    0                    0
## 216                    0                    0
## 217                    0                    0
## 218                    0                    0
## 219                    0                    0
## 220                    0                    0
## 221                    0                    0
## 222                    0                    0
## 223                    0                    0
## 224                    0                    0
## 225                    0                    0
## 226                    0                    0
## 227                    0                    0
## 228                    0                    0
## 229                    0                    0
## 230                    0                    0
## 231                    1                    0
## 232                    0                    0
## 233                    0                    0
## 234                    0                    0
## 235                    0                    0
## 236                    0                    0
## 237                    0                    0
## 238                    0                    0
## 239                    0                    0
## 240                    0                    0
## 241                    0                    0
## 242                    0                    0
## 243                    0                    0
## 244                    0                    0
## 245                    0                    0
## 246                    0                    0
## 247                    0                    0
## 248                    0                    0
## 249                    0                    0
## 250                    0                    0
## 251                    0                    0
## 252                    0                    0
## 253                    0                    0
## 254                    0                    0
## 255                    0                    0
## 256                    0                    0
```

```
## 257                       0                            0
## 258                       0                            0
## 259                       0                            0
## 260                       0                            0
## 261                       0                            0
## 262                       0                            0
## 263                       0                            0
## 264                       0                            0
## 265                       0                            0
## 266                       0                            0
## 267                       0                            0
## 268                       0                            0
## 269                       0                            0
## 270                       0                            0
## 271                       0                            0
## 272                       0                            0
## 273                       0                            0
## 274                       0                            0
## 275                       0                            0
## 276                       1                            1
## 277                       1                            0
## 278                       1                            1
## 279                       0                            1
## 280                       0                            0
## 281                       0                            0
## 282                       0                            0
## 283                       0                            0
## 284                       0                            1
## 285                       0                            0
## 286                       0                            0
## 287                       0                            0
## 288                       0                            0
## 289                       0                            0
## 290                       0                            0
## 291                       0                            0
## 292                       0                            0
## 293                       0                            0
## 294                       0                            0
## 295                       0                            0
## 296                       0                            0
## 297                       0                            0
## 298                       1                            0
## 299                       0                            0
## 300                       0                            0
##     glm_Plantago_lanceolata glm_Potentilla_erecta glm_Carex_sempervirens
## 1                         0                     1                      1
## 2                         1                     0                      0
## 3                         1                     0                      0
## 4                         1                     0                      0
## 5                         1                     0                      0
## 6                         1                     0                      0
## 7                         1                     0                      0
## 8                         1                     0                      0
## 9                         0                     0                      0
## 10                        1                     0                      0
## 11                        1                     0                      0
## 12                        1                     0                      0
## 13                        1                     0                      0
```

```
## 14                1                0                0
## 15                1                0                0
## 16                1                0                0
## 17                1                0                0
## 18                1                0                0
## 19                1                0                0
## 20                1                0                0
## 21                1                0                0
## 22                1                0                0
## 23                1                0                0
## 24                1                0                0
## 25                0                0                0
## 26                0                0                0
## 27                0                0                0
## 28                1                0                0
## 29                0                0                0
## 30                1                0                0
## 31                1                0                0
## 32                1                1                0
## 33                1                0                0
## 34                1                0                0
## 35                1                0                0
## 36                1                1                0
## 37                1                0                0
## 38                1                1                0
## 39                1                0                0
## 40                1                0                0
## 41                0                0                0
## 42                0                0                0
## 43                0                0                0
## 44                0                0                0
## 45                1                0                0
## 46                0                0                0
## 47                0                0                0
## 48                0                0                0
## 49                0                0                0
## 50                1                0                0
## 51                0                0                0
## 52                0                0                0
## 53                1                0                0
## 54                1                0                0
## 55                1                0                0
## 56                1                0                0
## 57                1                0                0
## 58                1                0                0
## 59                1                0                0
## 60                0                0                0
## 61                1                0                0
## 62                0                0                0
## 63                0                0                0
## 64                0                0                0
## 65                0                1                0
## 66                0                0                0
## 67                1                1                0
## 68                1                0                0
## 69                1                1                0
## 70                1                1                0
## 71                1                0                0
```

```
## 72                1                1                0
## 73                1                1                0
## 74                1                1                0
## 75                1                1                0
## 76                1                0                0
## 77                1                0                0
## 78                0                0                0
## 79                0                0                0
## 80                0                0                0
## 81                0                0                0
## 82                0                0                0
## 83                0                0                0
## 84                0                0                0
## 85                0                0                0
## 86                0                0                0
## 87                0                0                0
## 88                1                0                0
## 89                0                0                0
## 90                0                0                0
## 91                0                0                0
## 92                1                0                0
## 93                1                0                0
## 94                1                0                0
## 95                1                0                0
## 96                0                0                0
## 97                1                1                0
## 98                0                0                0
## 99                0                0                0
## 100               0                0                0
## 101               1                0                0
## 102               0                0                0
## 103               0                0                0
## 104               1                1                0
## 105               1                0                0
## 106               0                1                0
## 107               0                0                1
## 108               0                0                0
## 109               1                1                0
## 110               1                1                0
## 111               1                1                0
## 112               1                1                0
## 113               1                1                0
## 114               1                1                0
## 115               1                1                0
## 116               0                0                0
## 117               0                1                0
## 118               0                0                0
## 119               0                0                0
## 120               0                0                0
## 121               0                0                0
## 122               0                0                0
## 123               0                0                0
## 124               0                0                0
## 125               0                0                0
## 126               0                0                0
## 127               0                0                0
## 128               0                0                0
## 129               0                0                0
```

```
## 130  1  0  0
## 131  0  0  0
## 132  0  0  1
## 133  0  0  0
## 134  1  0  0
## 135  0  0  1
## 136  1  0  1
## 137  0  0  0
## 138  0  0  0
## 139  1  0  0
## 140  0  0  0
## 141  0  0  0
## 142  0  0  0
## 143  0  0  0
## 144  0  0  0
## 145  1  1  0
## 146  0  0  1
## 147  0  1  1
## 148  0  0  1
## 149  1  0  1
## 150  1  0  1
## 151  1  1  1
## 152  1  0  0
## 153  0  0  0
## 154  1  1  1
## 155  0  1  0
## 156  0  0  0
## 157  0  0  0
## 158  0  0  0
## 159  0  0  0
## 160  0  0  0
## 161  0  0  0
## 162  0  0  0
## 163  0  0  0
## 164  0  0  0
## 165  0  0  0
## 166  0  0  0
## 167  0  0  1
## 168  0  0  1
## 169  0  0  1
## 170  0  0  0
## 171  0  0  0
## 172  0  0  1
## 173  0  0  1
## 174  0  0  1
## 175  0  0  0
## 176  0  0  0
## 177  0  0  0
## 178  0  0  1
## 179  0  0  1
## 180  0  0  1
## 181  0  0  0
## 182  0  0  0
## 183  0  0  0
## 184  0  0  0
## 185  0  0  1
## 186  0  0  1
## 187  0  0  1
```

```
## 188  0  0  1
## 189  0  0  0
## 190  0  1  0
## 191  0  0  1
## 192  1  0  1
## 193  0  0  1
## 194  0  0  0
## 195  0  0  1
## 196  0  1  0
## 197  0  0  1
## 198  0  0  1
## 199  0  0  0
## 200  0  0  1
## 201  0  0  0
## 202  0  0  1
## 203  1  1  0
## 204  0  0  1
## 205  0  0  0
## 206  0  0  0
## 207  0  0  1
## 208  0  0  0
## 209  0  0  1
## 210  0  0  1
## 211  0  0  0
## 212  0  0  1
## 213  0  0  1
## 214  0  0  1
## 215  0  0  0
## 216  1  0  1
## 217  0  0  1
## 218  0  0  0
## 219  0  0  1
## 220  0  0  1
## 221  0  0  1
## 222  0  0  1
## 223  0  0  0
## 224  0  0  0
## 225  0  0  0
## 226  0  0  1
## 227  0  0  0
## 228  0  0  1
## 229  0  0  1
## 230  0  0  1
## 231  0  0  0
## 232  0  0  1
## 233  0  0  1
## 234  0  0  1
## 235  0  0  1
## 236  0  0  1
## 237  0  0  0
## 238  0  0  0
## 239  0  0  1
## 240  0  0  1
## 241  0  0  1
## 242  0  0  1
## 243  0  0  1
## 244  0  0  1
## 245  0  0  1
```

```
## 246                       0                       0                       1
## 247                       0                       0                       1
## 248                       0                       0                       1
## 249                       0                       0                       1
## 250                       0                       0                       1
## 251                       0                       0                       1
## 252                       0                       0                       1
## 253                       0                       0                       1
## 254                       0                       0                       0
## 255                       0                       0                       1
## 256                       0                       0                       1
## 257                       0                       0                       1
## 258                       0                       0                       0
## 259                       0                       0                       1
## 260                       0                       0                       1
## 261                       0                       0                       1
## 262                       0                       0                       0
## 263                       0                       0                       1
## 264                       0                       0                       1
## 265                       0                       0                       1
## 266                       0                       0                       0
## 267                       0                       0                       0
## 268                       0                       0                       0
## 269                       0                       0                       1
## 270                       0                       0                       1
## 271                       0                       0                       1
## 272                       0                       0                       1
## 273                       0                       0                       1
## 274                       0                       0                       1
## 275                       0                       0                       1
## 276                       1                       1                       0
## 277                       0                       0                       0
## 278                       1                       1                       0
## 279                       1                       0                       0
## 280                       0                       0                       0
## 281                       0                       0                       0
## 282                       0                       0                       0
## 283                       0                       0                       0
## 284                       0                       0                       0
## 285                       0                       0                       0
## 286                       0                       0                       0
## 287                       0                       0                       1
## 288                       0                       0                       1
## 289                       0                       0                       1
## 290                       0                       0                       1
## 291                       0                       0                       1
## 292                       0                       0                       1
## 293                       0                       0                       1
## 294                       0                       0                       1
## 295                       0                       0                       1
## 296                       0                       0                       1
## 297                       0                       0                       1
## 298                       1                       0                       0
## 299                       0                       0                       0
## 300                       0                       0                       1
##     glm_Soldanella_alpina glm_Cynosurus_cristatus
## 1                       0                       0
## 2                       0                       1
```

```
## 3                    0                    1
## 4                    0                    1
## 5                    0                    1
## 6                    0                    1
## 7                    0                    0
## 8                    0                    1
## 9                    0                    0
## 10                   0                    1
## 11                   0                    1
## 12                   0                    1
## 13                   0                    1
## 14                   0                    0
## 15                   0                    1
## 16                   0                    1
## 17                   0                    1
## 18                   0                    1
## 19                   0                    1
## 20                   0                    1
## 21                   0                    1
## 22                   0                    0
## 23                   0                    1
## 24                   0                    1
## 25                   0                    1
## 26                   0                    0
## 27                   0                    1
## 28                   0                    0
## 29                   0                    0
## 30                   0                    1
## 31                   0                    0
## 32                   0                    0
## 33                   0                    1
## 34                   0                    0
## 35                   0                    1
## 36                   0                    0
## 37                   0                    1
## 38                   0                    0
## 39                   0                    0
## 40                   0                    1
## 41                   0                    1
## 42                   0                    0
## 43                   0                    1
## 44                   0                    1
## 45                   0                    0
## 46                   0                    0
## 47                   0                    1
## 48                   0                    0
## 49                   0                    1
## 50                   0                    0
## 51                   0                    1
## 52                   0                    1
## 53                   0                    1
## 54                   0                    1
## 55                   0                    1
## 56                   0                    1
## 57                   0                    0
## 58                   0                    0
## 59                   0                    1
## 60                   0                    0
```

```
## 61                   0                   1
## 62                   0                   1
## 63                   0                   0
## 64                   0                   0
## 65                   0                   0
## 66                   0                   0
## 67                   0                   0
## 68                   0                   1
## 69                   0                   0
## 70                   0                   0
## 71                   0                   0
## 72                   0                   0
## 73                   0                   0
## 74                   0                   0
## 75                   0                   0
## 76                   0                   1
## 77                   0                   0
## 78                   0                   0
## 79                   0                   0
## 80                   0                   1
## 81                   0                   0
## 82                   1                   0
## 83                   0                   0
## 84                   0                   1
## 85                   0                   0
## 86                   0                   0
## 87                   0                   0
## 88                   0                   0
## 89                   0                   0
## 90                   0                   0
## 91                   0                   0
## 92                   0                   0
## 93                   0                   0
## 94                   0                   0
## 95                   0                   0
## 96                   0                   0
## 97                   0                   0
## 98                   0                   0
## 99                   0                   0
## 100                  0                   0
## 101                  0                   0
## 102                  0                   0
## 103                  0                   0
## 104                  0                   0
## 105                  0                   0
## 106                  0                   0
## 107                  0                   0
## 108                  0                   0
## 109                  0                   0
## 110                  0                   0
## 111                  0                   0
## 112                  0                   0
## 113                  0                   0
## 114                  0                   0
## 115                  0                   0
## 116                  0                   0
## 117                  0                   0
## 118                  1                   0
```

```
## 119                  1                  0
## 120                  1                  0
## 121                  0                  0
## 122                  0                  0
## 123                  1                  0
## 124                  0                  0
## 125                  1                  0
## 126                  1                  0
## 127                  1                  0
## 128                  0                  0
## 129                  0                  0
## 130                  0                  0
## 131                  0                  0
## 132                  0                  0
## 133                  0                  0
## 134                  0                  0
## 135                  0                  0
## 136                  0                  0
## 137                  0                  0
## 138                  0                  0
## 139                  0                  0
## 140                  1                  0
## 141                  1                  0
## 142                  0                  0
## 143                  0                  0
## 144                  1                  0
## 145                  0                  0
## 146                  0                  0
## 147                  0                  0
## 148                  0                  0
## 149                  0                  0
## 150                  0                  0
## 151                  0                  0
## 152                  0                  0
## 153                  1                  0
## 154                  0                  0
## 155                  1                  0
## 156                  1                  0
## 157                  1                  0
## 158                  1                  0
## 159                  1                  0
## 160                  1                  0
## 161                  0                  0
## 162                  1                  0
## 163                  1                  0
## 164                  1                  0
## 165                  1                  0
## 166                  1                  0
## 167                  0                  0
## 168                  1                  0
## 169                  0                  0
## 170                  1                  0
## 171                  1                  0
## 172                  0                  0
## 173                  0                  0
## 174                  1                  0
## 175                  0                  0
## 176                  1                  0
```

```
## 177                1                0
## 178                1                0
## 179                0                0
## 180                1                0
## 181                1                0
## 182                1                0
## 183                1                0
## 184                1                0
## 185                1                0
## 186                0                0
## 187                0                0
## 188                1                0
## 189                0                0
## 190                0                0
## 191                0                0
## 192                0                0
## 193                0                0
## 194                1                0
## 195                1                0
## 196                0                0
## 197                1                0
## 198                1                0
## 199                1                0
## 200                1                0
## 201                1                0
## 202                1                0
## 203                0                0
## 204                1                0
## 205                1                0
## 206                1                0
## 207                1                0
## 208                1                0
## 209                0                0
## 210                0                0
## 211                1                0
## 212                1                0
## 213                0                0
## 214                1                0
## 215                1                0
## 216                0                0
## 217                0                0
## 218                1                0
## 219                1                0
## 220                1                0
## 221                1                0
## 222                1                0
## 223                1                0
## 224                1                0
## 225                1                0
## 226                1                0
## 227                1                0
## 228                1                0
## 229                1                0
## 230                0                0
## 231                0                0
## 232                1                0
## 233                1                0
## 234                0                0
```

```
## 235                1                0
## 236                1                0
## 237                1                0
## 238                1                0
## 239                0                0
## 240                1                0
## 241                1                0
## 242                1                0
## 243                0                0
## 244                0                0
## 245                1                0
## 246                0                0
## 247                0                0
## 248                1                0
## 249                0                0
## 250                0                0
## 251                0                0
## 252                0                0
## 253                0                0
## 254                1                0
## 255                1                0
## 256                0                0
## 257                1                0
## 258                1                0
## 259                0                0
## 260                1                0
## 261                0                0
## 262                0                0
## 263                0                0
## 264                0                0
## 265                1                0
## 266                1                0
## 267                0                0
## 268                0                0
## 269                1                0
## 270                0                0
## 271                1                0
## 272                0                0
## 273                1                0
## 274                0                0
## 275                0                0
## 276                0                0
## 277                0                0
## 278                0                0
## 279                0                0
## 280                0                0
## 281                0                0
## 282                1                0
## 283                1                0
## 284                0                0
## 285                1                0
## 286                0                0
## 287                1                0
## 288                0                0
## 289                1                0
## 290                0                0
## 291                0                0
## 292                0                0
```

```
## 293                     1                     0
## 294                     0                     0
## 295                     0                     0
## 296                     1                     0
## 297                     1                     0
## 298                     0                     0
## 299                     0                     0
## 300                     0                     0
##     glm_Campanula_scheuchzeri glm_Festuca_pratensis_sl
## 1                           0                       0
## 2                           0                       0
## 3                           0                       0
## 4                           0                       0
## 5                           0                       0
## 6                           0                       1
## 7                           0                       1
## 8                           0                       1
## 9                           0                       1
## 10                          0                       1
## 11                          0                       1
## 12                          0                       1
## 13                          0                       1
## 14                          0                       1
## 15                          0                       1
## 16                          0                       1
## 17                          0                       0
## 18                          0                       0
## 19                          0                       1
## 20                          0                       1
## 21                          0                       1
## 22                          0                       1
## 23                          0                       0
## 24                          0                       1
## 25                          0                       1
## 26                          0                       1
## 27                          0                       1
## 28                          0                       1
## 29                          0                       1
## 30                          0                       1
## 31                          0                       1
## 32                          0                       1
## 33                          0                       0
## 34                          0                       1
## 35                          0                       0
## 36                          0                       1
## 37                          0                       1
## 38                          0                       0
## 39                          0                       1
## 40                          0                       0
## 41                          0                       0
## 42                          0                       0
## 43                          0                       0
## 44                          0                       0
## 45                          0                       0
## 46                          0                       0
## 47                          0                       1
## 48                          0                       0
## 49                          0                       0
```

```
## 50                    0                    0
## 51                    0                    1
## 52                    0                    0
## 53                    0                    0
## 54                    0                    0
## 55                    0                    0
## 56                    0                    0
## 57                    0                    0
## 58                    0                    0
## 59                    0                    1
## 60                    0                    0
## 61                    0                    1
## 62                    0                    1
## 63                    0                    1
## 64                    0                    1
## 65                    0                    0
## 66                    0                    1
## 67                    0                    0
## 68                    0                    1
## 69                    0                    0
## 70                    0                    0
## 71                    0                    0
## 72                    0                    1
## 73                    0                    0
## 74                    0                    0
## 75                    0                    1
## 76                    0                    1
## 77                    0                    1
## 78                    0                    0
## 79                    0                    0
## 80                    0                    0
## 81                    0                    0
## 82                    0                    0
## 83                    0                    0
## 84                    0                    0
## 85                    0                    0
## 86                    0                    0
## 87                    0                    0
## 88                    0                    0
## 89                    0                    0
## 90                    0                    0
## 91                    0                    0
## 92                    0                    0
## 93                    0                    0
## 94                    0                    0
## 95                    0                    0
## 96                    0                    0
## 97                    0                    0
## 98                    0                    0
## 99                    0                    0
## 100                   0                    0
## 101                   0                    0
## 102                   0                    0
## 103                   0                    0
## 104                   0                    0
## 105                   0                    0
## 106                   0                    0
## 107                   1                    0
```

```
## 108                    0                    0
## 109                    0                    0
## 110                    0                    0
## 111                    0                    0
## 112                    0                    0
## 113                    0                    0
## 114                    0                    0
## 115                    0                    0
## 116                    0                    0
## 117                    0                    0
## 118                    0                    0
## 119                    0                    0
## 120                    0                    0
## 121                    0                    0
## 122                    0                    0
## 123                    1                    0
## 124                    0                    0
## 125                    1                    0
## 126                    0                    0
## 127                    0                    0
## 128                    0                    0
## 129                    0                    0
## 130                    0                    0
## 131                    0                    0
## 132                    0                    0
## 133                    0                    0
## 134                    0                    0
## 135                    1                    0
## 136                    0                    0
## 137                    0                    0
## 138                    0                    0
## 139                    0                    0
## 140                    0                    0
## 141                    1                    0
## 142                    0                    0
## 143                    0                    0
## 144                    0                    0
## 145                    0                    0
## 146                    1                    0
## 147                    0                    0
## 148                    0                    0
## 149                    1                    0
## 150                    1                    0
## 151                    0                    0
## 152                    0                    0
## 153                    0                    0
## 154                    0                    0
## 155                    0                    0
## 156                    0                    0
## 157                    1                    0
## 158                    0                    0
## 159                    1                    0
## 160                    0                    0
## 161                    0                    0
## 162                    1                    0
## 163                    1                    0
## 164                    0                    0
## 165                    0                    0
```

```
## 166                  0                  0
## 167                  0                  0
## 168                  1                  0
## 169                  1                  0
## 170                  0                  0
## 171                  1                  0
## 172                  1                  0
## 173                  1                  0
## 174                  1                  0
## 175                  0                  0
## 176                  1                  0
## 177                  1                  0
## 178                  1                  0
## 179                  1                  0
## 180                  1                  0
## 181                  1                  0
## 182                  0                  0
## 183                  0                  0
## 184                  1                  0
## 185                  1                  0
## 186                  1                  0
## 187                  1                  0
## 188                  1                  0
## 189                  0                  0
## 190                  0                  0
## 191                  1                  0
## 192                  0                  0
## 193                  1                  0
## 194                  0                  0
## 195                  1                  0
## 196                  0                  0
## 197                  1                  0
## 198                  1                  0
## 199                  1                  0
## 200                  1                  0
## 201                  1                  0
## 202                  1                  0
## 203                  0                  0
## 204                  1                  0
## 205                  0                  0
## 206                  1                  0
## 207                  1                  0
## 208                  1                  0
## 209                  0                  0
## 210                  1                  0
## 211                  1                  0
## 212                  1                  0
## 213                  1                  0
## 214                  1                  0
## 215                  1                  0
## 216                  0                  0
## 217                  1                  0
## 218                  1                  0
## 219                  1                  0
## 220                  1                  0
## 221                  1                  0
## 222                  1                  0
## 223                  0                  0
```

```
## 224                1                0
## 225                1                0
## 226                1                0
## 227                1                0
## 228                1                0
## 229                1                0
## 230                1                0
## 231                0                0
## 232                1                0
## 233                1                0
## 234                1                0
## 235                1                0
## 236                1                0
## 237                1                0
## 238                1                0
## 239                1                0
## 240                1                0
## 241                1                0
## 242                1                0
## 243                1                0
## 244                1                0
## 245                1                0
## 246                1                0
## 247                1                0
## 248                1                0
## 249                1                0
## 250                1                0
## 251                1                0
## 252                0                0
## 253                0                0
## 254                0                0
## 255                1                0
## 256                1                0
## 257                1                0
## 258                1                0
## 259                1                0
## 260                1                0
## 261                1                0
## 262                1                0
## 263                1                0
## 264                1                0
## 265                1                0
## 266                1                0
## 267                1                0
## 268                1                0
## 269                1                0
## 270                1                0
## 271                1                0
## 272                1                0
## 273                1                0
## 274                1                0
## 275                1                0
## 276                0                0
## 277                0                0
## 278                0                0
## 279                0                0
## 280                0                0
## 281                0                0
```

```
## 282                          1                          0
## 283                          0                          0
## 284                          0                          0
## 285                          0                          0
## 286                          1                          0
## 287                          1                          0
## 288                          1                          0
## 289                          1                          0
## 290                          1                          0
## 291                          1                          0
## 292                          1                          0
## 293                          1                          0
## 294                          1                          0
## 295                          1                          0
## 296                          1                          0
## 297                          1                          0
## 298                          0                          1
## 299                          1                          0
## 300                          0                          0
##     glm_Bromus_erectus_sstr glm_Saxifraga_oppositifolia glm_Daucus_carota
## 1                         0                           0                 0
## 2                         0                           0                 0
## 3                         0                           0                 0
## 4                         0                           0                 0
## 5                         0                           0                 0
## 6                         0                           0                 0
## 7                         0                           0                 0
## 8                         0                           0                 0
## 9                         0                           0                 0
## 10                        0                           0                 0
## 11                        0                           0                 0
## 12                        1                           0                 0
## 13                        0                           0                 0
## 14                        0                           0                 0
## 15                        0                           0                 0
## 16                        1                           0                 1
## 17                        0                           0                 0
## 18                        0                           0                 0
## 19                        1                           0                 1
## 20                        1                           0                 1
## 21                        0                           0                 0
## 22                        1                           0                 1
## 23                        0                           0                 0
## 24                        0                           0                 0
## 25                        0                           0                 0
## 26                        0                           0                 0
## 27                        0                           0                 0
## 28                        0                           0                 0
## 29                        0                           0                 0
## 30                        0                           0                 0
## 31                        1                           0                 1
## 32                        0                           0                 0
## 33                        0                           0                 0
## 34                        1                           0                 1
## 35                        0                           0                 0
## 36                        1                           0                 1
## 37                        1                           0                 1
## 38                        1                           0                 1
```

```
## 39                0                 0                 0
## 40                0                 0                 0
## 41                0                 0                 0
## 42                0                 0                 0
## 43                0                 0                 0
## 44                0                 0                 0
## 45                0                 0                 0
## 46                0                 0                 0
## 47                0                 0                 0
## 48                0                 0                 0
## 49                0                 0                 0
## 50                0                 0                 0
## 51                0                 0                 0
## 52                0                 0                 0
## 53                0                 0                 0
## 54                0                 0                 0
## 55                0                 0                 0
## 56                0                 0                 0
## 57                0                 0                 0
## 58                0                 0                 0
## 59                0                 0                 0
## 60                0                 0                 0
## 61                1                 0                 0
## 62                0                 0                 0
## 63                0                 0                 0
## 64                0                 0                 0
## 65                0                 0                 0
## 66                0                 0                 0
## 67                0                 0                 0
## 68                1                 0                 1
## 69                0                 0                 0
## 70                0                 0                 0
## 71                1                 0                 0
## 72                1                 0                 1
## 73                1                 0                 1
## 74                0                 0                 0
## 75                1                 0                 0
## 76                1                 0                 0
## 77                0                 0                 0
## 78                0                 0                 0
## 79                0                 0                 0
## 80                0                 0                 0
## 81                0                 0                 0
## 82                0                 0                 0
## 83                0                 0                 0
## 84                0                 0                 0
## 85                0                 0                 0
## 86                0                 0                 0
## 87                0                 0                 0
## 88                0                 0                 0
## 89                0                 0                 0
## 90                0                 0                 0
## 91                0                 0                 0
## 92                0                 0                 0
## 93                0                 0                 0
## 94                0                 0                 0
## 95                0                 0                 0
## 96                0                 0                 0
```

```
## 97                0                0                0
## 98                0                0                0
## 99                0                0                0
## 100               0                0                0
## 101               0                0                0
## 102               0                0                0
## 103               0                0                0
## 104               0                0                0
## 105               0                0                0
## 106               0                0                0
## 107               0                0                0
## 108               0                0                0
## 109               0                0                0
## 110               1                0                0
## 111               0                0                0
## 112               0                0                0
## 113               0                0                0
## 114               0                0                0
## 115               0                0                0
## 116               0                0                0
## 117               0                0                0
## 118               0                0                0
## 119               0                0                0
## 120               0                0                0
## 121               0                0                0
## 122               0                0                0
## 123               0                0                0
## 124               0                0                0
## 125               0                0                0
## 126               0                0                0
## 127               0                0                0
## 128               0                0                0
## 129               0                0                0
## 130               0                0                0
## 131               0                0                0
## 132               0                0                0
## 133               0                0                0
## 134               0                0                0
## 135               0                0                0
## 136               0                0                0
## 137               0                0                0
## 138               0                0                0
## 139               0                0                0
## 140               0                0                0
## 141               0                0                0
## 142               0                0                0
## 143               0                0                0
## 144               0                0                0
## 145               1                0                1
## 146               0                0                0
## 147               0                0                0
## 148               0                0                0
## 149               0                0                0
## 150               0                0                0
## 151               0                0                0
## 152               0                0                0
## 153               0                0                0
## 154               0                0                0
```

```
## 155                0                0                0
## 156                0                0                0
## 157                0                0                0
## 158                0                0                0
## 159                0                0                0
## 160                0                0                0
## 161                0                0                0
## 162                0                0                0
## 163                0                0                0
## 164                0                0                0
## 165                0                0                0
## 166                0                0                0
## 167                0                0                0
## 168                0                0                0
## 169                0                0                0
## 170                0                0                0
## 171                0                0                0
## 172                0                0                0
## 173                0                0                0
## 174                0                0                0
## 175                0                0                0
## 176                0                0                0
## 177                0                0                0
## 178                0                0                0
## 179                0                0                0
## 180                0                0                0
## 181                0                0                0
## 182                0                0                0
## 183                0                0                0
## 184                0                0                0
## 185                0                0                0
## 186                0                0                0
## 187                0                0                0
## 188                0                0                0
## 189                0                0                0
## 190                0                0                0
## 191                0                0                0
## 192                0                0                0
## 193                0                0                0
## 194                0                0                0
## 195                0                0                0
## 196                0                0                0
## 197                0                0                0
## 198                0                0                0
## 199                0                0                0
## 200                0                0                0
## 201                0                0                0
## 202                0                0                0
## 203                0                0                0
## 204                0                0                0
## 205                0                0                0
## 206                0                0                0
## 207                0                0                0
## 208                0                0                0
## 209                0                0                0
## 210                0                0                0
## 211                0                0                0
## 212                0                0                0
```

```
## 213  0  0  0
## 214  0  0  0
## 215  0  0  0
## 216  0  0  0
## 217  0  0  0
## 218  0  0  0
## 219  0  0  0
## 220  0  0  0
## 221  0  0  0
## 222  0  0  0
## 223  0  0  0
## 224  0  0  0
## 225  0  0  0
## 226  0  0  0
## 227  0  0  0
## 228  0  0  0
## 229  0  0  0
## 230  0  0  0
## 231  0  0  0
## 232  0  0  0
## 233  0  0  0
## 234  0  0  0
## 235  0  0  0
## 236  0  1  0
## 237  0  0  0
## 238  0  0  0
## 239  0  0  0
## 240  0  0  0
## 241  0  0  0
## 242  0  0  0
## 243  0  0  0
## 244  0  0  0
## 245  0  0  0
## 246  0  0  0
## 247  0  0  0
## 248  0  1  0
## 249  0  0  0
## 250  0  0  0
## 251  0  0  0
## 252  0  0  0
## 253  0  1  0
## 254  0  1  0
## 255  0  0  0
## 256  0  1  0
## 257  0  0  0
## 258  0  1  0
## 259  0  1  0
## 260  0  0  0
## 261  0  1  0
## 262  0  1  0
## 263  0  1  0
## 264  0  1  0
## 265  0  0  0
## 266  0  1  0
## 267  0  1  0
## 268  0  1  0
## 269  0  1  0
## 270  0  1  0
```

```
## 271                       0                       1                       0
## 272                       0                       1                       0
## 273                       0                       1                       0
## 274                       0                       1                       0
## 275                       0                       1                       0
## 276                       0                       0                       0
## 277                       0                       0                       0
## 278                       1                       0                       1
## 279                       0                       0                       0
## 280                       0                       0                       0
## 281                       0                       0                       0
## 282                       0                       0                       0
## 283                       0                       0                       0
## 284                       0                       0                       0
## 285                       0                       0                       0
## 286                       0                       0                       0
## 287                       0                       0                       0
## 288                       0                       0                       0
## 289                       0                       0                       0
## 290                       0                       0                       0
## 291                       0                       0                       0
## 292                       0                       0                       0
## 293                       0                       0                       0
## 294                       0                       0                       0
## 295                       0                       0                       0
## 296                       0                       0                       0
## 297                       0                       1                       0
## 298                       0                       0                       0
## 299                       0                       1                       0
## 300                       0                       1                       0
##     glm_Pritzelago_alpina_sstr
## 1                            0
## 2                            0
## 3                            0
## 4                            0
## 5                            0
## 6                            0
## 7                            0
## 8                            0
## 9                            0
## 10                           0
## 11                           0
## 12                           0
## 13                           0
## 14                           0
## 15                           0
## 16                           0
## 17                           0
## 18                           0
## 19                           0
## 20                           0
## 21                           0
## 22                           0
## 23                           0
## 24                           0
## 25                           0
## 26                           0
## 27                           0
```

```
## 28                          0
## 29                          0
## 30                          0
## 31                          0
## 32                          0
## 33                          0
## 34                          0
## 35                          0
## 36                          0
## 37                          0
## 38                          0
## 39                          0
## 40                          0
## 41                          0
## 42                          0
## 43                          0
## 44                          0
## 45                          0
## 46                          0
## 47                          0
## 48                          0
## 49                          0
## 50                          0
## 51                          0
## 52                          0
## 53                          0
## 54                          0
## 55                          0
## 56                          0
## 57                          0
## 58                          0
## 59                          0
## 60                          0
## 61                          0
## 62                          0
## 63                          0
## 64                          0
## 65                          0
## 66                          0
## 67                          0
## 68                          0
## 69                          0
## 70                          0
## 71                          0
## 72                          0
## 73                          0
## 74                          0
## 75                          0
## 76                          0
## 77                          0
## 78                          0
## 79                          0
## 80                          0
## 81                          0
## 82                          0
## 83                          0
## 84                          0
## 85                          0
```

```
## 86                       0
## 87                       0
## 88                       0
## 89                       0
## 90                       0
## 91                       0
## 92                       0
## 93                       0
## 94                       0
## 95                       0
## 96                       0
## 97                       0
## 98                       0
## 99                       0
## 100                      0
## 101                      0
## 102                      0
## 103                      0
## 104                      0
## 105                      0
## 106                      0
## 107                      0
## 108                      0
## 109                      0
## 110                      0
## 111                      0
## 112                      0
## 113                      0
## 114                      0
## 115                      0
## 116                      0
## 117                      0
## 118                      0
## 119                      0
## 120                      0
## 121                      0
## 122                      0
## 123                      0
## 124                      0
## 125                      0
## 126                      0
## 127                      0
## 128                      0
## 129                      0
## 130                      0
## 131                      0
## 132                      0
## 133                      0
## 134                      0
## 135                      0
## 136                      0
## 137                      0
## 138                      0
## 139                      0
## 140                      0
## 141                      0
## 142                      0
## 143                      0
```

```
## 144                    0
## 145                    0
## 146                    0
## 147                    0
## 148                    0
## 149                    0
## 150                    0
## 151                    0
## 152                    0
## 153                    0
## 154                    0
## 155                    0
## 156                    0
## 157                    0
## 158                    0
## 159                    0
## 160                    0
## 161                    0
## 162                    0
## 163                    0
## 164                    0
## 165                    0
## 166                    0
## 167                    0
## 168                    0
## 169                    0
## 170                    0
## 171                    0
## 172                    0
## 173                    0
## 174                    0
## 175                    0
## 176                    0
## 177                    1
## 178                    0
## 179                    0
## 180                    0
## 181                    0
## 182                    0
## 183                    0
## 184                    0
## 185                    0
## 186                    0
## 187                    0
## 188                    0
## 189                    0
## 190                    0
## 191                    0
## 192                    0
## 193                    0
## 194                    0
## 195                    0
## 196                    0
## 197                    0
## 198                    0
## 199                    1
## 200                    0
## 201                    0
```

```
## 202                    0
## 203                    0
## 204                    0
## 205                    0
## 206                    0
## 207                    0
## 208                    0
## 209                    0
## 210                    0
## 211                    1
## 212                    0
## 213                    0
## 214                    0
## 215                    0
## 216                    0
## 217                    0
## 218                    0
## 219                    0
## 220                    0
## 221                    0
## 222                    0
## 223                    1
## 224                    0
## 225                    0
## 226                    0
## 227                    0
## 228                    1
## 229                    0
## 230                    0
## 231                    0
## 232                    0
## 233                    0
## 234                    0
## 235                    1
## 236                    0
## 237                    1
## 238                    1
## 239                    0
## 240                    0
## 241                    1
## 242                    0
## 243                    0
## 244                    0
## 245                    0
## 246                    0
## 247                    1
## 248                    0
## 249                    0
## 250                    0
## 251                    0
## 252                    0
## 253                    0
## 254                    1
## 255                    0
## 256                    0
## 257                    0
## 258                    1
## 259                    0
```

```
## 260                    0
## 261                    0
## 262                    1
## 263                    0
## 264                    1
## 265                    1
## 266                    1
## 267                    1
## 268                    1
## 269                    0
## 270                    0
## 271                    0
## 272                    0
## 273                    0
## 274                    1
## 275                    0
## 276                    0
## 277                    0
## 278                    0
## 279                    0
## 280                    0
## 281                    0
## 282                    0
## 283                    0
## 284                    0
## 285                    0
## 286                    0
## 287                    0
## 288                    0
## 289                    0
## 290                    0
## 291                    0
## 292                    0
## 293                    0
## 294                    0
## 295                    0
## 296                    0
## 297                    0
## 298                    0
## 299                    1
## 300                    0
```

4 Post-Modelling

4.1 Spatial Predictions of species assamblages

4.1.1 Co-occurrence analysis & Environmentally Constrained Null Models

Input data as a matrix of plots (rows) x species (columns). Input matrices should have column names (species names) and row names (sampling plots).

```
presence<-ecospat.testData[c(53,62,58,70,61,66,65,71,69,43,63,56,68,57,55,60,54,67,59,64)]
pred<-ecospat.testData[c(73:92)]
```

Define the number of permutations. It is recomended to use at least 10000 permutatiobns for the test. As an example we used nperm = 100, to reduce the computational time.

```
nbpermut <- 100
```

Define the outpath

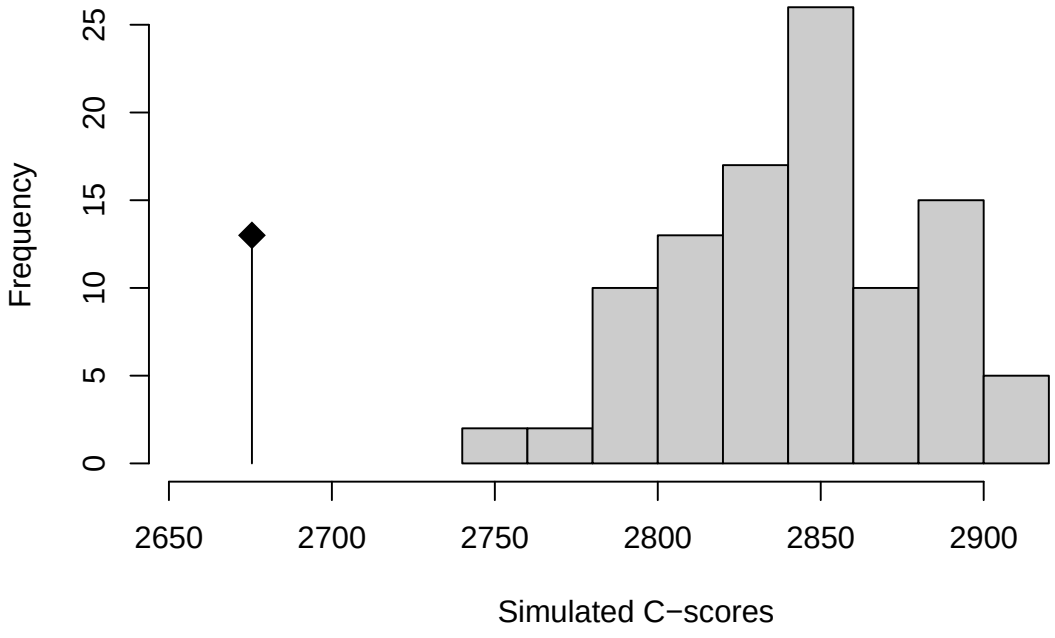
```
outpath <- getwd()
```

Run the function *ecospat.cons_Cscore*

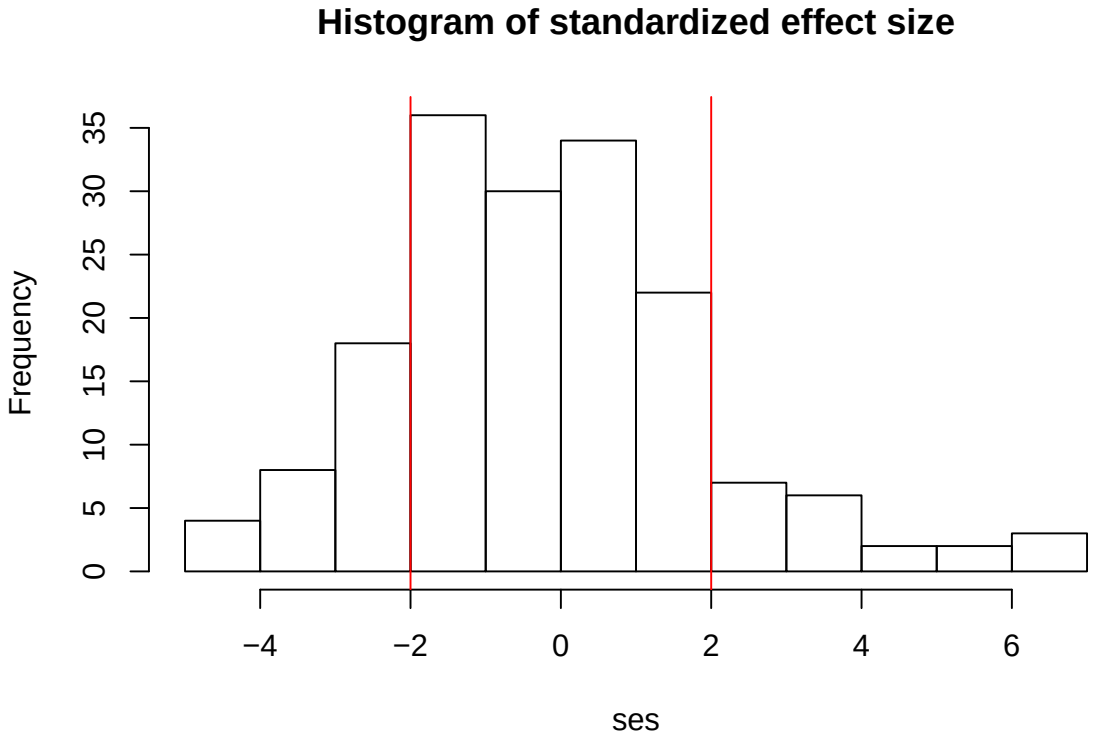
The function tests for non-random patterns of species co-occurrence in a presence-absence matrix. It calculates the C-score index for the whole community and for each species pair. An environmental constraint is applied during the generation of the null communities.

```
ecospat.cons_Cscore(presence, pred, nbpermut, outpath)
```

```
## Computing observed co-occurence matrix
## .............
## .............
## .............
## Computing permutations
## .............
## .............
## .............
```




```
## Permutations finished Thu Jun 14 17:51:22 2018
## .............
## .............
## Exporting dataset
## .............
## .............
## .............
```




```
## $ObsCscoreTot
## [1] 2675.468
##
## $SimCscoreTot
## [1] 2842.198
##
## $PVal.less
## [1] 0.00990099
##
## $PVal.greater
## [1] 1
##
## $SES.Tot
## [1] -4.609203
```

The function returns - the C-score index for the observed community (ObsCscoreTot), - the mean of C-score for the simulated communities (SimCscoreTot), - the p.values (PVal.less and PVal.greater) to evaluate the significance of the difference between the former two indices. - the standardized effect size for the whole community (SES.Tot). A SES that is greater than 2 or less than -2 is statistically significant with a tail probability of less than 0.05 (Gotelli & McCabe 2002 - Ecology). If a community is structured by competition, we would expect the C-score to be large relative to a randomly assembled community (positive SES). In this case the observed C-score is significantly lower than expected by chance, this meaning that the community is dominate by positive interactions (aggregated pattern).

A table is saved in the path specified where the same metrics are calculated for each species pair (only the table with species pairs with significant p.values is saved).