> old.time = proc.time()

>

> set.seed(820)

> init = sample(1:n)

>

> newInit = c(init, init[1])

>

> res <- optim(newInit, obj.fun.ms, swap, method = "SANN", control = list(maxit = 1e5,

+ temp = y2, tmax = 1000, trace = TRUE, REPORT = 10, fnscale = -1))

sann objective function values

initial value -4.601990

iter 10000 value -7.122449

iter 20000 value -7.122449

iter 30000 value -7.122449

iter 40000 value -7.122449

iter 50000 value -7.122449

iter 60000 value -7.122449

iter 70000 value -7.122449

iter 80000 value -7.122449

iter 90000 value -7.122449

iter 99999 value -7.122449

final value -7.122449

sann stopped after 99999 iterations

>

> proc.time() - old.time

user system elapsed

6.57 0.09 6.67

> bestInd = newind

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$ave.eff

[1] 0.5294118

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$can.eff

[1] 1.0000000 0.9590797 0.7500000 0.5568772 0.2340431

>

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$ave.eff

[1] 0.8823529

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$can.eff

[1] 1.00 1.00 1.00 0.75 0.75

>

> test(X.trt = X.trt[bestInd,], mI(n) - Pb, Rep=trt.rep)$can.eff

[1] 0.8333333

> test(X.trt = X.trt[bestInd,], blk.proj, Rep=trt.rep)$can.eff

[1] 0.7222222

>

> test(X.trt = X.trt[bestInd,], Pb - mK(n), Rep=trt.rep)$can.eff

[1] 0.1666667

> test(X.trt = X.trt[bestInd,], Pb1 - mK(n), Rep=trt.rep)$can.eff

[1] 0.1111111

>

>

> new.Z1.mat= Z1.mat[bestInd,]

> #new.Z1.mat= Z1.mat

>

> ################################################################################

> #Set the design from the search

>

> colnames(new.Z1.mat) = sort(levels(interaction(newLETTERS[1:nZ1])))

> new.Z1.des = apply(new.Z1.mat, 1, function(x)

+ colnames(new.Z1.mat)[which(as.logical(x))])

> new.Z1.des = as.data.frame(t(sapply(strsplit(new.Z1.des, "\\."), function(x) x)))

>

> design.df = data.frame(Run = as.factor(Z.des), Tag = factor(1:nPlot))

>

> design.df = cbind(design.df,

+ Ani = t(new.Z1.des),

+ Trt = phase1DesignEX1[match(as.character(t(new.Z1.des )),

+ as.character(phase1DesignEX1$Ani)),]$Trt)

>

>

>

> ################################################################################

> #Theortical ANOVA table

>

> summary.aov.twoPhase(design.df, blk.str2 = "Run", blk.str1 = "Ani",

+ trt.str = "Tag + Trt")

$ANOVA

DF e Ani Run

Between Run

Between Ani

Trt 1 1 1/2 4

Residual 1 1 1/2 4

Within

Between Ani

Tag 2 1 9/5 0

Trt 1 1 811/490 0

Residual 2 1 367/196 0

Residual

Tag 3 1 0 0

Residual 1 1 0 0

$EF

Tag Trt eff.Tag eff.Trt

Between Run

Between Ani

Trt 1 1/6

Within

Between Ani

Tag 3/2 26/15 1/2 13/45

Trt 49/15 49/90

Residual

Tag 27/19 9/19

> matrix(design.df$Ani, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "AE" "AF" "AC" "AD"

[2,] "AB" "AC" "AA" "AE"

[3,] "AA" "AD" "AF" "AB"

> (N = with(design.df, table(Ani, Run)))

Run

Ani 1 2 3

AA 0 1 1

AB 0 1 1

AC 1 1 0

AD 1 0 1

AE 1 1 0

AF 1 0 1

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 2 1 1 1 1

AB 2 2 1 1 1 1

AC 1 1 2 1 2 1

AD 1 1 1 2 1 2

AE 1 1 2 1 2 1

AF 1 1 1 2 1 2

>

> (N = with(design.df, table(Ani, Tag)))

Tag

Ani 1 2 3 4

AA 1 0 1 0

AB 1 0 0 1

AC 0 1 1 0

AD 0 1 0 1

AE 1 0 0 1

AF 0 1 1 0

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 1 1 0 1 1

AB 1 2 0 1 2 0

AC 1 0 2 1 0 2

AD 0 1 1 2 1 1

AE 1 2 0 1 2 0

AF 1 0 2 1 0 2

>

> matrix(design.df$Trt, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "a" "b" "a" "b"

[2,] "b" "a" "a" "a"

[3,] "a" "b" "b" "b"

> (N = with(design.df, table(Trt, Run)))

Run

Trt 1 2 3

a 2 3 1

b 2 1 3

> N %\*% t(N)

Trt

Trt a b

a 14 10

b 10 14

>

> (N = with(design.df, table(Trt, Tag)))

Tag

Trt 1 2 3 4

a 2 1 2 1

b 1 2 1 2

> N %\*% t(N)

Trt

Trt a b

a 10 8

b 8 10

>

> old.time = proc.time()

>

> res <- optim(newInit, obj.fun.ave, swap, method = "SANN", control = list(maxit = 1e5,

+ temp = y2, tmax = 1000, trace = TRUE, REPORT = 10, fnscale = -1))

sann objective function values

initial value -63.849765

iter 10000 value -100.000000

iter 20000 value -100.000000

iter 30000 value -100.000000

iter 40000 value -100.000000

iter 50000 value -100.000000

iter 60000 value -100.000000

iter 70000 value -100.000000

iter 80000 value -100.000000

iter 90000 value -100.000000

iter 99999 value -100.000000

final value -100.000000

sann stopped after 99999 iterations

> newind = res$par[-length(res$par)]

> bestInd = newind

> #bestInd = 1:n

>

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$can.eff

[1] 1 1 1

>

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$can.eff

[1] 1 1 1 1

>

> test(X.trt = X.trt[bestInd,], mI(n) - Pb, Rep=trt.rep)$can.eff

[1] 1

> test(X.trt = X.trt[bestInd,], blk.proj, Rep=trt.rep)$can.eff

[1] 0.8888889

>

> test(X.trt = X.trt[bestInd,], Pb - mK(n), Rep=trt.rep)$can.eff

numeric(0)

> test(X.trt = X.trt[bestInd,], Pb1 - mK(n), Rep=trt.rep)$can.eff

[1] 0.1111111

>

>

> new.Z1.mat= Z1.mat[bestInd,]

> #new.Z1.mat= Z1.mat

>

> ################################################################################

> #Set the design from the search

>

> colnames(new.Z1.mat) = sort(levels(interaction(newLETTERS[1:nZ1])))

> new.Z1.des = apply(new.Z1.mat, 1, function(x)

+ colnames(new.Z1.mat)[which(as.logical(x))])

> new.Z1.des = as.data.frame(t(sapply(strsplit(new.Z1.des, "\\."), function(x) x)))

>

> design.df = data.frame(Run = as.factor(Z.des), Tag = factor(1:nPlot))

>

> design.df = cbind(design.df,

+ Ani = t(new.Z1.des),

+ Trt = phase1DesignEX1[match(as.character(t(new.Z1.des )),

+ as.character(phase1DesignEX1$Ani)),]$Trt)

>

>

>

> ################################################################################

> #Theortical ANOVA table

>

> summary.aov.twoPhase(design.df, blk.str2 = "Run", blk.str1 = "Ani",

+ trt.str = "Tag + Trt")

$ANOVA

DF e Ani Run

Between Run

Between Ani 1 1 2 4

Residual 1 1 0 4

Within

Between Ani

Tag 1 1 2 0

Trt 1 1 2 0

Residual 2 1 2 0

Residual

Tag 2 1 0 0

Residual 3 1 0 0

$EF

Tag Trt eff.Tag eff.Trt

Between Run

Between Ani

Residual

Within

Between Ani

Tag 3 2/3 1 1/9

Trt 16/3 8/9

Residual

Tag 3 1

> matrix(design.df$Ani, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "AC" "AF" "AF" "AC"

[2,] "AE" "AA" "AB" "AD"

[3,] "AD" "AB" "AA" "AE"

> (N = with(design.df, table(Ani, Run)))

Run

Ani 1 2 3

AA 0 1 1

AB 0 1 1

AC 2 0 0

AD 0 1 1

AE 0 1 1

AF 2 0 0

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 2 0 2 2 0

AB 2 2 0 2 2 0

AC 0 0 4 0 0 4

AD 2 2 0 2 2 0

AE 2 2 0 2 2 0

AF 0 0 4 0 0 4

>

> (N = with(design.df, table(Ani, Tag)))

Tag

Ani 1 2 3 4

AA 0 1 1 0

AB 0 1 1 0

AC 1 0 0 1

AD 1 0 0 1

AE 1 0 0 1

AF 0 1 1 0

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 2 0 0 0 2

AB 2 2 0 0 0 2

AC 0 0 2 2 2 0

AD 0 0 2 2 2 0

AE 0 0 2 2 2 0

AF 2 2 0 0 0 2

>

> matrix(design.df$Trt, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "a" "b" "b" "a"

[2,] "a" "a" "b" "b"

[3,] "b" "b" "a" "a"

> (N = with(design.df, table(Trt, Run)))

Run

Trt 1 2 3

a 2 2 2

b 2 2 2

> N %\*% t(N)

Trt

Trt a b

a 12 12

b 12 12

>

> (N = with(design.df, table(Trt, Tag)))

Tag

Trt 1 2 3 4

a 2 1 1 2

b 1 2 2 1

> N %\*% t(N)

Trt

Trt a b

a 10 8

b 8 10

> init = sample(1:n)

>

> newInit = c(init, init[1])

>

> res <- optim(newInit, obj.fun.old, swap, method = "SANN", control = list(maxit = 1e+5,

+ temp = y2, tmax = 1000, trace = TRUE, REPORT = 10, fnscale = -1))

sann objective function values

initial value -44.209335

iter 10000 value -88.888889

iter 20000 value -88.888889

iter 30000 value -88.888889

iter 40000 value -88.888889

iter 50000 value -88.888889

iter 60000 value -88.888889

iter 70000 value -88.888889

iter 80000 value -88.888889

iter 90000 value -88.888889

iter 99999 value -88.888889

final value -88.888889

sann stopped after 99999 iterations

>

> proc.time() - old.time

user system elapsed

43.90 2.51 234.05

> bestInd = newind

> #bestInd = 1:n

>

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$ave.eff

[1] 0.8888889

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$can.eff

[1] 0.8888889 0.8888889 0.8888889

>

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$can.eff

[1] 1 1 1

>

> test(X.trt = X.trt[bestInd,], mI(n) - Pb, Rep=trt.rep)$can.eff

[1] 1

> test(X.trt = X.trt[bestInd,], blk.proj, Rep=trt.rep)$can.eff

[1] 0.8888889

>

> test(X.trt = X.trt[bestInd,], Pb - mK(n), Rep=trt.rep)$can.eff

numeric(0)

> test(X.trt = X.trt[bestInd,], Pb1 - mK(n), Rep=trt.rep)$can.eff

[1] 0.1111111

>

>

> new.Z1.mat= Z1.mat[bestInd,]

> #new.Z1.mat= Z1.mat

>

> ################################################################################

> #Set the design from the search

>

> colnames(new.Z1.mat) = sort(levels(interaction(newLETTERS[1:nZ1])))

> new.Z1.des = apply(new.Z1.mat, 1, function(x)

+ colnames(new.Z1.mat)[which(as.logical(x))])

> new.Z1.des = as.data.frame(t(sapply(strsplit(new.Z1.des, "\\."), function(x) x)))

>

> design.df = data.frame(Run = as.factor(Z.des), Tag = factor(1:nPlot))

>

> design.df = cbind(design.df,

+ Ani = t(new.Z1.des),

+ Trt = phase1DesignEX1[match(as.character(t(new.Z1.des )),

+ as.character(phase1DesignEX1$Ani)),]$Trt)

>

>

>

> ################################################################################

> #Theortical ANOVA table

>

> summary.aov.twoPhase(design.df, blk.str2 = "Run", blk.str1 = "Ani",

+ trt.str = "Tag + Trt")

$ANOVA

DF e Ani Run

Between Run 2 1 0 4

Within

Between Ani

Tag 3 1 3 0

Residual

Tag 3 1 0 0

Residual 3 1 0 0

$EF

Tag Trt eff.Tag eff.Trt

Between Run

Within

Between Ani

Tag 1/3 6 1/9 1

Residual

Tag 8/3 8/9

> matrix(design.df$Ani, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "AB" "AA" "AC" "AD"

[2,] "AC" "AD" "AA" "AB"

[3,] "AA" "AB" "AD" "AC"

> (N = with(design.df, table(Ani, Run)))

Run

Ani 1 2 3

AA 1 1 1

AB 1 1 1

AC 1 1 1

AD 1 1 1

> N %\*% t(N)

Ani

Ani AA AB AC AD

AA 3 3 3 3

AB 3 3 3 3

AC 3 3 3 3

AD 3 3 3 3

>

> (N = with(design.df, table(Ani, Tag)))

Tag

Ani 1 2 3 4

AA 1 1 1 0

AB 1 1 0 1

AC 1 0 1 1

AD 0 1 1 1

> N %\*% t(N)

Ani

Ani AA AB AC AD

AA 3 2 2 2

AB 2 3 2 2

AC 2 2 3 2

AD 2 2 2 3

>

> matrix(design.df$Trt, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "b" "a" "a" "b"

[2,] "a" "b" "a" "b"

[3,] "a" "b" "b" "a"

> (N = with(design.df, table(Trt, Run)))

Run

Trt 1 2 3

a 2 2 2

b 2 2 2

> N %\*% t(N)

Trt

Trt a b

a 12 12

b 12 12

>

> (N = with(design.df, table(Trt, Tag)))

Tag

Trt 1 2 3 4

a 2 1 2 1

b 1 2 1 2

> N %\*% t(N)

Trt

Trt a b

a 10 8

b 8 10

> set.seed(527)

> init = sample(1:n)

>

> newInit = c(init, init[1])

>

> res <- optim(newInit, obj.fun.old1, swap, method = "SANN", control = list(maxit = 1e+5,

+ temp = y2, tmax = 1000, trace = TRUE, REPORT = 10, fnscale = -1))

sann objective function values

initial value -46.055556

iter 10000 value -91.666667

iter 20000 value -91.666667

iter 30000 value -91.666667

iter 40000 value -91.666667

iter 50000 value -91.666667

iter 60000 value -91.666667

iter 70000 value -91.666667

iter 80000 value -91.666667

iter 90000 value -91.666667

iter 99999 value -91.666667

final value -91.666667

sann stopped after 99999 iterations

> newind = res$par[-length(res$par)]

> bestInd = newind

> #bestInd = 1:n

>

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$can.eff

[1] 1 1

>

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$can.eff

[1] 1 1 1

>

> test(X.trt = X.trt[bestInd,], mI(n) - Pb, Rep=trt.rep)$can.eff

[1] 1

> test(X.trt = X.trt[bestInd,], blk.proj, Rep=trt.rep)$can.eff

[1] 0.6666667

>

> test(X.trt = X.trt[bestInd,], Pb - mK(n), Rep=trt.rep)$can.eff

numeric(0)

> test(X.trt = X.trt[bestInd,], Pb1 - mK(n), Rep=trt.rep)$can.eff

[1] 0.3333333

>

>

> new.Z1.mat= Z1.mat[bestInd,]

> #new.Z1.mat= Z1.mat

>

> ################################################################################

> #Set the design from the search

>

> colnames(new.Z1.mat) = sort(levels(interaction(newLETTERS[1:nZ1])))

> new.Z1.des = apply(new.Z1.mat, 1, function(x)

+ colnames(new.Z1.mat)[which(as.logical(x))])

> new.Z1.des = as.data.frame(t(sapply(strsplit(new.Z1.des, "\\."), function(x) x)))

>

> design.df = data.frame(Run = as.factor(Z.des), Tag = factor(1:nPlot))

>

> design.df = cbind(design.df,

+ Ani = t(new.Z1.des),

+ Trt = phase1DesignEX1[match(as.character(t(new.Z1.des )),

+ as.character(phase1DesignEX1$Ani)),]$Trt)

>

>

>

> ################################################################################

> #Theortical ANOVA table

>

> summary.aov.twoPhase(design.df, blk.str2 = "Run", blk.str1 = "Ani",

+ trt.str = "Tag + Trt")

$ANOVA

DF e Ani Run

Between Run 2 1 0 4

Within

Between Ani

Tag 1 1 3 0

Trt 1 1 3 0

Residual 1 1 3 0

Residual

Tag 2 1 0 0

Residual 4 1 0 0

$EF

Tag Trt eff.Tag eff.Trt

Between Run

Within

Between Ani

Tag 3 2 1 1/3

Trt 4 2/3

Residual

Tag 3 1

> matrix(design.df$Ani, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "AC" "AA" "AD" "AB"

[2,] "AA" "AB" "AD" "AC"

[3,] "AB" "AC" "AD" "AA"

> (N = with(design.df, table(Ani, Run)))

Run

Ani 1 2 3

AA 1 1 1

AB 1 1 1

AC 1 1 1

AD 1 1 1

> N %\*% t(N)

Ani

Ani AA AB AC AD

AA 3 3 3 3

AB 3 3 3 3

AC 3 3 3 3

AD 3 3 3 3

>

> (N = with(design.df, table(Ani, Tag)))

Tag

Ani 1 2 3 4

AA 1 1 0 1

AB 1 1 0 1

AC 1 1 0 1

AD 0 0 3 0

> N %\*% t(N)

Ani

Ani AA AB AC AD

AA 3 3 3 0

AB 3 3 3 0

AC 3 3 3 0

AD 0 0 0 9

>

> matrix(design.df$Trt, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "a" "a" "b" "b"

[2,] "a" "b" "b" "a"

[3,] "b" "a" "b" "a"

> (N = with(design.df, table(Trt, Run)))

Run

Trt 1 2 3

a 2 2 2

b 2 2 2

> N %\*% t(N)

Trt

Trt a b

a 12 12

b 12 12

>

> (N = with(design.df, table(Trt, Tag)))

Tag

Trt 1 2 3 4

a 2 2 0 2

b 1 1 3 1

> N %\*% t(N)

Trt

Trt a b

a 12 6

b 6 12

> res <- optim(newInit, obj.fun.old1, swap, method = "SANN", control = list(maxit = 1e+5,

+ temp = y2, tmax = 1000, trace = TRUE, REPORT = 10, fnscale = -1))

sann objective function values

initial value -29.047899

iter 10000 value -100.000000

iter 20000 value -100.000000

iter 30000 value -100.000000

iter 40000 value -100.000000

iter 50000 value -100.000000

iter 60000 value -100.000000

iter 70000 value -100.000000

iter 80000 value -100.000000

iter 90000 value -100.000000

iter 99999 value -100.000000

final value -100.000000

sann stopped after 99999 iterations

> newind = res$par[-length(res$par)]

> bestInd = newind

> #bestInd = 1:n

>

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$can.eff

[1] 1 1 1

>

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$can.eff

[1] 1 1 1 1

>

> test(X.trt = X.trt[bestInd,], mI(n) - Pb, Rep=trt.rep)$can.eff

[1] 1

> test(X.trt = X.trt[bestInd,], blk.proj, Rep=trt.rep)$can.eff

[1] 1

>

> test(X.trt = X.trt[bestInd,], Pb - mK(n), Rep=trt.rep)$can.eff

[1] 1

> test(X.trt = X.trt[bestInd,], Pb1 - mK(n), Rep=trt.rep)$can.eff

numeric(0)

>

>

> new.Z1.mat= Z1.mat[bestInd,]

> #new.Z1.mat= Z1.mat

>

> ################################################################################

> #Set the design from the search

>

> colnames(new.Z1.mat) = sort(levels(interaction(newLETTERS[1:nZ1])))

> new.Z1.des = apply(new.Z1.mat, 1, function(x)

+ colnames(new.Z1.mat)[which(as.logical(x))])

> new.Z1.des = as.data.frame(t(sapply(strsplit(new.Z1.des, "\\."), function(x) x)))

>

> design.df = data.frame(Run = as.factor(Z.des), Tag = factor(1:nPlot))

>

> design.df = cbind(design.df,

+ Ani = t(new.Z1.des),

+ Trt = phase1DesignEX1[match(as.character(t(new.Z1.des )),

+ as.character(phase1DesignEX1$Ani)),]$Trt)

>

>

>

> ################################################################################

> #Theortical ANOVA table

>

> summary.aov.twoPhase(design.df, blk.str2 = "Run", blk.str1 = "Ani",

+ trt.str = "Tag + Trt")

$ANOVA

DF e Ani Run

Between Run

Between Ani

Trt 1 1 2 4

Residual 1 1 0 4

Within

Between Ani

Tag 1 1 2 0

Trt 1 1 2 0

Residual 2 1 2 0

Residual

Tag 2 1 0 0

Residual 3 1 0 0

$EF

Tag Trt eff.Tag eff.Trt

Between Run

Between Ani

Trt 4 1

Residual

Within

Between Ani

Tag 3 1

Trt 4 1

Residual

Tag 3 1

> matrix(design.df$Ani, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "AB" "AE" "AB" "AE"

[2,] "AC" "AA" "AD" "AF"

[3,] "AD" "AF" "AC" "AA"

> (N = with(design.df, table(Ani, Run)))

Run

Ani 1 2 3

AA 0 1 1

AB 2 0 0

AC 0 1 1

AD 0 1 1

AE 2 0 0

AF 0 1 1

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 0 2 2 0 2

AB 0 4 0 0 4 0

AC 2 0 2 2 0 2

AD 2 0 2 2 0 2

AE 0 4 0 0 4 0

AF 2 0 2 2 0 2

>

> (N = with(design.df, table(Ani, Tag)))

Tag

Ani 1 2 3 4

AA 0 1 0 1

AB 1 0 1 0

AC 1 0 1 0

AD 1 0 1 0

AE 0 1 0 1

AF 0 1 0 1

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 0 0 0 2 2

AB 0 2 2 2 0 0

AC 0 2 2 2 0 0

AD 0 2 2 2 0 0

AE 2 0 0 0 2 2

AF 2 0 0 0 2 2

>

> matrix(design.df$Trt, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "b" "b" "b" "b"

[2,] "c" "a" "a" "c"

[3,] "a" "c" "c" "a"

> (N = with(design.df, table(Trt, Run)))

Run

Trt 1 2 3

a 0 2 2

b 4 0 0

c 0 2 2

> N %\*% t(N)

Trt

Trt a b c

a 8 0 8

b 0 16 0

c 8 0 8

>

> (N = with(design.df, table(Trt, Tag)))

Tag

Trt 1 2 3 4

a 1 1 1 1

b 1 1 1 1

c 1 1 1 1

> N %\*% t(N)

Trt

Trt a b c

a 4 4 4

b 4 4 4

c 4 4 4

> init = sample(1:n)

>

> newInit = c(init, init[1])

>

> res <- optim(newInit, obj.fun.new, swap, method = "SANN", control = list(maxit = 1e+5,

+ temp = y2, tmax = 1000, trace = TRUE, REPORT = 10, fnscale = -1))

sann objective function values

initial value -42.613990

iter 10000 value -98.412698

iter 20000 value -98.412698

iter 30000 value -98.412698

iter 40000 value -98.412698

iter 50000 value -98.412698

iter 60000 value -98.412698

iter 70000 value -98.412698

iter 80000 value -98.412698

iter 90000 value -98.412698

iter 99999 value -98.412698

final value -98.412698

sann stopped after 99999 iterations

> newind = res$par[-length(res$par)]

> bestInd = newind

> #bestInd = 1:n

>

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], blk.proj, Rep=Z1.rep)$can.eff

[1] 1 1 1

>

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$ave.eff

[1] 1

> test(X.trt = Z1.mat[bestInd,], mI(n) - Pb, Rep=Z1.rep)$can.eff

[1] 1 1 1 1

>

> test(X.trt = X.trt[bestInd,], mI(n) - Pb, Rep=trt.rep)$can.eff

[1] 1.00 0.75

> test(X.trt = X.trt[bestInd,], blk.proj, Rep=trt.rep)$can.eff

[1] 1.00 0.75

>

> test(X.trt = X.trt[bestInd,], Pb - mK(n), Rep=trt.rep)$can.eff

[1] 0.25

> test(X.trt = X.trt[bestInd,], Pb1 - mK(n), Rep=trt.rep)$can.eff

numeric(0)

>

>

> new.Z1.mat= Z1.mat[bestInd,]

> #new.Z1.mat= Z1.mat

>

> ################################################################################

> #Set the design from the search

>

> colnames(new.Z1.mat) = sort(levels(interaction(newLETTERS[1:nZ1])))

> new.Z1.des = apply(new.Z1.mat, 1, function(x)

+ colnames(new.Z1.mat)[which(as.logical(x))])

> new.Z1.des = as.data.frame(t(sapply(strsplit(new.Z1.des, "\\."), function(x) x)))

>

> design.df = data.frame(Run = as.factor(Z.des), Tag = factor(1:nPlot))

>

> design.df = cbind(design.df,

+ Ani = t(new.Z1.des),

+ Trt = phase1DesignEX1[match(as.character(t(new.Z1.des )),

+ as.character(phase1DesignEX1$Ani)),]$Trt)

>

>

>

> ################################################################################

> #Theortical ANOVA table

>

> summary.aov.twoPhase(design.df, blk.str2 = "Run", blk.str1 = "Ani",

+ trt.str = "Tag + Trt")

$ANOVA

DF e Ani Run

Between Run

Between Ani

Trt 1 1 2 4

Residual 1 1 0 4

Within

Between Ani

Tag 1 1 2 0

Trt 2 1 2 0

Residual 1 1 2 0

Residual

Tag 2 1 0 0

Residual 3 1 0 0

$EF

Tag Trt eff.Tag eff.Trt

Between Run

Between Ani

Trt 1 1/4

Residual

Within

Between Ani

Tag 3 1

Trt 24/7 6/7

Residual

Tag 3 1

> matrix(design.df$Ani, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "AC" "AC" "AB" "AB"

[2,] "AE" "AD" "AF" "AA"

[3,] "AD" "AE" "AA" "AF"

> (N = with(design.df, table(Ani, Run)))

Run

Ani 1 2 3

AA 0 1 1

AB 2 0 0

AC 2 0 0

AD 0 1 1

AE 0 1 1

AF 0 1 1

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 0 0 2 2 2

AB 0 4 4 0 0 0

AC 0 4 4 0 0 0

AD 2 0 0 2 2 2

AE 2 0 0 2 2 2

AF 2 0 0 2 2 2

>

> (N = with(design.df, table(Ani, Tag)))

Tag

Ani 1 2 3 4

AA 0 0 1 1

AB 0 0 1 1

AC 1 1 0 0

AD 1 1 0 0

AE 1 1 0 0

AF 0 0 1 1

> N %\*% t(N)

Ani

Ani AA AB AC AD AE AF

AA 2 2 0 0 0 2

AB 2 2 0 0 0 2

AC 0 0 2 2 2 0

AD 0 0 2 2 2 0

AE 0 0 2 2 2 0

AF 2 2 0 0 0 2

>

> matrix(design.df$Trt, nrow = nBlk, ncol = nPlot, byrow = TRUE)

[,1] [,2] [,3] [,4]

[1,] "c" "c" "b" "b"

[2,] "b" "a" "c" "a"

[3,] "a" "b" "a" "c"

> (N = with(design.df, table(Trt, Run)))

Run

Trt 1 2 3

a 0 2 2

b 2 1 1

c 2 1 1

> N %\*% t(N)

Trt

Trt a b c

a 8 4 4

b 4 6 6

c 4 6 6

>

> (N = with(design.df, table(Trt, Tag)))

Tag

Trt 1 2 3 4

a 1 1 1 1

b 1 1 1 1

c 1 1 1 1

> N %\*% t(N)

Trt

Trt a b c

a 4 4 4

b 4 4 4

c 4 4 4