Package 'PBTools'

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Type Package

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Author Alaine A. Gulles

Maintainer Alaine A. Gulles <a.gulles@irri.org>

Description Generate randomization for different experimental designs commonly used in Plant Breeding Trials.

Depends R (>= 3.4.0), DiGGer, plyr

License GPL (>= 2)

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

R topics documented:

allFactors *allFactors*

Description

Function that return all factors of an integer

Usage

```
allFactors(x)
```

Source

http://stackoverflow.com/questions/6424856/r-function-for-returning-all-factors

designAlphaLattice *Alpha Lattice Design*

Description

Generate randomization and layout for Alpha Lattice Design.

Usage

```
designAlphaLattice(generate, numBlk = 2, numRep = 2, numTrial = 1,
  genLayout = FALSE, numRowPerBlk = 1, numRowPerRep = 1,
  numFieldRow = 1, serpentine = FALSE, display = TRUE)
```

Arguments

generate	list of entries to be randomized
numRep	number of replicates or blocks
numTrial	number of trials (randomization set-ups with the complete set of entries)
genLayout	logical, whether a layout of the design will be generated
numRowPerBlk	number of rows per block
numRowPerRep	number of rows per replicate
numFieldRow	number of field rows
serpentine	a logical variable indicating whether plot number will be arranged as serpentine order
display	a logical variable indicating whether randomization parameters will be displayed

Details

If genLayout is TRUE, then parameters numFieldRow, numRowPerRep and numRowPerBlk must be specified. Values of numRowPerBlk should be a factor of numRowPerRep while values of numRowPerRep should be a factor of numFieldRow.

Value

A list containing the following components:

fieldbook	a data frame
plan	a data frame, if genLayout is FALSE or a list containing the following components if genLayout is TRUE
TrmtLayout	a data frame, if genLayout is FALSE or a list whose length is equal to the number of trials containing the treatment layout for each trial, if genLayout is TRUE
PlotNumLayout	a matrix containing the plot number layout of the experiment, if genLayout is TRUE
RepLayout	a matrix containing the replication layout of the experiment, if genLayout is TRUE
BlockLayout	a matrix containing the block layout of the experiment

Examples

```
## Generate randomization for an experiment with 24 treatment levels in Alpha Lattice replicated
## 4 times. Each replicate will have 4 blocks.
alpha1 <- designAlphaLattice(generate = list(Entry = 24), numBlk = 4, numRep = 4, numTrial = 1,
   genLayout = FALSE)

## Generate randomization and layout for an experiment with 24 levels in Alpha Lattice replicated
## 4 times. Each replicate will have 4 blocks. The experiment will be arranged in a 8 x 12 field.
## Each replicate will be arranged in a 4 x 6, while each block will be arranged in 2 x 3.
alpha2 <- designAlphaLattice(generate = list(Entry = 24), numBlk = 4, numRep = 4, numTrial = 1,
   genLayout = TRUE, numRowPerBlk = 2, numRowPerRep = 4, numFieldRow = 8)
```

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designAugmentedRCB *Augmented Randomized Complete Block Design*

Description

Generate randomization and layout for Augmented Randomized Complete Block Design.

Usage

```
designAugmentedRCB(numCheck, numTest, trmtName = NULL, numBlk = 2,
  numTrial = 1, genLayout = FALSE, numRowPerBlk = 1,
  numFieldRow = 1, serpentine = FALSE, checkTrmtList = NULL,
  testTrmtList = NULL, display = TRUE)
```

Arguments

numCheck	number of replicated treatments
numTest	number of unreplicated treatments
trmtName	NULL or a character string which indicate the name of the treatment to be displayed in the output dataframe
numBlk	number of blocks

numTrial	number of trials (randomization set-ups with the complete set of entries)
genLayout	logical, whether a layout of the design will be generated or not
numRowPerBlk	number of rows per block, if genLayout is TRUE
numFieldRow	number of field rows, if genLayout is TRUE
serpentine	a logical variable indicating whether plot number will be arranged as serpentine order, , if genLayout is TRUE
checkTrmtList	NULL or a character vector indicating the names of the replicated treatment
testTrmtList	NULL or a character vector indicating the names of the unreplicated treatment
display	a logical variable indicating whether randomization parameters will be displayed

Details

If genLayout is TRUE, then parameters numFieldRow and numRowPerBlk must be specified. Values of numRowPerBlk should be a factor of numFieldRow.

If checkTrmtList is a character vector, the length should be equal to the numCheck. If testTrmtList is a character vector, the length should be equal to the numTest.

Value

A list containing the following components:

fieldbook	a data frame
plan	a data frame, if genLayout is FALSE or a list containing the following components if genLayout is TRUE:
TrmtLayout	a list whose length is equal to the number of trials containing the treatment layout for each trial
PlotNumLayout	a matrix containing the plot number information of the experiment
BlockLayout	a matrix containing the replication information of the experiment

Examples

```
## Generate randomization of 6 entries replicated 4 times and 8 unreplicated entries using
## Augmented Randomized Complete Block Design
augRCBD1 <- designAugmentedRCB(numCheck = 6, numTest = 8, trmtName = "Variety", numBlk = 4,
    numTrial = 2, genLayout = FALSE)

augRCBD2 <- designAugmentedRCB(numCheck = 6, numTest = 8, trmtName = "Variety", numBlk = 4,
    numTrial = 2, genLayout = TRUE, numRowPerBlk = 2, numFieldRow = 4, serpentine = TRUE)
```

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designRCBD *Randomized Complete Block Design (RCBD)*

Description

Generate randomization and layout for randomized complete block design (RCBD) for single factor or factorial experiments.

Usage

```
designRCBD(generate, numBlk = 2, numTrial = 1, genLayout = FALSE,
  numFieldRow = 1, numRowPerBlk = 1, serpentine = FALSE,
  topToBottom = TRUE, display = TRUE)
```

Arguments

generate	list of entries to be randomized
numBlk	number of replicates or blocks
numTrial	number of trials (randomization set-ups with the complete set of entries)
genLayout	logical, whether a layout of the design will be generated
numFieldRow	number of field rows
numRowPerBlk	number of rows per replicate or block
serpentine	a logical variable indicating whether plot number will be arranged as serpentine order
topToBottom	a logical variable indicating whether plot number will be written from to to bottom
display	a logical variable indicating whether randomization parameters will be displayed

Details

If genLayout is TRUE, then parameters numFieldRow and numRowPerBlk must be specified. Values of numRowPerBlk should be a factor of numFieldRow.

Value

A list containing the following components:

fieldbook	a data frame
plan	a data frame, if genLayout is FALSE or a list containing the following components if genLayout is TRUE:
TrmtLayout	a list whose length is equal to the number of trials containing the treatment layout for each trial
PlotNumLayout	a matrix containing the plot number layout of the experiment
BlockLayout	a matrix containing the replication layout of the experiment

Examples

```
## Generate randomization for an experiment with 10 levels in RCBD replicated 4 times
rcbd1a <- designRCBD(generate = list(Entry = 1:10), numBlk = 4, numTrial = 1, genLayout = FALSE)

## Generate randomization and layout in RCBD for an experiment with 10 levels replicated 4 times in 2 trials
rcbd1b <- designRCBD(generate = list(Entry = 10), numBlk = 4, numTrial = 2, genLayout = TRUE,
   numFieldRow = 10, numRowPerBlk = 5)

## Generate randomization and layout in RCBD for a 5 x 4 factorial experiment replicated 4 times in 2 trials
varietyLevel <- paste("V", 1:5, sep = "")
fertLevel <- paste("F", 1:4, sep = "")
rcbd2a <- designRCBD(generate = list(Variety = varietyLevel, Fertilizer = fertLevel), numBlk = 4,
    numTrial = 2, genLayout = TRUE, numFieldRow = 10, numRowPerBlk = 5, serpentine = TRUE)
```

`designRowColumn` *Row-Column Design*

Description

Generate randomization and layout for Row-Column Design.

Usage

```
designRowColumn(generate, numRowBlk = 2, numRep = 2, numTrial = 1,
  genLayout = FALSE, numFieldRow = 2, serpentine = FALSE,
  display = TRUE)
```

Arguments

`generate`	list of entries to be randomized
`numRowBlk`	number of rows per replicate or number of row blocks per replicate
`numRep`	number of replicates or blocks
`numTrial`	number of trials (randomization set-ups with the complete set of entries)
`genLayout`	logical, whether a layout of the design will be generated or not
`numFieldRow`	number of field rows, if genLayout is TRUE
`serpentine`	a logical variable indicating whether plot number will be arranged as serpentine order, , if genLayout is TRUE
`display`	a logical variable indicating whether randomization parameters will be displayed

Details

If `genLayout` is `TRUE`, then parameters `numFieldRow`, `numRowBlk` and `numRowPerBlk` must be specified. Values of `numRowPerBlk` should be a factor of `numRowBlk` while values of `numRowBlk` should be a factor of `numFieldRow`.

Value

A list containing the following components:

`fieldbook`	a data frame
`plan`	a data frame, if `genLayout` is `FALSE` or a list containing the following components if `genLayout` is `TRUE`:
`TrmtLayout`	a data frame, if `genLayout` is `FALSE` or a list whose length is equal to the number of trials containing the treatment layout for each trial, if `genLayout` is `TRUE`
`PlotNumLayout`	a matrix containing the plot number information of the experiment, if `genLayout` is `TRUE`
`RepLayout`	a matrix containing the replication information of the experiment, if `genLayout` is `TRUE`
`RowBlockLayout`	a matrix containing the row block information of the experiment
`ColumnBlockLayout`	a matrix containing the column block information of the experiment

Examples

```
## Generate randomization for an experiment with 20 treatment levels in Row-Column design replicated 4 times.
## Each replicate will have 4 row blocks.
rowcol1 <- designRowColumn(generate = list(Entry = 20), numRowBlk = 4, numRep = 4, numTrial = 1,
                           genLayout = FALSE)

## Generate randomization and layout for an experiment with 20 treatment levels in Row-Column design replicated
## 4 times. Each replicate will have 4 row blocks. The experiment will be arrange in a 8 x 10 field while each
## replicate will be arrange in a 4 x 5.

rowcol2 <- designRowColumn(generate = list(Entry = 20), numRowBlk = 4, numRep = 4, numTrial = 2,
                           genLayout = TRUE, numFieldRow = 8)
```

FactorList *Create levels of a factor*

Description

Generate all treatment combination of several factors.

Usage

```
FactorList(generate)
```

Arguments

generate	a list containing the different levels of treatment combination

Value

a dataframe.

Examples

```
FactorList(generate = list(Entry = 1:10))
```

GenerateFactor *Create list of treatments or treatment combinations*

Description

Generate all treatment combination of several factors.

Usage

```
GenerateFactor(generate, times = 1)
```

Arguments

generate	a list
times	number of times the levels will be repeated

Value

a dataframe.

Examples

```
GenerateFactor(generate = list(Variety = 4))
```

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generateLayout *Layout Creation*

Description

Creates layout from an experimental design in Randomized Complete Block.

Usage

```
generateLayout(fieldbook, numFieldRow = 1, numRowPerBlk = 1,
  serpentine = FALSE, topToBottom = TRUE)
```

Arguments

fieldbook	a dataframe which is a result from the function randomizeRCBD
numFieldRow	number of field rows
numRowPerBlk	number of rows per block (or replicate)
serpentine	a logical variable indicating whether plot number will be arranged as serpentine order
topToBottom	a logical variable indicating whether plot number will be written from to to bottom
fieldbook	a data frame
plan	a list containing the following components:
TrmtLayout	a list whose length is equal to the number of trials containing the treatment layout for each trial
PlotNumLayout	a matrix containing the plot number layout of the experiment
BlockLayout	a matrix containing the replication layout of the experiment

Value

A list containing the following components:

Examples

```
myFieldbook <- randomizeRCBD(generate = list(Entry = 1:10), numRep = 4, numTrial = 1)
myLayout <- generateLayout(myFieldbook, numFieldRow = 10, numRowPerBlk = 5)
```

layoutIBD *Layout Creation for Incomplete Block Designs*

Description

Creates layout Incomplete Block Designs including Alpha Lattice and Row-Column Design.

Usage

```
layoutIBD(fieldbook, trmtLayout, numFieldRow, numFieldCol, numRowPerRep,
  numColPerRep, numBlk = NULL, numRowPerBlk = NULL,
  numColPerBlk = NULL, serpentine = FALSE)
```

Arguments

fieldbook	a dataframe which is a result from the function randomizeIBD
trmtLayout	a list which is a result from the function randomizeIBD
numFieldRow	number of field rows
numFieldCol	number of field columns
numRowPerRep	number of rows per replicate
numColPerRep	number of columns per replicate
numRowPerBlk	number of rows per block
numColPerBlk	number of columns per block
serpentine	a logical variable indicating whether plot number will be arranged as serpentine order

Value

list containing a fieldbook, the layout and plot numbers.

randomizeIBD *Randomization for Incomplete Block designs*

Description

Generate randomization.

Usage

```
randomizeIBD(numTrmt, numFieldRow, numFieldCol, numRep, numRowPerRep,
  numColPerRep, numBlk = NULL, blksize = NULL, numRowPerBlk = NULL,
  numColPerBlk = NULL, trmtList = NULL)
```

Arguments

numTrmt	number of treatment
numFieldRow	number of field rows
numFieldCol	number of field columns
numRep	number of replicates
numRowPerRep	number of row per replicate
numColPerRep	number of column per replicate
numBlk	number of blocks per replicate
blksize	number of plots per block
numRowPerBlk	number of row per block
numColPerBlk	number of column per block
trmtList	NULL or vector or character containing the levels of the treatment

Value

A list containing dataframe and statistical design array.

Examples

```
randomizeIBD(numTrmt = 16, numRep = 3, numRowPerRep = 16, numColPerRep = 1,
   numBlk = 4, blksize = 4, numRowPerBlk = 4, numColPerBlk = 1,
   numFieldRow = 16, numFieldCol = 3)
```

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randomizeRCBD *Randomization for Randomized Complete Block Design (RCBD)*

Description

Generate randomization for randomized complete block design (RCBD) for single factor or factorial experiments.

Usage

```
randomizeRCBD(generate, numBlk = 2, numTrial = 1)
```

Arguments

generate	list of entries to be randomized
numBlk	number of replicates or blocks
numTrial	number of trials (randomization set-ups with the complete set of entries)

Value

A dataframe.

Examples

```
randomizeRCBD(generate = list(Variety = 4), numBlk = 2, numTrial = 1)
```

writePlotNumInfo *writePlotNumInfo*

Description

Utility function.

Usage

```
writePlotNumInfo(info, table, tableGrp = NULL, numGrpRow, numGrpCol,
  numRowPerGrp, numColPerGrp, incrementWithin = TRUE, increment = NULL)
```

Arguments

info	information to be
table	a matrix
tableGrp	NULL or a matrix
numGrpRow	a numerical value
numGrpCol	a numerical value
numRowPerGrp	a numerical value
numColPerGrp	a numerical value
incrementWithin	a logical value
increment	NULL or a numerical value

Value

a matrix

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