Package 'SudokuDesigns'

March 18, 2025

Type Package

Title Sudoku as an Experimental Design

Version 1.2.0

Maintainer Ashutosh Dalal <ashutosh.dalal97@gmail.com>

Description

Sudoku designs (Bailey et al., 2008<doi:10.1080/00029890.2008.11920542>) can be used as experimental designs which tackle one extra source of variation than conventional Latin square designs. Although Sudoku designs are similar to Latin square designs, only addition is the region concept. Some very important functions related to row-column designs as well as block designs along with basic functions are included in this package.

License GPL (>= 2)

Encoding UTF-8

RoxygenNote 7.3.2

NeedsCompilation no

Author Ashutosh Dalal [aut, cre],
Cini Varghese [aut, ctb],
Rajender Parsad [aut, ctb],
Mohd Harun [aut, ctb]

Repository CRAN

Date/Publication 2025-03-18 07:30:37 UTC

Contents

Check_IBD 2
Check_IRC 2
Check_MP_Inverse 3
Check_Obsn_vs_Col_Matrix 3
Check_Obsn_vs_Reg_Matrix 4
Check_Obsn_vs_Rows_Matrix 5
Check_Obsn_vs_Trt_Matrix 5
Check_Rank 6
Check_Replications 6

Check_Sudoku_Design 7
Check_Tupple 8
Get_Sudoku_I 8
Get_Sudoku_II 9

Index **10**

`Check_IBD` *Check properties of an incomplete block design (IBD)*

Description

Check properties of an incomplete block design (IBD)

Usage

```
Check_IBD(Design)
```

Arguments

`Design`	Provide an IBD in matrix format

Value

Provides C matrix (Information matrix), eigenvalues(EVs) and canonical efficiency factor (CEF) of a given IBD

Examples

```
library(SudokuDesigns)
Design<-matrix(c(1,2,3,2,5,3,2,4,6),nrow=3,byrow=TRUE)
Check_IBD(Design)
```

`Check_IRC` *Check properties of an incomplete row-column design (IRC)*

Description

Check properties of an incomplete row-column design (IRC)

Usage

```
Check_IRC(Design)
```

Arguments

`Design`	Provide an IRC in matrix format

Value

Provides C matrix (Information matrix), eigenvalues(EVs) and canonical efficiency factor (CEF) of a given IRC.

Examples

```
library(SudokuDesigns)
Design<-matrix(c(1,2,3,2,5,3,2,4,6),nrow=3,byrow=TRUE)
Check_IRC(Design)
```

Check_MP_Inverse *Moore Penrose Inverse*

Description

Moore Penrose Inverse

Usage

```
Check_MP_Inverse(matrix)
```

Arguments

matrix	Any matrix

Value

Provides Moore Penrose inverse of a given matrix

Examples

```
library(SudokuDesigns)
mat<-matrix(c(1,2,3,2,5,3,2,4,6),nrow=3,byrow=TRUE)
Check_MP_Inverse(mat)
```

Check_Obsn_vs_Col_Matrix *Observations Vs Columns Incidence Matrix*

Description

Observations Vs Columns Incidence Matrix

Usage

```
Check_Obsn_vs_Col_Matrix(Matrix)
```

Arguments

Matrix	Any matrix

Value

Generates observations vs columns incidence matrix of a given design

Examples

```
library(SudokuDesigns)
mat1<-matrix(c(1,2,3,4,1,3,6,2,8,1,8,3),nrow=4,byrow=TRUE)
mat1
Check_Obsn_vs_Col_Matrix(mat1)
```

Check_Obsn_vs_Reg_Matrix

Observations Vs Regions Incidence Matrix

Description

Observations Vs Regions Incidence Matrix

Usage

```
Check_Obsn_vs_Reg_Matrix(Design, Region)
```

Arguments

Design	A Sudoku design in matrix format
Region	A matrix of regions according to the Sudoku design

Value

Observations vs regions incidence matrix for a given Sudoku design and region matrix

Examples

```
library(SudokuDesigns)
design<-matrix(c(1,2,3,4,3,4,1,2,2,1,4,3,4,3,2,1),nrow=4,ncol=4,byrow=TRUE)
region<-matrix(c(1,1,2,2,1,1,2,2,3,3,4,4,3,3,4,4),nrow=4,ncol=4,byrow=TRUE)
Check_Obsn_vs_Reg_Matrix(design, region)
```

Check_Obsn_vs_Rows_Matrix

Observations Vs Rows Incidence Matrix

Description

Observations Vs Rows Incidence Matrix

Usage

```
Check_Obsn_vs_Rows_Matrix(Matrix)
```

Arguments

Matrix	Any matrix

Value

Generates observations vs rows matrix for a given design

Examples

```
library(SudokuDesigns)
mat1<-matrix(c(1,2,3,4,1,3,6,2,8,1,8,3),nrow=4,byrow=TRUE)
mat1
Check_Obsn_vs_Rows_Matrix(mat1)
```

Check_Obsn_vs_Trt_Matrix

Observations Vs Treatments Incidence Matrix

Description

Observations Vs Treatments Incidence Matrix

Usage

```
Check_Obsn_vs_Trt_Matrix(Matrix)
```

Arguments

Matrix	Any matrix

Value

Generates observations Vs treatments matrix

Examples

```
library(SudokuDesigns)
mat1<-matrix(c(1,2,3,4,1,3,6,2,8,1,8,3),nrow=4,byrow=TRUE)
mat1
Check_Obsn_vs_Trt_Matrix(mat1)
```

Check_Rank *Checking Rank of a Matrix*

Description

Checking Rank of a Matrix

Usage

```
Check_Rank(matrix)
```

Arguments

matrix	Any matrix

Value

Print the rank of the given matrix

Examples

```
library(SudokuDesigns)
mat<-matrix(c(1,2,3,2,4,6,5,2,3),nrow=3,byrow=TRUE)
Check_Rank(mat)
```

Check_Replications *Replications for each treatments*

Description

Replications for each treatments

Usage

```
Check_Replications(matrix)
```

Arguments

matrix	Any matrix

Value

Returns a matrix of replications for each treatment.

Examples

```
library(SudokuDesigns)
mat11<-matrix(c(1,2,3,4,1,3,6,2,8,1,8,3),nrow=4,byrow=TRUE)
mat11
Check_Replications(mat11)
```

Check_Sudoku_Design *Check Properties of Sudoku Designs*

Description

Check Properties of Sudoku Designs

Usage

```
Check_Sudoku_Design(Design, Region)
```

Arguments

Design	Give the Sudoku design in a matrix format
Region	Provide a Region matrix corresponding to Sudoku design

Value

Design along with design parameters, C matrix (Information matrix), eigenvalues(EVs) and canonical efficiency factor (CEF) of a given Sudoku design

Examples

```
library(SudokuDesigns)
design<-matrix(c(1,2,3,4,3,4,1,2,2,1,4,3,4,3,2,1),nrow=4,ncol=4,byrow=TRUE)
region<-matrix(c(1,1,2,2,1,1,2,2,3,3,4,4,3,3,4,4),nrow=4,ncol=4,byrow=TRUE)
Check_Sudoku_Design(design,region)
```

Check_Tupple *Find tupple occurances in a given matrix rows*

Description

Find tupple occurances in a given matrix rows

Usage

```
Check_Tupple(matrix, tupple)
```

Arguments

matrix	Any matrix
tupple	A vector of numbers

Value

Number of times a tupple occurs within the rows of a given matrix

Examples

```
mat1<-matrix(c(1,2,3,4,1,3,6,2,8,1,8,3),nrow=4,byrow=TRUE)
mat1
Check_Tupple(mat1,c(1,2))
```

Get_Sudoku_I *Complete/Incomplete Sudoku Designs for Even Number, v*

Description

To obtain complete as well as incomplete Sudoku designs for an even number one can use this function. The generated designs are a new series of Sudoku designs.

Usage

```
Get_Sudoku_I(v, type = "complete")
```

Arguments

v	Please enter an number, v
type	Please choose type as "complete" or "incomplete". Default is "complete".

Value

For a given v, this function will provide the Sudoku design and its parameters, Region matrix, C matrix, eigenvalues (EVs) and canonical efficiency factor (CEF).

Examples

```
library(SudokuDesigns)
Get_Sudoku_I(10)
```

`Get_Sudoku_II` *Incomplete Sudoku designs for v = nC2 where n (>=5) is an odd number*

Description

Generated designs with less number of regions with quite high canonical efficiency factors.

Usage

```
Get_Sudoku_II(v)
```

Arguments

v	Provide v = nC2 where n (>=5) is an odd number

Value

It returns an incomplete Gerechte design along with its parameters, region matrix, C matrix, eigenvalues (EVs) and canonical efficiency factor (CEF).

Examples

```
library(SudokuDesigns)
Get_Sudoku_II(10)
```

Index

Check_IBD, 2
Check_IRC, 2
Check_MP_Inverse, 3
Check_Obsn_vs_Col_Matrix, 3
Check_Obsn_vs_Reg_Matrix, 4
Check_Obsn_vs_Rows_Matrix, 5
Check_Obsn_vs_Trt_Matrix, 5
Check_Rank, 6
Check_Replications, 6
Check_Sudoku_Design, 7
Check_Tupple, 8

Get_Sudoku_I, 8
Get_Sudoku_II, 9