Package 'CombinS'

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Type Package

Title Construction Methods for Series of PBIB Designs via Combinatory Method S

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Description Provides constructions of series of partially balanced incomplete block designs (PBIB) based on the combinatory method S, introduced by Rezgui et al. (2014) <doi:10.3844/jmssp.2014.45.48>. This package also offers the associated U-type designs. Version 1.1-1 generalizes the approach to designs with v = wnl treatments. It includes various rectangular and generalized rectangular right angular association schemes with 4, 5, and 7 associated classes.

Imports stats, utils

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Contents

`CombS` *The Combinatory Method (s) for the construction of rectangular PBIB designs*

Description

The application of the Combinatory Method (s), with s chosen in $[2, l-1]$, on rectangular association scheme to obtain the configuration and the parameters of the `PBIB` design associated.

Usage

```
CombS(n, l, s)
```

Arguments

`n`	Number of lines of the association schemes array.
`l`	Number of columns of the association schemes array.
`s`	Number of the token treatments from the same row of the association scheme.

Details

- For $2 < s < l$, we obtain a rectangular PBIB design.
- For $s = l$, we obtain a singular group divisible designs.

Value

A LIST :

- `PBIB` The configuration of the PBIB.
- `Type` The type of the design
- `V` Number of treatments.
- `B` Number of blocs.
- `R` Repetition of each treatment.
- `K` Size of blocs.
- `lamda` Vector of m-lambda.
- `Resolvable` Is the design Resolvable ?

Author(s)

Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod

References

Imane Rezgui, Z. Gheribi-Aoulmi (2014). New construction method of rectangular partially balanced incomplete block designs and singular group divisible designs, Journal of Mathematics and Statistics, 10, 45- 48.

M.N. Vartak 1955. On an application of Kronecker product of Matrices to Statistical designs. Ann. Math. Stat.,26(420-438).

See Also

UType

Examples

```
## Not run:
n<-3
l<-3
s<-2
CombS(l,n,s)

## End(Not run)
```

GPBIB4A *Generalized rectangular right angular (4) design with $\lambda\_4 = 0$*

Description

Gives the configuration and the parametres of the design obtained by the first construction method of GPBIB_4 (see 3.1.1 of the paper rezgui et al (2015)).

Usage

```
GPBIB4A(n, l, s, w)
```

Arguments

n	Number of lines of the association schemes array.
l	Number of columns of the association schemes array.
s	Number of the token treatments from the same row of the association scheme.
w	Number of the association scheme arrays.

Details

- For $s = l$, the previous method gives configuration of nested group divisible designs.

Value

A LIST :

- `PBIB` The configuration of the PBIB.
- `Type` The type of the design
- `V` Number of treatments.
- `B` Number of blocs.
- `R` Repetition of each treatment.
- `K` Size of blocs.
- `lamda` Vector of m-lambda.
- `Resolvable` Is the design Resolvable ?

Note

For $w = 2$, the `GPBIB_4` is a rectangular right angular (4) (PBIB_4)

Author(s)

Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod

References

Imane Rezgui, Z. Gheribi-Aoulmi and H. Monod (2015). U-type Designs via New Generalized Partially Balanced Incomplete Block Designs with m = 4, 5 and 7 Associated Classes, doi:10.4236/am.2015.62024, Applied mathematics, 6, 242-264.

Imane Rezgui, Z.Gheribi-Aoulmi and H. Monod, New association schemes with 4, 5 and 7 associated classes and their associated partially balanced incomplete block designs; Advances and Applications in Discrete Mathematics Vol.12 Issue 2 197-206.

See Also

`GPBIB4B` and `UType`

Examples

```
## Not run:
n<-3
l<-3
s<-3
w<-3
GPBIB4A(n, l, s, w)

## End(Not run)
```

GPBIB4B *Generalized rectangular right angular (4) design with λ_4 not equal to 0*

Description

Gives the configuration and the parametres of the design obtained by the seconde construction method of GPBIB_4 (see 3.1.2 of the paper rezgui et al (2015)).

Usage

```
GPBIB4B(n, l, s, w)
```

Arguments

n	Number of lines of the association schemes array.
l	Number of columns of the association schemes array.
s	Number of the token treatments from the same row of the association scheme.
w	Number of the association scheme arrays.

Value

A LIST :

- PBIB The configuration of the PBIB.
- Type The type of the design
- V Number of treatments.
- B Number of blocs.
- R Repetition of each treatment.
- K Size of blocs.
- lamda Vector of m-lambda.
- Resolvable Is the design Resolvable ?

Note

For $w = 2$, the GPBIB_4 is a rectangular right angular (4) (PBIB_4)

Author(s)

Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod

References

Imane Rezgui, Z. Gheribi-Aoulmi and H. Monod (2015). U-type Designs via New Generalized Partially Balanced Incomplete Block Designs with m = 4, 5 and 7 Associated Classes, doi:10.4236/am.2015.62024, Applied mathematics, 6, 242-264.

Imane Rezgui, Z.Gheribi-Aoulmi and H. Monod, New association schemes with 4, 5 and 7 associated classes and their associated partially balanced incomplete block designs; Advances and Applications in Discrete Mathematics Vol.12 Issue 2 197-206.

See Also

GPBIB4A and UType

Examples

```
## Not run:
n<-3
l<-3
s<-3
w<-3
GPBIB4B(n, l, s, w)

## End(Not run)
```

GPBIB5 *Generalized rectangular right angular (5) design.*

Description

gives the configuration and the parametres of the design obtained by the construction method of GPBIB_5 (see 3.2 of the paper rezgui et al (2015)).

Usage

```
GPBIB5(n, l, s, w)
```

Arguments

n	Number of lines of the association schemes array.
l	Number of columns of the association schemes array.
s	Number of the token treatments from the same row of the association scheme.
w	Number of the association scheme arrays.

Value

A LIST :

- `PBIB` The configuration of the PBIB.
- `Type` The type of the design
- `V` Number of treatments.
- `B` Number of blocs.
- `R` Repetition of each treatment.
- `K` Size of blocs.
- `lamda` Vector of m-lambda.
- `Resolvable` Is the design Resolvable ?

Note

For $w = 2$, the `GPBIB_5` is a rectangular right angular (5) (PBIB_5).

Author(s)

Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod

References

Imane Rezgui, Z. Gheribi-Aoulmi and H. Monod (2015). U-type Designs via New Generalized Partially Balanced Incomplete Block Designs with m = 4, 5 and 7 Associated Classes, doi:10.4236/am.2015.62024, Applied mathematics, 6, 242-264.

Imane Rezgui, Z.Gheribi-Aoulmi and H. Monod, New association schemes with 4, 5 and 7 associated classes and their associated partially balanced incomplete block designs; Advances and Applications in Discrete Mathematics Vol.12 Issue 2 197-206.

See Also

`UType`

Examples

```
## Not run:
n<-3
l<-3
s<-3
w<-3
GPBIB5(n, l, s, w)

## End(Not run)
```

GPBIB7A *Generalized rectangular right angular (7) design with λ_i equal to λ_i + 4 (i = 1, ..., 4)*

Description

gives the configuration and the parametres of the design obtained by the first construction method of GPBIB_7 (see 3.3.1 of the paper rezgui et al (2015))

Usage

```
GPBIB7A(n, l, s, w)
```

Arguments

n	Number of lines of the association schemes array.
l	Number of columns of the association schemes array.
s	Number of the token treatments from the same row of the association scheme.
w	Number of the association scheme arrays.

Value

A LIST :

- PBIB The configuration of the PBIB.
- Type The type of the design
- V Number of treatments.
- B Number of blocs.
- R Repetition of each treatment.
- K Size of blocs.
- lambda Vector of m-lambda.
- Resolvable Is the design Resolvable ?

Note

For $w = 2$, the GPBIB_7 is a rectangular right angular (7) (PBIB_7).

Author(s)

Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod

References

Imane Rezgui, Z. Gheribi-Aoulmi and H. Monod (2015). U-type Designs via New Generalized Partially Balanced Incomplete Block Designs with m = 4, 5 and 7 Associated Classes, doi:10.4236/am.2015.62024, Applied mathematics, 6, 242-264.

Imane Rezgui, Z.Gheribi-Aoulmi and H. Monod, New association schemes with 4, 5 and 7 associated classes and their associated partially balanced incomplete block designs; Advances and Applications in Discrete Mathematics Vol.12 Issue 2 197-206.

See Also

GPBIB7B and UType

Examples

```
## Not run:
n<-3
l<-3
s<-3
w<-3
GPBIB7A(n, l, s, w)

## End(Not run)
```

GPBIB7B *Generalized rectangular right angular (7) design with distinct λ_i (i=1,...,7)*

Description

Gives the configuration and the parametres of the design obtained by the seconde construction method of GPBIB_7 (see 3.3.2 of the paper rezgui et al (2015)).

Usage

```
GPBIB7B(n, l, s, w)
```

Arguments

n	Number of lines of the association schemes array.
l	Number of columns of the association schemes array.
s	Number of the token treatments from the same row of the association scheme.
w	Number of the association scheme arrays.

Value

A LIST :

- `PBIB` The configuration of the PBIB.
- `Type` The type of the design
- `V` Number of treatments.
- `B` Number of blocs.
- `R` Repetition of each treatment.
- `K` Size of blocs.
- `lambda` Vector of m-lambda.
- `Resolvable` Is the design Resolvable ?

Note

For $w = 2$, the `GPBIB_7` is a rectangular right angular (7) (PBIB_7).

Author(s)

Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod

References

Imane Rezgui, Z. Gheribi-Aoulmi and H. Monod (2015). U-type Designs via New Generalized Partially Balanced Incomplete Block Designs with m = 4, 5 and 7 Associated Classes, doi:10.4236/am.2015.62024, Applied mathematics, 6, 242-264.

Imane Rezgui, Z.Gheribi-Aoulmi and H. Monod, New association schemes with 4, 5 and 7 associated classes and their associated partially balanced incomplete block designs; Advances and Applications in Discrete Mathematics Vol.12 Issue 2 197-206.

See Also

`GPBIB7A` and `UType`

Examples

```
## Not run:
n<-3
l<-3
s<-3
w<-3
GPBIB7B(n, l, s, w)

## End(Not run)
```

UType *U-type design via some PBIB designs*

Description

Applies the Fang algorithm on our constructed designs to obtain the configuration and the parameters of the U-type design associated.

Usage

```
UType(lst)
```

Arguments

lst	The output of one of our package functions.

Value

A LIST :

- v Number of runs.
- r Number of factors.
- UtypeDesign The configuration of the U-type design..

Author(s)

Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod

References

K.T. Fang, R.Li and A.Sudjanto (2006). Design ans Modeling for Computer Experiments. Taylor & Francis Group, LLC London.

Examples

```
## Not run:
M<-GPBIB4A(4,4,2,2)
UType(M)

## End(Not run)
```

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