Package ‘CombinS’

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Type Package
Title Construction Methods of some Series of PBIB Designs
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Author Mohamed Laib, Imane Rezgui, Zebida Gheribi-Aoulmi and Herve Monod
Maintainer Mohamed Laib <laibNmed@gmailNcom>
Description Series of partially balanced incomplete block designs (PBIB) based on the combinatorial method (S) introduced in (Imane Rezgui et al, 2014) <doi:10.3844/jmssp.2014.45.48>; and it gives their associated U-type design.
Imports stats, utils
URL 'www.sites.google.com/site/mohamedlaibwebpage'
License GPL-3
Encoding UTF-8
LazyData true
Note This version is a generalisation for (v=wnl) treatments. In the version 1.0 we used rectangular right angular (m) association schemes with (v=2nl) and m=4,5 and 7 associated classes. The Association schemes used in this R-package are: Rectangular association scheme; Generalized rectangular right angular association scheme (4); Generalized rectangular right angular association scheme (5); Generalized rectangular right angular association scheme (7).
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| 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

```r
Combs(n, 1, 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

See Also
UType

Examples
```r
## Not run:
n<-3
l<-3
s<-2
Combs(1,n,s)
## End(Not run)
```

---

**GPBIB4A**

*Generalized rectangular right angular (4) design with* $\lambda_A = 0$

**Description**

Gives the configuration and the parameters of the design obtained by the first construction method of **GPBIB4** (see 3.1.1 of the paper rezgui et al (2015)).

**Usage**

```r
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.
- lambda Vector of m-lambda.
- Resolvable Is the design Resolvable?

Note

For \( w = 2 \), the \texttt{GPBIB4A} 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, 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

\texttt{GPBIB4B} and \texttt{UType}

Examples

```r
## 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 \( \lambda_A \) not equal to 0*

---

**Description**

Gives the configuration and the parameters of the design obtained by the second construction method of GPBIB_4 (see 3.1.2 of the paper Rezgui et al (2015)).

**Usage**

```r
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 blocks.
- `R` Repetition of each treatment.
- `K` Size of blocks.
- `lambda` 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, 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

```r
## 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 parameters 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

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>Number of lines of the association schemes array.</td>
</tr>
<tr>
<td>l</td>
<td>Number of columns of the association schemes array.</td>
</tr>
<tr>
<td>s</td>
<td>Number of the token treatments from the same row of the association scheme.</td>
</tr>
<tr>
<td>w</td>
<td>Number of the association scheme arrays.</td>
</tr>
</tbody>
</table>
**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.
- **lamba**  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, 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**

```r
## 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 \( \lambda_i \) equal to \( \lambda_i + 4 \) (\( i = 1, \ldots, 4 \))*

---

**Description**

Gives the configuration and the parameters 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, 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

```r
## 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 $\lambda_i$ ($i=1,...,7$)*

**Description**

Gives the configuration and the parameters of the design obtained by the second 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, 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

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

## End(Not run)
```
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


Examples

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

## End(Not run)
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