Package 'pRepDesigns'

September 1, 2022

Type Package

Title Partially Replicated (p-Rep) Designs

Version 1.0.0

Maintainer Vinaykumar L.N. <vinaymandya123@gmail.com>

Description Early generation breeding trials are to be conducted in multiple environments where it may not be possible to replicate all the lines in each environment due to scarcity of resources. For such situations, partially replicated (p-Rep) designs have wide application potential as only a proportion of the test lines are replicated at each environment. A collection of several utility functions related to p-Rep designs have been developed. Here, the package contains four functions for a complete stepwise analytical study of these designs. Three functions pRep1(), pRep2() and pRep3() are used to generate three new series of p-Rep designs and also compute canonical efficiency factors, variance factors between associates and average variance factors of these designs. A fourth function NCEV() is used to generate incidence matrix (N), information matrix (C), canonical efficiency factor (E) and average variance factor (V). This function is general in nature and can be used for studying the characterization properties of any block design.A construction procedure for p-Rep designs was given by Williams et al.(2011)<doi:10.1002/bimj.201000102> which was tidious and time consuming. Here, in this package, three different methods have been given to generate p-Rep designs easily.

Suggests MASS

License GPL (>= 2)

Encoding UTF-8

LazyData false

Repository CRAN

RoxygenNote 7.1.2

NeedsCompilation no

Author Vinaykumar L.N. [aut, cre],
Cini Varghese [aut, ctb],
Mohd Harun [aut, ctb],
Ashutosh Dalal [aut, ctb],
Sayantani Karmakar [aut, ctb],
Vinayaka [aut, ctb]

R topics documented:

NCEV	*Incidence Matrix, Information Matrix, Canonical efficiency factor, Variance between associates and average variance*

Description

This function generates incidence matrix, information matrix, canonical efficiency factor,variance factor between associates and average variance for the input design

Usage

```
NCEV(design)
```

Arguments

design   p-rep design in matrix form considering rows as blocks

Value

This function generates incidence matrix, information matrix, canonical efficiency factor, variance factor between associates and average variance factor for the input design

References

Williams E, Piepho HP, Whitaker D (2011)<https://doi.org/10.1002/bimj.201000102>

Examples

```
library(pRepDesigns)
design=matrix(1:9, nrow = 3, ncol = 3)
NCEV(design)
```

---

pRep1 *First series of p-rep designs*

Description

This function generates first series of p-rep designs for given values of v, m and s. The input should satisfy the condition v=2*m*s*(s-1), m>=1 and s>=3.

Usage

```
pRep1(v, m, s)
```

Arguments

v	Total number of treatments or breeding lines or entries
m	positive integer (>=1)
s	positive integer (>=3)

Value

This function generates p-rep designs with parameters:

v = 2ms(s-1) : number of treatments,

b_1 = 2(s-1) : first set of blocks of size k_1 = ms,

b_2 = 2s : second set of blocks of size k_2 = 2m(s-1) and

r = 3 : number of replications.

e = 2 : number of environments,

This function also generates incidence matrix, information matrix, canonical efficiency factor and average variance factor of the generated p-rep design.

References

Williams E, Piepho HP, Whitaker D (2011)<https://doi.org/10.1002/bimj.201000102>

Examples

```
library(pRepDesigns)
pRep1(24, 2, 3)
```

---

pRep2   *Second series of p-rep designs*

Description

For the specified values of v and p, this function generates the second series of p-rep designs. The input should meet the condition that v=10*p where, p>=2.

Usage

```
pRep2(v, p)
```

Arguments

v   Total number of treatments or breeding lines or entries

p   positive integer (>=2)

Value

This function generates a new series of p-rep designs with parameters:

v = 10p number of treatments,

e = 2 number of environments,

b = 10 blocks of size k = 3p and

r = 3 number of replications.

This function also generates canonical efficiency factor and average variance factor of the generated p-rep design.

References

Williams E, Piepho HP, Whitaker D (2011)<https://doi.org/10.1002/bimj.201000102>

Examples

```
library(pRepDesigns)
pRep2(20,2)
```

pRep3	*Third series of p-rep designs*

Description

For the specified values of v and p, this function generates a series of p-rep designs. The input should meet the condition that v=6*p where, p>=2.

Usage

```
pRep3(v, p)
```

Arguments

v	Total number of treatments or breeding lines or entries
p	positive integer (>=2)

Value

This function generates a new series of p-rep designs with parameters:

v = 6p : number of treatments,

e = 2 : number of environments,

b = 6 : blocks of size k = 3p and

r = 3 : number of replications.

Canonical efficiency factor and average variance factor of the generated p-rep design.

References

Williams E, Piepho HP, Whitaker D (2011)<https://doi.org/10.1002/bimj.201000102>

Examples

```
library(pRepDesigns)
pRep3(18, 2)
```

Index