Package 'NBBDesigns'

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Type Package

Title Neighbour Balanced Block Designs (NBBDesigns)

Version 1.1.0

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Description Neighbour-balanced designs ensure that no treatment is disadvantaged unfairly by its surroundings. The treatment allocation in these designs is such that every treatment appears equally often as a neighbour with every other treatment. Neighbour Balanced Designs are employed when there is a possibility of neighbour effects from treatments used in adjacent experimental units. In the literature, a vast number of such designs have been developed. This package generates some efficient neighbour balanced block designs which are balanced and partially variance balanced for estimating the contrast pertaining to direct and neighbour effects, as well as provides a function for analysing the data obtained from such trials (Azais, J.M., Bailey, R.A. and Monod, H. (1993). ``A catalogue of efficient neighbour designs with border plots". Biometrics, 49, 1252-1261 ; Tomar, J. S., Jaggi, Seema and Varghese, Cini (2005)<DOI:10.1080/02664760420003051 77>. ``On totally balanced block designs for competition effects"). This package contains functions named nbbd1(),nbbd2(),nbbd3(),pnbbd1() and pnbbd2() which generates neighbour balanced block designs within a specified range of number of treatment (v). It contains another function named anlys()for performing the analysis of data generated from such trials.

License GPL (>= 2)

Encoding UTF-8

LazyData True

Repository CRAN

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NeedsCompilation no

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`anlys` *Analysis of data*

Description

This function provides the Analysis of Variance (Type III) of the data generated from experiments conducted using a neighbour balanced/partially neighbour balanced block design.

Usage

```
anlys(data)
```

Arguments

`data`	The data file should be in csv format. The columns should be named as block,treatment, left_neighbour, right_neighbour and yield as given in the example data set.

Value

It provides the ANOVA table.

Examples

```
## Not run:
library(NBBDesigns)
data<-file.choose()
data<-read.csv(data,header=TRUE,colClasses = c("factor","factor","factor","factor","numeric"))
fix(data)
anlys(data)

## End(Not run)
```

nbbd1 *NBB Design of Type 1 (NBBD 1)*

Description

When v(>3) is a prime number (prime number is a number which is divisible by itself and by 1) then it will generate a class of neighbour balanced block designs. This class of design is generated using the method of constructing Type 3 designs of (Azais, 1993). It also gives the parameters of the design, information matrix for estimating the contrast pertaining to direct and neighbour effects (both left and right) of the treatments.

Usage

```
nbbd1(v)
```

Arguments

v	Number of treatments (a prime number)

Value

It generates neighbour balanced blocks designs for a given number of treatments (v>3), when v is prime number.

References

(i) Azais, J.M. (1987)<DOI: 10.1111/j.2517-6161.1987.tb01704.x>."Design of experiments for studying intergenotypic competition"; (ii) Azais, J.M., Bailey, R.A. and Monod, H. (1993)<DOI: 10.2307/2532269>."A catalogue of efficient neighbour designs with border plots"; (iii) Rees, D. H. (1967)<DOI: 10.2307/2528428>."Some designs of use in serology";

Examples

```
library(NBBDesigns)
nbbd1(5)
```

nbbd2 *NBB Design of Type 2 (NBBD 2)*

Description

When v is odd number but not a power of a prime number (v<= 100) , the function generates a class of neighbour balanced block designs for a given number of treatments. This design listed as type 1 design (Azais, 1993) which is constructed using the method of Rees (1967) and Azais (1987). It also gives the parameters of the design, information matrix for estimating the contrast pertaining to direct and neighbour effects (both left and right) of the treatments.

Usage

```
nbbd2(v)
```

Arguments

v	Number of treatments (v is odd number but not a power of a prime number)

Value

It generates neighbour balanced block designs for a given number of treatments (v>3), v is odd number but not a power of a prime number.

References

Azais, J.M., Bailey, R.A. and Monod, H. (1993)<DOI: 10.2307/2532269>."A catalogue of efficient neighbour designs with border plots".

Examples

```
library(NBBDesigns)
nbbd2(7)
```

---

nbbd3 *NBB Design of Type 3 (NBBD 3)*

Description

When v is even number but not a power of 2 (v<=100), the function generates a class of neighbour balanced block designs for a given number of treatments. This class of design is generated using the method of constructing this designs which is listed as Type 2 designs of (Azais, 1993). It also gives the parameters of the design, information matrix for estimating the contrast pertaining to direct and neighbour effects (both left and right) of the treatments.

Usage

```
nbbd3(v)
```

Arguments

v	Number of treatments (When v is even but not a power of 2)

Value

It generates neighbour balanced block designs when v is an even number but not a power of 2. For example v = 6, 10, 12, 14...

References

Azais, J.M., Bailey, R.A. and Monod, H. (1993)<DOI: 10.2307/2532269>."A catalogue of efficient neighbour designs with border plots".

Examples

```
library(NBBDesigns)
nbbd3(6)
```

---

pnbbd1 *PNBB Design of Type 1 (PNBBD 1)*

Description

A block design with neighbour effects is said to be partially neighbour balanced based on m-class association scheme if two treatments 'Theta' and 'Phi' that are mutually u-th associates (u = 1, 2,. . . , m) appear as neighbours (left and right) 'Mu'_1u times. For this class of design 'Mu'_11=1 and 'Mu'_12=0. The number of first associates is (v/2) and number of second associates is (v/2 -1). When v is a power of 2, the function will generate a class of partially neighbour balanced block designs. It also gives the parameters of the design, information matrix for estimating the contrast pertaining to direct and neighbour effects (both left and right) of the treatments.

Usage

```
pnbbd1(v)
```

Arguments

v	Number of treatments (v), v>4 should be of the form v=s^2. For example v= 8, 9. . . ..

Note

Here v should be greater than 4 i.e v>4.

References

Azais, J.M., Bailey, R.A. and Monod, H. (1993)<DOI: 10.2307/2532269>."A catalogue of efficient neighbour designs with border plots".

Examples

```
library(NBBDesigns)
pnbbd1(8)
```

pnbbd2 *PNBB Design of Type 2 (PNBBD 2)*

Description

A block design with neighbour effects is said to be partially neighbour balanced based on m-class association scheme if two treatments 'Theta' and 'Phi' that are mutually u-th associates (u = 1, 2,. . . , m) appear as neighbours (left and right) 'Mu'_1u times. The design so obtained is a ((v-1)/2) associate classes partially variance balanced design following a varying circular association scheme. When v is a prime number, the function will generate a class of partially neighbour balanced block designs. It also gives the parameters of the design, information matrix for estimating the contrast pertaining to direct and neighbour effects (both left and right) of the treatments.

Usage

```
pnbbd2(v)
```

Arguments

v	Number of treatments (v>5), v should be a prime number

Value

It gives Partially Neighbour Balanced Block Designs for v, when v is any prime number.

Note

v should be greater than 5 i.e v>5.

References

Azais, J.M., Bailey, R.A. and Monod, H. (1993)<DOI: 10.2307/2532269>."A catalogue of efficient neighbour designs with border plots".

Examples

```
library(NBBDesigns)
pnbbd2(7)
```

sample_data *sample data for analysis of NBB/PNBB design*

Description

Data is given here for illustration purpose.Here the data frame contains 5 columns of block, treatment, left_neighbour, right_neighbour and yield.

Usage

```
sample_data
```

Format

A data frame with 110 observations on the following 5 variables.

`block` a factor with levels `1 2 3 4 5 6 7 8 9 10`

`treatment` a factor with levels `1 2 3 4 5 6 7 8 9 10 11`

`left_neighbour` a factor with levels `1 2 3 4 5 6 7 8 9 10 11`

`right_neighbour` a factor with levels `1 2 3 4 5 6 7 8 9 10 11`

`yield` a numeric vector

Examples

```
#To view the sample data set
library(NBBDesigns)
sample_data
#To analyze the sample_data
anlys(sample_data)
```

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