Package 'Vdgraph'

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Type Package

Title This package creates variance dispersion graphs for response surface designs

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Author John Lawson <lawson@byu.edu>

Maintainer John Lawson <lawson@byu.edu>

Description This package calls a modification of the published FORTRAN code for producing variance dispersion graphs. For more details on variance dispersion graphs see "A Computer Program for Generating Variance Dispersion Graphs" by G. Vining, Journal of Quality Technology, Vol. 25 No. 1 January 1993.

License GPL-2

Depends rsm

LazyLoad yes

R topics documented:

Vdgraph-package	*This package creates variance dispersion graphs for response surface designs*

Description

The **Vdgraph** package provides a function for creating Variance Dispersion Graphs of a standardized response surface design stored in a matrix.

The function Vdgraph(des) creates the graph of the response surface design stored in the matrix des. Useful response surface designs are also included as matricies in the package. These inclued the hexagonal design for two factors Hex2, the small composite designs for 3 to 6 factors and Roquemore's hybrid designs for 3 to 6 factors.

Details

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Index:

```
D310                    Roquemore (1976) Hybrid design D310
D311A                   Roquemore (1976) Hybrid design 311A
D311B                   Roquemore (1976) Hybrid design D311B
D416A                   Roquemore (1976) Hybrid design 416A
D416B                   Roquemore (1976) Hybrid design D416B
D416C                   Roquemore (1976) Hybrid design D416C
D628A                   Roquemore (1976) Hybrid design D628A
Hex2                    Hexagonal design for two factors
SCDDL5                  Draper and Lin's Small Composite Design for
                        five factors
SCDH2                   Hartley's Small Composite Design for two
                        factors
SCDH3                   Hartley's Small Composite Design for three
                        factors
SCDH4                   Hartley's Small Composite Design for four
                        factors
SCDH5                   Hartley's Small Composite Design for five
                        factors
SCDH6                   Hartley's Small Composite Design for six
                        factors
Vardsgr                 Loads compiled fortran in shared file vdg
```

`Vdgraph`	`this function makes a Variance Dispersion Graph of a response surface design`

Author(s)

John Lawson <lawson@byu.edu>

Maintainer: John Lawson <lawson@byu.edu>

`Compare2Vdg`	*this function compares Variance Dispersion Graph of two response surface designs with the same number of factors on the same scale*

Description

This function calls the function Vardsgr which uses Vining's (1993) fortran code to get the coordinates of a two variance dispersion graph, and then makes the plot.

Usage

```
Compare2Vdg(name1,des,name2,des2)
```

Arguments

`name1`	name1 is a character string containing a descriptive name for the first design. This descriptive name should be no more than 40 characters in order to fit in the space for a legend.
`des`	des is a matrix or a data frame containing the first response surface design to be compared in coded or uncoded units. There should be one column for each factor in the design, and one row for each run in the design. The maximum number of rows allowed is 99, and the maximum number of columns is 7.
`name2`	name2 is a character string containing a descriptive name for the second design. This descriptive name should be no more than 40 characters in order to fit in the space for a legend.
`des2`	des2 is a matrix or a data frame containing the second response surface design to be compared in coded or uncoded units. There should be one column for each factor in the design, and one row for each run in the design. The maximum number of rows allowed is 99, and the maximum number of columns is 7.

Value

vdgpl

`vdgpl`	This is a graph containing the two Variance Dispersion Graphs, one for each design

Note

This function calls the function Vardsgr to get the coordinates for the plot.

Author(s)

John S. Lawson `<lawson@byu.edu>`

References

1. Vining, G. "A Computer Program for Generating Variance Dispersion Graphs" Journal of Quality Technology, Vol 25, No. 1, pp. 45-58, 1993. 2. Vining, G. "Corrigenda" Journal of Quality Technology, Vol 25, No. 4, pp 333-335. 1993.

Examples

```
data(SCDH5)
data(SCDDL5)
Compare2Vdg("Hartley's Small Composite-5 fac",SCDH5,"Draper and Lin's Small Composite-5 f


library(rsm)
BB.des3<-bbd(3)
CCD.des3<-ccd(3, n0=5)
CCD.des3<-CCD.des3[,2:4]
Compare2Vdg("Box Behnken 3 Factors",BB.des3,"Central Composite 3 Factors",CCD.des3)
```

D310   *Roquemore (1976) Hybrid design D310*

Description

A This is an .rda file containing the design in a matrix.

Usage

```
data(D310)
```

Format

Three columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

D311A *Roquemore (1976) Hybrid design 311A*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(D311A)
```

Format

Three columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

D311B *Roquemore (1976) Hybrid design D311B*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(D311B)
```

Format

Three columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

`D416A`   *Roquemore (1976) Hybrid design 416A*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(D416A)
```

Format

Four columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

`D416B`   *Roquemore (1976) Hybrid design D416B*

Description

this is an .rda file containing the design in a matrix.

Usage

```
data(D416B)
```

Format

Four columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

D416C	*Roquemore (1976) Hybrid design D416C*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(D416C)
```

Format

Three columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

D628A	*Roquemore (1976) Hybrid design D628A*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(D628A)
```

Format

Three columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

---

f   *Calculate column means of design*

Description

This function calculates means of design.

Usage

```
f(x)
```

Arguments

x   This is a design matrix

Value

mean

mean   This is the mean of the design x

Note

This function is called by the function Vdgraph.

Author(s)

John S. Lawson <lawson@byu.edu>

Hex2   *Hexagonal design for two factors*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(Hex2)
```

Format

Two columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

SCDDL5   *Draper and Lin's Small Composite Design for five factors*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(SCDDL5)
```

Format

Five columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

SCDH2   *Hartley's Small Composite Design for two factors*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(SCDH2)
```

Format

Two columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

SCDH3   *Hartley's Small Composite Design for three factors*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(SCDH3)
```

Format

Three columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

SCDH4   *Hartley's Small Composite Design for four factors*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(SCDH4)
```

Format

Four columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

SCDH5 *Hartley's Small Composite Design for five factors*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(SCDH5)
```

Format

Five columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

SCDH6 *Hartley's Small Composite Design for six factors*

Description

This is an .rda file containing the design in a matrix.

Usage

```
data(SCDH6)
```

Format

Six columns of independent variables

Source

source

References

Myers, R. H. and Montgomery D. C. *Response Surface Methodology* 2nd Ed., John Wiley and Sons NY, 2002. p.386

Vardsgr	*Loads compiled fortran in shared file vdg*

Description

This function loads and runs the compiled fortran code vdg. vdg is Vining's 1999 JQT fortran code for producing variance dispersion graphs.

Usage

```
Vardsgr(ndpts, kvar1, kdv1, rdes)
```

Arguments

ndpts   This is the number of runs in the response surface design (maximum=99).

kvar1   This is the number of factors in the design matrix (maximum=6).

kdv1   This is the product of ndpts and kvar1.

rdes   This is the response surface design matrix stored as a vector of the concatenated columns of the design matrix, one column for each factor in the design.

Value

vdgr

vdgr   This is the matrix of coordinates for the variance dispersion graph. It is stored as a vector of concatenated columns. Each column is of length 20, and there are four columns in the matrix. The first column is the radius from the center of the response surface design. The second column is the maximum variance of a predicted value, the third column is the minimum variance of a predicted value, and the fourth column is the average variance of a predicted value.

Note

This function is called by the function Vdgraph.

Author(s)

John S. Lawson <lawson@byu.edu>

References

1. Vining, G. "A Computer Program for Generating Variance Dispersion Graphs" Journal of Quality Technology, Vol 25, No. 1, pp. 45-58, 1993. 2. Vining, G. "Corrigenda" Journal of Quality Technology, Vol 25, No. 4, pp 333-335. 1993.

| `Vdgraph` | *this function makes a Variance Dispersion Graph of a response surface design* |

Description

This function calls the function Vardsgr which uses Vining's (1993) fortran code to get the coordinates of a variance dispersion graph, and then makes the plot.

Usage

```
Vdgraph(des)
```

Arguments

`des`   des is a matrix or a data frame containing a response surface design in coded or uncoded units. There should be one column for each factor in the design, and one row for each run in the design. The maximum number of rows allowed is 99, and the maximum number of columns is 7.

Value

vdgpl

`vdgpl`   This is a graph containing the Variance Dispersion Graph

Note

This function calls the function Vardsgr to get the coordinates for the plot.

Author(s)

John S. Lawson `<lawson@byu.edu>`

References

1. Vining, G. "A Computer Program for Generating Variance Dispersion Graphs" Journal of Quality Technology, Vol 25, No. 1, pp. 45-58, 1993. 2. Vining, G. "Corrigenda" Journal of Quality Technology, Vol 25, No. 4, pp 333-335. 1993.

Examples

```
data(D310)
Vdgraph(D310)

library(rsm)
bbhrsm<-bbd(4,n0=3)
des<-bbhrsm[,2:5]
des<-as.matrix(des)
Vdgraph(des)

dat<-ccd(~A+B,generators=B~A,n0=c(1,1),alpha=1.212,wbreps=1)
```

```
des2<-dat[,2:3]
Vdgraph(des2)
```

Index