Package: Vdgraph (via r-universe)

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Type Package

Title Variance Dispersion Graphs and Fraction of Design Space Plots
for Response Surface Designs

Version 2.2-7

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Description Uses a modification of the published FORTRAN code in ``A
Computer Program for Generating Variance Dispersion Graphs'' by
G. Vining, Journal of Quality Technology, Vol. 25 No. 1 January
1993, to produce variance dispersion graphs. Also produces
fraction of design space plots, and contains data frames for
several minimal run response surface designs.

License GPL-2

LazyLoad yes

RoxygenNote 7.2.3

NeedsCompilation yes

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Repository https://johnjsl7.r-universe.dev

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Contents

Vdgraph-package   *This package creates variance dispersion graphs and fraction of design space plots for response surface designs*

Description

The **Vdgraph** package provides functions for creating Variance Dispersion Graphs and Fraction of Design Space Plots of a standardized response surface design stored in a matrix or a data frame.

The function Vdgraph(des) creates the variance dispersion graph of the response surface design stored in the matrix or data frame des. The function FDSPlot(des) creates the fraction of design space plot of the response surface design stored in the matrix or data frame des. Useful response surface designs are also included as matricies in the package. These include 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. The function Compare2Vdg makes the variance dispersion graphs of two designs on the same scale for comparison.

Details

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Index:

Author(s)

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Compare2FDS   *This function compares Fraction of Design Space Plots for two response surface designs.*

Description

This function compares Fraction of Design Space Plots for two response surface designs with the same number of factors over the unit hypercube design space.

Usage

```
Compare2FDS(des1, des2, name1, name2, mod=2)
```

Arguments

des1   des1 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.

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.

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. If left out name1 defaults to des1

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. If left out name2 defaults to des2

mod   mod is the model to be represented. 0 = linear model 1 = linear main effects plus linear by linear 2-factor interactions 2 = full quadratic response surface model (default.

Author(s)

John S. Lawson <lawson@byu.edu>

References

1.Zahran, A., Anderson-Cook, C. M. and Myers,R. H. "Fraction of Design Space to Assess Prediction Capability of Response Surface Designs" Journal of Quality Technology, Vol 35, No. 4, pp 377-386. 2003.

Examples

```
data(SCDH5)
data(SCDDL5)
Compare2FDS(SCDH5, SCDDL5, "Hartley SCD-5", "Draper-Lin SCD5", mod=2)
```

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

Arguments

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.
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.
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. If left out name1 defaults to des
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. If left out name2 defaults to des2
ncolleg	The number of columns in the legend this can be 1 or 2

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(SCDH5,SCDDL5,"Hartley's SCD-5","Draper-Lin's SCD-5 fac",ncolleg=1)
```

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>

FDSPlot   *This function makes a Fraction of Design Space Plot of a response*
                           surface design.

Description

This function creates a Fraction of Design Space Plot over the hypercube design space from -1 to 1
on each component.

Usage

```
FDSPlot(des, mod=2)
```

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.
mod	mod is the model to be represented. 0 = linear model 1 = linear main effects plus linear by linear 2-factor interactions 2 = full quadratic response surface model (default.

Author(s)

John S. Lawson <lawson@byu.edu>

References

1.Zahran, A., Anderson-Cook, C. M. and Myers,R. H. "Fraction of Design Space to Assess Prediction Capability of Response Surface Designs" Journal of Quality Technology, Vol 35, No. 4, pp 377-386. 2003.

Examples

```
data(D310)
FDSPlot(D310)
```

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

---

mx   *Calculate column maximums of design*

Description

This function calculates maximums of design.

Usage

```
mx(x)
```

Arguments

x   This is a design matrix

Value

mean

max   This is the maximum of the design x

Note

This function is called by the function FDSPlot.

Author(s)

John S. Lawson <lawson@byu.edu>

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 sur-
                               face design*

Description

This function calls the function Vardsgr which uses Vining's (1993) fortran code to get the coordi-
nates 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)
```

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