Package ‘Vdgraph’

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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.
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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 matrices 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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Compare2FDS

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

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.

Author(s)

John Lawson <lawson@byu.edu>

Maintainer: John Lawson <lawson@byu.edu>
Usage

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

Arguments

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 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 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 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 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


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**

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

**Arguments**

def: 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: 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**


**Examples**

```r
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


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

---

**D311B**

*Roquemore (1976) Hybrid design D311B*

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

**Usage**
```r
data(D311B)
```

**Format**
Three columns of independent variables

**Source**
source

**References**

---

**D416A**

*Roquemore (1976) Hybrid design 416A*

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

**Usage**
```r
data(D416A)
```

**Format**
Four columns of independent variables

**Source**
source
References

---

**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**

---

**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

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

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

Hex2

Examples

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

**Hexagonal design for two factors**

**Description**

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

**Usage**

```r
data(Hex2)
```

**Format**

Two columns of independent variables

**Source**

source

**References**


mx

**Calculate column maximums of design**

**Description**

This function calculates maximums of design.

**Usage**

```r
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

SCDH2  

**Hartley’s Small Composite Design for two factors**

**Description**

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

**Usage**

```r
data(SCDH2)
```

**Format**

Two columns of independent variables

**Source**

source

**References**


---

SCDH3  

**Hartley’s Small Composite Design for three factors**

**Description**

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

**Usage**

```r
data(SCDH3)
```

**Format**

Three columns of independent variables

**Source**

source

**References**

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

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
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


loadsgr

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.
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


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

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**


**Examples**

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