Package 'mixOofA'

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Title Design and Analysis of Order-of-Addition Mixture Experiments

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Depends R (>= 4.4.0)

Imports doofa, crossdes, mixexp, combinat, Rsolnp

Description A facility to generate various classes of fractional designs for order-of-addition experiments namely fractional order-of-additions orthogonal arrays, see Voelkel, Joseph G. (2019). ``The design of order-of-addition experiments." Journal of Quality Technology 51:3, 230-241, <doi:10.1080/00224065.2019.1569958>. Provides facility to construct component orthogonal arrays, see Jian-Feng Yang, Fasheng Sun and Hongquan Xu (2020). ``A Component Position Model, Analysis and Design for Order-of-Addition Experiments." Technometrics, <doi:10.1080/00401706.2020.1764394>. Supports generation of fractional designs for order-of-addition mixture experiments. Analysis of data from order-of-addition mixture experiments is also supported.

License GPL (>= 2)

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`COA` *construct a component orthogonal array with m components when m is prime or prime power*

Description

construct a component orthogonal array with m components

Usage

```
COA(m)
```

Arguments

`m`	a positive integer, should be prime or prime power

Value

a component orthogonal array with m components

Examples

```
COA(5)
```

`D_effi_pwo` *D-efficiency from PWO matrix of a given design*

Description

Compute D-efficiency from PWO matrix of a given design for order-of-addition experiments

Usage

```
D_effi_pwo(X)
```

Arguments

`X`	PWO matrix of a design for order-of-addition experiments

Value

D-efficiency

Examples

```
design <- matrix(c(4,2,3,1,
4,1,3,2,
3,4,2,1,
3,4,1,2,
3,2,1,4,
3,1,2,4,
2,4,3,1,
2,4,1,3,
2,1,3,4,
1,4,3,2,
1,4,2,3,
1,2,3,4), 12, 4, byrow = TRUE)
X = PWO(design)
D_effi_pwo(X)
```

---

find_opt_target *Optimum mixture proportions and optimal order of addition of the components*

Description

Find optimum mixture proportions and optimal order of addition of the components

Usage

```
find_opt_target(m, model, target)
```

Arguments

m	number of mixture components
model	a fitted model of class lm which fits a model for data from mixture order-of-addition experiment
target	desired target value of response variable

Value

returns optimum mixture proportions of the components and their optimal order-of-addition

Examples

```
data(fish)
mixoofa.fit <- lm(y ~ -1 + (x1+x2+x3)^2 + z12+z13+z23, data = fish)
summary(mixoofa.fit)
find_opt_target(m = 3, mixoofa.fit, target = 2.75)
```

fish *Data from an mixture order-of-addition experiment*

Description

Data from an mixture order-of-addition experiment

Usage

```
data(fish)
```

Format

A data frame with 39 observations and following 7 variables.

`y` response variable

`x1` first mixture component proportion

`x2` second mixture component proportion

`x3` third mixture component proportion

`z12` first PWO variable

`z13` second PWO variable

`z23` third PWO variable

Examples

```
data(fish)
```

mixoofa.anova *Anova Table for a mixture order-of-addition experiment*

Description

obtain ANOVA table for a mixture order-of-addition experiment

Usage

```
mixoofa.anova(formula, response, nmix, mixvar, Zmat, caption)
```

Arguments

`formula`	formula for mixture experiment
`response`	response variable
`nmix`	number of mixture components
`mixvar`	matrix representing mixture variables
`Zmat`	matrix containing PWO variables for the components
`caption`	caption for ANOVA table, default is blank

Value

an ANOVA table for mixture order-of-addition experiment

Examples

```
data(fish)
m = 3
mixvar<-fish[, 1:(m+1)]
Zmat<-fish[, (m+2): (m+1+choose(m,2))]
mixoofa.anova(y ~ -1 + (x1+x2+x3)^2, response=fish$y, nmix=m, mixvar, Zmat=Zmat,caption="")
```

---

oofa.oa *construct an order-of-addition orthogonal array with m+1 components from an order-of-addition orthogonal array with m components*

Description

construct an order-of-addition orthogonal array with m+1 components from an order-of-addition orthogonal array with m components

Usage

```
oofa.oa(design)
```

Arguments

design	an order-of-addition orthogonal array with m components

Value

a component orthogonal array with m+1 components

Examples

```
design <- matrix(c(4,2,3,1,
4,1,3,2,
3,4,2,1,
3,4,1,2,
3,2,1,4,
3,1,2,4,
2,4,3,1,
2,4,1,3,
2,1,3,4,
1,4,3,2,
1,4,2,3,
1,2,3,4), 12, 4, byrow = TRUE)
oofa.oa(design)
```

oofa.scd *Order-of-addition Simplex Centroid Designs*

Description

Construct an order-of-addition simplex centroid design with m components

Usage

```
oofa.scd(m)
```

Arguments

m	number of components

Value

An order-of-addition simplex centroid design

Examples

```
oofa.scd(4)
```

oofa.sld *Order-of-addition Simplex Lattice Designs*

Description

Construct an order-of-addition simplex lattice design with m components

Usage

```
oofa.sld(m)
```

Arguments

m	number of components

Value

An order-of-addition simplex lattice design

Examples

```
oofa.sld(4)
```

PWO *Pair-wise-ordering (PWO) matrix of a given design*

Description

Obtain PWO matrix from a given design for order-of-addition experiments

Usage

```
PWO(design)
```

Arguments

design	a design for order-of-addition experiments

Value

PWO matrix

Examples

```
design <- matrix(c(4,2,3,1,
4,1,3,2,
3,4,2,1,
3,4,1,2,
3,2,1,4,
3,1,2,4,
2,4,3,1,
2,4,1,3,
2,1,3,4,
1,4,3,2,
1,4,2,3,
1,2,3,4), 12, 4, byrow = TRUE)
PWO(design)
```

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