Package ‘OBsMD’

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Title  Objective Bayesian Model Discrimination in Follow-Up Designs

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OBsMD-package

Objective Bayesian Model Discrimination in Follow-Up Designs

Description

Implements the objective Bayesian methodology proposed in Consonni and Deldossi in order to choose the optimal experiment that better discriminate between competing models.

Details

Package: OBsMD
Type: Package
Version: 6.1
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License: GPL version 3 or later

The package allows you to perform the calculations and analyses described in Consonni and Deldossi paper in TEST (2016), Objective Bayesian model discrimination in follow-up experimental designs.

Author(s)

Author: Laura Deldossi and Marta Nai Ruscone based on Daniel Meyer’s code. \ Maintainer: Marta Nai Ruscone <marta.nairuscone@unige.it>

References


Examples

data(BM86.data)

BM86.data  Data sets in Box and Meyer (1986)

Description

Design factors and responses used in the examples of Box and Meyer (1986)

Usage

data(BM86.data)

Format

A data frame with 16 observations on the following 19 variables.

X1 numeric vector. Contrast factor.
X2 numeric vector. Contrast factor.
X3 numeric vector. Contrast factor.
X4 numeric vector. Contrast factor.
X5 numeric vector. Contrast factor.
X6 numeric vector. Contrast factor.
X7 numeric vector. Contrast factor.
X8 numeric vector. Contrast factor.
X9 numeric vector. Contrast factor.
X10 numeric vector. Contrast factor.
X11 numeric vector. Contrast factor.
X12 numeric vector. Contrast factor.
X13 numeric vector. Contrast factor.
X14 numeric vector. Contrast factor.
X15 numeric vector. Contrast factor.
y1 numeric vector. Log drill advance response.
y2 numeric vector. Tensile strength response.
y3 numeric vector. Shrinkage response.
y4 numeric vector. Yield of isatin response.

References

Examples

```r
library(OBsMD)
data(BM86.data, package="OBsMD")
print(BM86.data)
```

BM93.e1.data  Example 1 data in Box and Meyer (1993)

Description

12-run Plackett-Burman design from the $2^5$ reactor example from Box, Hunter and Hunter (1977).

Usage

```r
data(BM93.e1.data)
```

Format

A data frame with 12 observations on the following 7 variables.

- **Run**: a numeric vector. Run number from a $2^5$ factorial design in standard order.
- **A**: a numeric vector. Feed rate factor.
- **B**: a numeric vector. Catalyst factor.
- **C**: a numeric vector. Agitation factor.
- **D**: a numeric vector. Temperature factor.
- **E**: a numeric vector. Concentration factor.
- **y**: a numeric vector. Percent reacted response.

References


Examples

```r
library(OBsMD)
data(BM93.e1.data, package="OBsMD")
print(BM93.e1.data)
```
BM93.e2.data

Example 2 data in Box and Meyer (1993)

Description

12-run Plackett-Burman design for the study of fatigue life of weld repaired castings.

Usage

data(BM93.e2.data)

Format

A data frame with 12 observations on the following 8 variables.

A  a numeric vector. Initial structure factor.
B  a numeric vector. Bead size factor.
C  a numeric vector. Pressure treat factor.
D  a numeric vector. Heat treat factor.
E  a numeric vector. Cooling rate factor.
F  a numeric vector. Polish factor.
G  a numeric vector. Final treat factor.
y  a numeric vector. Natural log of fatigue life response.

References


Examples

library(OBsMD)
data(BM93.e2.data,package="OBsMD")
print(BM93.e2.data)
Example 3 data in Box and Meyer (1993)

Description

$2^{8-4}$ Fractional factorial design in the injection molding example from Box, Hunter and Hunter (1978).

Usage

data(BM93.e3.data)

Format

A data frame with 20 observations on the following 10 variables.

blk  a numeric vector
A   a numeric vector. Mold temperature factor.
B   a numeric vector. Moisture content factor.
C   a numeric vector. Holding Pressure factor.
D   a numeric vector. Cavity thickness factor.
E   a numeric vector. Booster pressure factor.
F   a numeric vector. Cycle time factor.
G   a numeric vector. Gate size factor.
H   a numeric vector. Screw speed factor.
y   a numeric vector. Shrinkage response.

References


Examples

library(OBsMD)
data(BM93.e3.data,package="OBsMD")
print(BM93.e3.data)
**combinations**

**Enumerate the Combinations of the Elements of a Vector**

**Description**

combinations enumerates the possible combinations of a specified size from the elements of a vector.

**Usage**

```r
combinations(n, r, v=1:n, set=TRUE, repeats.allowed=FALSE)
```

**Arguments**

- `n`  
  Size of the source vector
- `r`  
  Size of the target vectors
- `v`  
  Source vector. Defaults to `1:n`
- `set`  
  Logical flag indicating whether duplicates should be removed from the source vector `v`. Defaults to `TRUE`.
- `repeats.allowed`  
  Logical flag indicating whether the constructed vectors may include duplicated values. Defaults to `FALSE`.

**Details**

Caution: The number of combinations increases rapidly with `n` and `r`!.

To use values of `n` above about 45, you will need to increase R's recursion limit. See the expression argument to the options command for details on how to do this.

**Value**

Returns a matrix where each row contains a vector of length `r`.

**Author(s)**

Original versions by Bill Venables `<Bill.Venables@cmis.csiro.au>`. Extended to handle `repeats.allowed` by Gregory R. Warnes `<greg@warnes.net>`.

**References**

Examples

```
combinations(3,2,letters[1:3])
combinations(3,2,c(1:3),repeats=TRUE)
combinations(6,3,1:6,repeats=TRUE)
```

# To use large 'n', you need to change the default recursion limit
options(expressions=1e5)
cmat <- combinations(100,2)
dim(cmat) # 4950 by 2

---

**MetalCutting**

*Data sets in Edwards, Weese and Palmer (2014)*

**Description**

Design factors and responses used in the examples of Edwards, Weese and Palmer (2014)

**Usage**

```
data(MetalCutting)
```

**Format**

A data frame with 64 observations on the following 8 variables.

- **blk** block
- **A** numeric vector. Tool speed.
- **B** numeric vector. Workpiece speed.
- **C** numeric vector. Depth of cut.
- **D** numeric vector. Coolant.
- **E** numeric vector. Direction of cut.
- **F** numeric vector. Number of cut.
- **Ytransformed** numeric vector. Response.

**References**


**Examples**

```
library(OBsMD)
data(MetalCutting,package="OBsMD")
print(MetalCutting)
```
Description

Data of the Reactor Experiment from Box, Hunter and Hunter (1978).

Usage

data(OBsMD.es5)

Format

A data frame with 8 observations on the following 6 variables.

- **A** numeric vector. Contrast factor.
- **B** numeric vector. Contrast factor.
- **C** numeric vector. Contrast factor.
- **D** numeric vector. Contrast factor.
- **E** numeric vector. Contrast factor.
- **y** numeric vector. Response.

References


Examples

library(OBsMD)
data(OBsMD.es5, package = "OBsMD")
print(OBsMD.es5)

Description

Objective model posterior probabilities and marginal factor posterior probabilities from Bayesian screening experiments according to Consonni and Deldossi procedure.

Usage

OBsProb(X, y, abeta=1, bbeta=1, blk, mFac, mInt, nTop)
Arguments

X  Matrix. The design matrix.
y  vector. The response vector.
abeta  First parameter of the Beta prior distribution on model space
bbeta  Second parameter of the Beta prior distribution on model space
blk  integer. Number of blocking factors (>=0). These factors are accommodated in the first columns of matrix X. There are ncol(X)−blk design factors.
mFac  integer. Maximum number of factors included in the models.
mInt  integer <= 3. Maximum order of interactions among factors considered in the models.
nTop  integer <=100. Number of models to print ordered according to the highest posterior probability.

Details

Model and factor posterior probabilities are computed according to Consonni and Deldossi Objective Bayesian procedure. The design factors are accommodated in the matrix X after blk columns of the blocking factors. So, ncol(X)−blk design factors are considered. A BETA(abeta, bbeta) distribution is assumed as a prior on model space. The function calls the FORTRAN subroutine ‘obm’ and captures summary results. The complete output of the FORTRAN code is save in the ‘OBsPrint.out’ file in the working directory. The output is a list of class OBsProb for which print, plot and summary methods are available.

Value

Below a list with all output parameters of the FORTRAN subroutine ‘obm’. The names of the list components are such that they match the original FORTRAN code. Small letters are used for capturing program’s output.

X  matrix. The design matrix.
Y  vector. The response vector.
N  integer. Number of runs of the screening experiment.
COLS  integer. Number of design factors.
abeta  integer. First parameter of the Beta prior distribution on model space
bbeta  integer. Second parameter of the Beta prior distribution on model space
BLKS  integer. Number of blocking factors accommodated in the first columns of matrix X.
MXFAC  integer. Maximum number of factors considered in the models.
MXINT  integer. Maximum interaction order among factors considered in the models.
NTOP  integer. Number of models to print ordered according to the highest posterior probability.
mdcnt  integer. Total number of models evaluated.
ptop  vector. Vector of posterior probabilities of the top ntop models.
**OBsProb**

- `nftop` integer. Number of factors in each of the top `nftop` models.
- `jtop` matrix. Matrix of the factors’ labels of the top `nftop` models.
- `prob` vector. Vector of factor posterior probabilities.
- `sigtop` vector. Vector of residual variances of the top `nftop` models.
- `ind` integer. Indicator variable. `ind` is 1 if the ‘obm’ subroutine exited properly. Any other number correspond to the format label number in the FORTRAN subroutine script.

**Note**

The function is a wrapper to call the FORTRAN subroutine ‘obm’, modification of Daniel Meyer’s original program, ‘mbcqp5.f’, for the application of Objective Bayesian follow-up design.

**Author(s)**

Laura Deldossi. Adapted for R by Marta Nai Ruscone.

**References**


**See Also**

`print.OBsProb`, `plot.OBsProb`, `summary.OBsProb`.

**Examples**

```r
library(OBsMD)
data(OBsMD.es5, package="OBsMD")
X <- as.matrix(OBsMD.es5[,1:5])
y <- OBsMD.es5[,6]
# Using for model prior probability a Beta with parameters a=1 b=1
es5.OBsProb <- OBsProb(X=X, y=y, abeta=1, bbeta=1, blk=0, mFac=5, mInt=2, nTop=32)
print(es5.OBsProb)
summary(es5.OBsProb)
```
Objective Model Discrimination (OMD) in Follow-Up Experiments

Description

Optimal follow-up experiments to discriminate between competing models. The extra-runs are derived from the maximization of the objective model discrimination criterion represented by a weighted average of Kullback-Leibler divergences between all possible pairs of rival models.

Usage

OMD(OBsProb, nFac, nBlk = 0, nMod, nFoll, Xcand, mIter, nStart, startDes, top = 20)

Arguments

- OBsProb: list. OBsProb class list. Output list of OBsProb function.
- nFac: integer. Number of factors in the initial experiment.
- nBlk: integer >=0. Number of blocking factors in the initial experiment. They are accommodated in the first columns of matrix X.
- nMod: integer. Number of competing models considered to compute OMD.
- nFoll: integer. Number of additional runs in the follow-up experiment.
- Xcand: matrix. Matrix [2^nFac x (nBlk + nFac)] of candidate runs for the follow-up design. It generally represents the full 2^nFac design.
- mIter: integer >=0. Maximum number of iterations in the exchange algorithm. If mIter = 0 exchange algorithm doesn’t work.
- nStart: integer. Number of different designs of dimension nFoll to be evaluated by OMD criterion. When exchange algorithm is used nStart represents the number of random starts to initialize the algorithm; otherwise nStart = nrow(startDes).
- startDes: matrix. Input matrix [nStart x nFoll] containing different nStart designs to be evaluated by OMD criterion. If the exchange algorithm is used startDes = NULL.
- top: integer. Number of highest OMD follow-up designs recorded.

Details

The OMD criterion, proposed by Consonni and Deldossi, is used to discriminate among competing models. Random starting runs chosen from Xcand are used for the Wynn search of best OMD follow-up designs. nStart starting points are tried in the search limited to mIter iterations. If mIter=0 then startDes user-provided designs are used. Posterior probabilities and residual variances of the competing models are obtained from OBsProb. The function calls the FORTRAN subroutine ‘omd’ and captures summary results. The complete output of the FORTRAN code is save in the ‘MDPrint.out’ file in the working directory.
Value

Below a list with all input and output parameters of the FORTRAN subroutine OMD. Most of the variable names kept to match FORTRAN code.

NSTART integer. Number of different designs of dimension nFoll to be evaluated by OMD criterion. When exchange algorithm is used nStart represents the number of random starts to initialize the algorithm; otherwise nStart = nrow(startDes).

NRUNS integer. Number nFoll of runs used in follow-up designs.

ITMAX integer. Maximum number mIter of iterations in the exchange algorithm.

INITDES integer. Indicator variable. If INITDES = 1 exchange algorithm is used, otherwise INITDES = 0 exchange algorithm doesn’t work.

N0 integer. Numbers of runs nrow(X) of the initial experiment before follow-up.

X matrix. Matrix from initial experiment (nrow(X); ncol(X)=nBlk+nFac).

Y double. Response values from initial experiment (length(Y)=nrow(X)).

BL integer >=0. The number of blocking factors in the initial experiment. They are accommodated in the first columns of matrix X and Xcand.

COLS integer. Number of factors nFac.

N integer. Number of candidate runs nrow(Xcand).

Xcand matrix. Matrix [2^nFac x (nBlk + nFac)] candidate runs for the follow-up design. It generally represents the full 2^nFac design [nrow(Xcand)=N, ncol(Xcand)=ncol(X)].

NM integer. Number of competing models nMod considered to compute OMD.

P double. Models posterior probability optop. It derives from the OBSProb output.

SIGMA2 double. Competing models residual variances osigtop. It derives from the OBSProb output.

NF integer. Number of main factors in each competing models onftop. It derives from the OBSProb output.

MNF integer. Maximum number of factor in models (MNF=max(onftop)).

JFAC matrix. Matrix ojtop of dimension [nMod x max(onftop)] of the labels of the main factors present in each competing models. It derives from the OBSProb output.

CUT integer. Maximum order of the interaction among factors in the models mInt.

MBEST matrix. If INITDES=0, the first row of the MBEST[1,:] matrix has the first user-supplied starting design. The last row the NSTART-th user-supplied starting design.

NTOP integer. Number of the top best OMD designs top.

TOPD double. The OMD value for the best top NTOP designs.

TOPDES matrix. Top NTOP optimal OMD follow-up designs.

flag integer. Indicator = 1, if the ‘md’ subroutine finished properly, -1 otherwise.

Note

The function is a wrapper to call the modified FORTRAN subroutine ‘omd’, ‘OMD.f’, part of the mdopt bundle for Bayesian model discrimination of multifactor experiments.
Author(s)

Laura Deldossi. Adapted for R by Marta Nai Ruscone.

References


See Also

`print.OMD, OBsProb`

Examples

```r
library(OBsMD)
data(OBsMD.es5, package="OBsMD")
X <- as.matrix(OBsMD.es5[,1:5])
y <- OBsMD.es5[,6]
es5.OBsProb <- OBsProb(X=X,y=y,blk=0,mFac=5,mInt=2,nTop=32)
nMod <- 26
Xcand <- matrix(c(-1,-1,-1, -1,-1,-1,-1,-1,-1, -1,1,-1,-1,-1, 1,1,-1,-1,-1,-1,-1,-1,1,1,-1,-1,-1, 1,1,1,-1,-1,-1,1,1,-1,-1,1,1,1,1,-1,-1,-1,-1,1,1,1,1,-1,-1,-1,1,1,1,1,-1,1,-1,-1,1,1,1,1,-1,-1,-1,1,1,1,1,-1,1,-1,-1,1,1,1,1,-1, -1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1,1,-1,-1,-1), ncol=5)
```
PB12Des

12-run Plackett-Burman Design Matrix

Description

12-run Plackett-Burman design matrix.

Usage

data(PB12Des)

Format

A data frame with 12 observations on the following 11 variables.

x1 numeric vectors. Contrast factor.

x2 numeric vectors. Contrast factor.

x3 numeric vectors. Contrast factor.

x4 numeric vectors. Contrast factor.

x5 numeric vectors. Contrast factor.

x6 numeric vectors. Contrast factor.

x7 numeric vectors. Contrast factor.

x8 numeric vectors. Contrast factor.

x9 numeric vectors. Contrast factor.

x10 numeric vectors. Contrast factor.

x11 numeric vectors. Contrast factor.

References


Examples

library(OBsMD)
data(PB12Des,package="OBsMD")
str(PB12Des)
X <- as.matrix(PB12Des)
print(t(X)%*%X)
Method Function for plotting marginal factor posterior probabilities from Objective Bayesian Design.

Usage

```r
## S3 method for class 'OBsProb'
plot(x, code = TRUE, prt = FALSE, cex.axis=par("cex.axis"), ...)
```

Arguments

- `x`: list. List of class OBsProb output from the OBsProb function.
- `code`: logical. If TRUE coded factor names are used.
- `prt`: logical. If TRUE, summary of the posterior probabilities calculation is printed.
- `cex.axis`: Magnification used for the axis annotation. See `par`.
- `...`: additional graphical parameters passed to `plot`.

Details

A spike plot, similar to barplots, is produced with a spike for each factor. Marginal posterior probabilities are used for the vertical axis. If code=TRUE, X1, X2, ... are used to label the factors otherwise the original factor names are used. If prt=TRUE, the print.OBsProb function is called and the marginal posterior probabilities are displayed.

Value

The function is called for its side effects. It returns an invisible NULL.

Author(s)

Marta Nai Ruscone.

References


See Also

OBsProb, print.OBsProb, summary.OBsProb.

Examples

library(OBsMD)
data(OBsMD.es5, package="OBsMD")
X <- as.matrix(OBsMD.es5[,1:5])
y <- OBsMD.es5[,6]
# Using for model prior probability a Beta with parameters a=1 b=1
es5.OBsProb <- OBsProb(X=X, y=y, abeta=1, bbeta=1, blk=0, mFac=5, mInt=2, nTop=32)
print(es5.OBsProb)
summary(es5.OBsProb)
plot(es5.OBsProb)

print.OBsProb

Printing Objective Posterior Probabilities from Bayesian Design

Description

Printing method for lists of class OBsProb. It prints the posterior probabilities of factors and models from the Objective Bayesian procedure.

Usage

## S3 method for class 'OBsProb'
print(x, X = TRUE, resp = TRUE, factors = TRUE, models = TRUE, nTop, digits = 3, plt = FALSE, verbose = FALSE, Sh = TRUE, CV = TRUE, ...)

Arguments

x
list. Object of OBsProb class, output from the OBsProb function.

X
logical. If TRUE, the design matrix is printed.

resp
logical. If TRUE, the response vector is printed.

factors
logical. If TRUE, marginal posterior probabilities are printed.

models
logical. If TRUE, models posterior probabilities are printed.

nTop
integer. Number of the top ranked models to print.

digits
integer. Significant digits to use for printing.

plt
logical. If TRUE, factor marginal probabilities are plotted.

verbose
logical. If TRUE, the unclass-ed list x is displayed.

Sh
logical. If TRUE, the Shannon index is printed.

CV
logical. If TRUE, the coefficient of variation is printed.

... additional arguments passed to print function.
The function prints out marginal factors and models posterior probabilities. Returns invisible list with the components:

calc numeric vector with general calculation information.
probabilities Data frame with the marginal posterior factor probabilities.
models Data frame with model posterior probabilities.
Sh Normalized Shannon heterogeneity index on the posterior probabilities of models
CV Coefficient of variation of factor posterior probabilities.

Author(s)
Marta Nai Ruscone.

References


See Also
OBsProb, summary.OBsProb, plot.OBsProb.

Examples

library(OBsMD)
data(OBsMD.es5, package="OBsMD")
X <- as.matrix(OBsMD.es5[,1:5])
y <- OBsMD.es5[,6]
# Using for model prior probability a Beta with parameters a=1 b=1
es5.OBsProb <- OBsProb(X=X,y=y, abeta=1, bbeta=1, blk=0,mFac=5,mInt=2,nTop=32)
print(es5.OBsProb)
summary(es5.OBsProb)
plot(es5.OBsProb)

print.OMD

Print Optimal OMD Follow-Up Experiments

Description
Printing method for lists of class OMD. It displays the best extra-runs according to the OMD criterion together with the correspondent OMD values.
print.OMD

Usage

```r
## S3 method for class 'OMD'
print(x, X = FALSE, resp = FALSE, Xcand = TRUE, models = TRUE, nMod = x$nMod,
      digits = 3, verbose = FALSE, ...)
```

Arguments

- `x`: list of class OMD. Output list of the `OMD` function.
- `X`: logical. If TRUE, the initial design matrix is printed.
- `resp`: logical. If TRUE, the response vector of initial design is printed.
- `Xcand`: logical. If TRUE, prints the candidate runs.
- `models`: logical. Competing models are printed if TRUE.
- `nMod`: integer. Top models to print.
- `digits`: integer. Significant digits to use in the print out.
- `verbose`: logical. If TRUE, the unclass-ed x is displayed.
- `...`: additional arguments passed to `print` generic function.

Value

The function is mainly called for its side effects. Prints out the selected components of the class OMD objects, output of the `OMD` function. For example the marginal factors and models posterior probabilities and the top OMD follow-up experiments with their corresponding OMD statistic. It returns invisible list with the components:

- `calc`: Numeric vector with basic calculation information.
- `models`: Data frame with the competing models posterior probabilities.
- `follow-up`: Data frame with the runs for follow-up experiments and their corresponding OMD statistic.

Author(s)

Marta Nai Ruscone.

References


See Also

`OMD`, `OBsProb`
Examples

```r
library(OBsMD)
data(OBsMD.es5, package="OBsMD")
X <- as.matrix(OBsMD.es5[,1:5])
y <- OBsMD.es5[,6]
es5.OBsProb <- OBsProb(X=X,y=1,blk=0,mFac=5,mInt=2,nTop=32)
nMod <- 26
Xcand <- matrix(c(-1,-1,-1,-1, -1,-1,-1,-1,-1, -1,1,-1,-1,-1, 1,-1,-1,-1,-1, -1,1,1,-1,-1, 1,1,1,-1,-1, 1,1,1,1,-1, -1,1,1,1,-1, 1,1,1,1,1, 1,1,-1,-1,-1, -1,1,-1,-1,-1, -1,1,1,-1,-1, 1,1,1,-1,-1, 1,1,-1,1,-1, -1,1,-1,1,-1, -1,1,1,1,-1, 1,1,1,1,-1, -1,1,1,1,1, 1,1,1,1,1, 1,1,-1,1,-1, -1,1,-1,1,-1, -1,1,1,1,1, 1,1,1,1,1, 1,1,1,1,1, 1,1,1,1,1),nrow=32,ncol=5,dimnames=list(1:32,c("A","B","C","D","E")),byrow=TRUE)
p_omd <- OMD(OBsProb=es5.OBsProb,nFac=5,nBlk=0,nMod=26,
nFoll=4,Xcand=Xcand,mIter=20,nStart=25,startDes=NULL,
top=30)
print(p_omd)
```

<table>
<thead>
<tr>
<th>Reactor.data</th>
<th>Reactor Experiment Data</th>
</tr>
</thead>
</table>

Description

Data of the Reactor Experiment from Box, Hunter and Hunter (1978).
Usage

data(Reactor.data)

Format

A data frame with 32 observations on the following 6 variables.

A numeric vector. Feed rate factor.
B numeric vector. Catalyst factor.
C numeric vector. Agitation rate factor.
D numeric vector. Temperature factor.
E numeric vector. Concentration factor.
y numeric vector. Percentage reacted response.

References


Examples

library(OBsMD)
data(Reactor.data, package="OBsMD")
print(Reactor.data)

---

**summary.OBsProb**

*Summary of Posterior Probabilities from Objective Bayesian Design*

Description

Reduced printing method for class OBsProb lists. Prints posterior probabilities of factors and models from Objective Bayesian procedure.

Usage

```r
## S3 method for class 'OBsProb'
summary(object, nTop = 10, digits = 3, ...)
```

Arguments

- `object` list. OBsProb class list. Output list of OBsProb function.
- `nTop` integer. Number of the top ranked models to print.
- `digits` integer. Significant digits to use.
- `...` additional arguments passed to summary generic function.
Value

The function prints out the marginal factors and models posterior probabilities. Returns invisible list with the components:

- **calc**: Numeric vector with basic calculation information.
- **probabilities**: Data frame with the marginal posterior probabilities.
- **models**: Data frame with the models posterior probabilities.

Author(s)

Marta Nai Ruscone.

References


See Also

OBsProb, print.OBsProb, plot.OBsProb.

Examples

```r
library(OBsMD)
data(OBsMD.es5, package="OBsMD")
X <- as.matrix(OBsMD.es5[,1:5])
y <- OBsMD.es5[,6]
# Using for model prior probability a Beta with parameters a=1 b=1
es5.ObProb <- OBsProb(X=X,y, abeta=1, bbeta=1, blk=0, nFac=5, nInt=2, nTop=32)
print(es5.ObProb)
summary(es5.ObProb)
```

### summary.OMD

**Summary of Optimal OMD Follow-Up Experiments**

Description

Reduced printing method for lists of class OMD. It displays the best extra-runs according to the OMD criterion together with the correspondent OMD value.

Usage

```r
## S3 method for class 'OMD'
summary(object, digits = 3, verbose=FALSE, ...)
```
summary.OMD

Arguments

- **object**: list of OMD class. Output list of OMD function.
- **digits**: integer. Significant digits to use in the print out.
- **verbose**: logical. If TRUE, the unclass-ed object is displayed.
- **...**: additional arguments passed to summary generic function.

Value

It prints out the marginal factors and models posterior probabilities and the top OMD follow-up experiments with their corresponding OMD statistic.

Author(s)

Marta Nai Ruscone.

References


See Also

- `print.OMD` and `OMD`

Examples

```r
library(OBsMD)
data(OBsMD.es5, package="OBsMD")
X <- as.matrix(OBsMD.es5[,1:5])
y <- OBsMD.es5[,6]
es5.ObProb <- OBsProb(X=X,y=y,blk=0,mFac=5,mInt=2,nTop=32)
nMod <- 26
Xcand <- matrix(c(-1,-1,-1,-1,-1,
                  1,-1,-1,-1,-1,
                  -1,1,-1,-1,-1,
                  1,1,-1,-1,-1,
                  -1,-1,1,-1,-1,
                  1,-1,1,-1,-1,
                  -1,1,1,-1,-1,
                  1,1,1,-1,-1,
                  -1,-1,-1,1,-1,
                  1,-1,-1,1,-1,
                  -1,1,-1,1,-1,
                  1,-1,-1,1,-1,
                  1,1,-1,1,-1),
                  nrow=26,ncol=5)
```
summary.OMD

```
-1,-1,1,1,-1,
1,-1,1,1,-1,
-1,1,1,1,-1,
1,1,1,1,-1,
-1,-1,-1,-1,1,
1,-1,-1,-1,1,
1,-1,-1,1,1,
1,1,-1,1,1,
-1,-1,1,1,1,
1,1,-1,1,1,
-1,-1,-1,1,1,
1,1,-1,1,1,
-1,-1,1,1,1,
1,1,-1,1,1,
1,-1,-1,1,1,
1,1,-1,1,1,
-1,-1,-1,1,1,
1,1,-1,1,1,
-1,-1,1,1,1,
1,1,-1,1,1,
1,-1,-1,1,1,
1,1,-1,1,1,
-1,1,1,1,1,
1,1,1,1,1
```

```
summary(p_omd)
```

```
# OMD
p_omd <- OMD(OBsProb=es5.OBsProb,nFac=5,nBlk=0,nMod=26,
nFoll=4,Xcand=Xcand,mIter=20,nStart=25,startDes=NULL,
top=30)
summary(p_omd)
```
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