

Package ‘BSW’

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Type Package

Title Fitting a Log-Binomial Model using the Bekhit-Schöpe-Wagenpfeil
(BSW) Algorithm

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Description

Implements a modified Newton-type algorithm (BSW algorithm) for solving the maximum likelihood estimation problem in fitting a log-binomial model under linear inequality constraints.

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Encoding UTF-8

URL <https://github.com/adam-bec/BSW>

BugReports <https://github.com/adam-bec/BSW/issues>

VignetteBuilder knitr

Depends Matrix, matrixStats, quadprog

Suggests knitr, rmarkdown, testthat

Imports methods

LazyData true

RoxygenNote 7.1.1

NeedsCompilation no

Repository CRAN

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bsw	<i>Fitting a log-binomial model using the Bekhit-Schöpe-Wagenpfeil (BSW) algorithm</i>
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Description

bsw() fits a log-binomial model using a modified Newton-type algorithm (BSW algorithm) for solving the maximum likelihood estimation problem under linear inequality constraints.

Usage

```
bsw(formula, data, maxit = 200L)
```

Arguments

formula	An object of class "formula" (or one that can be coerced to that class): a symbolic description of the model to be fitted.
data	A data frame containing the variables in the model.
maxit	A positive integer giving the maximum number of iterations.

Value

An object of S4 class "bsw" containing the following slots:

call	An object of class "call".
formula	An object of class "formula".
coefficients	A numeric vector containing the estimated model parameters.
iter	A positive integer indicating the number of iterations.
converged	A logical constant that indicates whether the model has converged.
y	A numerical vector containing the dependent variable of the model.
x	The model matrix.
data	A data frame containing the variables in the model.

Author(s)

Adam Bekhit, Jakob Schöpe

References

Wagenpfeil S (1996) Dynamische Modelle zur Ereignisanalyse. Herbert Utz Verlag Wissenschaft, Munich, Germany

Wagenpfeil S (1991) Implementierung eines SQP-Verfahrens mit dem Algorithmus von Ritter und Best. Diplomarbeit, TUM, Munich, Germany

Examples

```
set.seed(123)
x <- rnorm(100, 50, 10)
y <- rbinom(100, 1, exp(-4 + x * 0.04))
fit <- bsw(formula = y ~ x, data = data.frame(y = y, x = x))
summary(fit)
```

bws-class

S4 Class "bws"

Description

S4 Class "bws"

Slots

call An object of class "call".

formula An object of class "formula".

coefficients A numeric vector containing the estimated model parameters.

iter A positive integer indicating the number of iterations.

converged A logical constant that indicates whether the model has converged.

y A numeric vector containing the dependent variable of the model.

x The model matrix.

data A data frame containing the variables in the model.

Author(s)

Adam Bekhit, Jakob Schöpe

coef,bsw-method	<i>Extracting the estimated model parameters of bsw()</i>
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Description

For objects of class "bsw", coef() extracts the estimated model parameters of bsw().

Usage

```
## S4 method for signature 'bsw'
coef(object)
```

Arguments

object	An object of class "bsw".
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Value

A numeric vector containing the estimated model parameters.

Author(s)

Adam Bekhit, Jakob Schöpe

confint,bsw-method	<i>Estimating confidence intervals of the estimated model parameters of bsw()</i>
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Description

For objects of class "bsw", confint() estimates confidence intervals of the estimated model parameters of bsw().

Usage

```
## S4 method for signature 'bsw'
confint(object, parm, level = 0.95, method = "wald", R = 1000L)
```

Arguments

object	An object of class "bsw".
parm	A specification of which model parameters are to be given confidence intervals, either a vector of numbers or a vector of names. If missing, all model parameters are considered.
level	A numeric value that indicates the level of confidence.
method	A character giving the estimation method of the confidence intervals ("bca" or "wald").
R	A positive integer giving the number of bootstrap replicates.

Details

confint provides Wald (default) and bias-corrected accelerated bootstrap confidence intervals of the estimated model parameters of bsw().

Value

A matrix with columns giving the lower and upper confidence limits of each estimated model parameter.

Author(s)

Adam Bekhit, Jakob Schöpe

constr

Setting the linear inequality constraints for bsw()

Description

constr() sets the linear inequality constraints for bsw().

Usage

```
constr(x)
```

Arguments

x A model matrix.

Value

A matrix containing the linear inequality constraints for bsw().

Author(s)

Adam Bekhit, Jakob Schöpe

gradF	<i>Deriving the first derivatives of the log likelihood function of the log-binomial model in bsw()</i>
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Description

gradF() derives the first derivatives of the log likelihood function of the log-binomial model.

Usage

```
gradF(theta, y, x)
```

Arguments

theta	A numeric vector containing the initial values of the model parameters.
y	A numeric vector containing the dependent variable of the model.
x	The model matrix.

Value

A numeric vector containing the first derivatives of the log likelihood function of the log-binomial model.

Author(s)

Adam Bekhit, Jakob Schöpe

hess	<i>Deriving the second partial derivatives of the log likelihood function of the log-binomial model in bsw() (Hessian matrix)</i>
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Description

hess() derives the second partial derivatives of the log likelihood function of the log-binomial model.

Usage

```
hess(theta, y, x)
```

Arguments

theta	A numeric vector containing the initial values of the model parameters.
y	A numeric vector containing the dependent variable of the model.
x	The model matrix.

Value

A numeric matrix containing the second partial derivatives of the log likelihood function of the log-binomial model (Hessian matrix).

Author(s)

Adam Bekhit, Jakob Schöpe

summary,bsw-method	<i>Summarizing the estimated model parameters of bsw()</i>
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Description

For objects of class "bsw", summary() summarizes the estimated model parameters of bsw().

Usage

```
## S4 method for signature 'bsw'  
summary(object)
```

Arguments

object	An object of class "bsw".
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Value

A list containing the following elements:

coefficients	A numeric vector containing the estimated model parameters.
std.err	A numeric vector containing the estimated standard errors of the model parameters.
z.value	A numeric vector containing the estimated z test statistic of the model parameters.
p.value	A numeric vector containing the estimated p values of the model parameters.

Author(s)

Adam Bekhit, Jakob Schöpe

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