

Package ‘gfilogisreg’

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Title Generalized Fiducial Inference for Binary Logistic Regression Models

Version 1.0.2

Description Fiducial framework for the logistic regression model. The fiducial distribution of the parameters of the logistic regression is simulated, allowing to perform statistical inference on any parameter of interest. The algorithm is taken from Jessi Cisewski's PhD thesis: Jessi Cisewski (2012), "Generalized fiducial inference for mixed linear models".

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Encoding UTF-8

RoxygenNote 7.1.1

SystemRequirements C++11, gmp

Imports rcd, lazyeval, spatstat (>= 2.0.0), spatstat.geom, EigenR, stats, Rcpp

LinkingTo Rcpp, RcppArmadillo, roptim, BH

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation yes

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`gfiCDF` *Fiducial cumulative distribution function*

Description

Fiducial cumulative distribution function of a parameter of interest.

Usage

```
gfiCDF(parameter, fidsamples)
```

Arguments

`parameter` a right-sided formula defining the parameter of interest
`fidsamples` fiducial samples, the output of `gfilogisreg`

Value

The fiducial cumulative distribution function of the parameter.

Examples

```
y <- c(
  0, 0, 0, 1,
  0, 1, 1, 1
)
group <- gl(2, 4)
fidsamples <- gfilogisreg(y ~ 0 + group, N = 500) # (N=500 is not serious)
fcdf <- gfiCDF(~ exp(group1) / exp(group2), fidsamples)
fcdf(1)
plot(fcdf)
```

`gfiConfInt` *Fiducial confidence interval*

Description

Fiducial confidence interval of a parameter of interest.

Usage

```
gfiConfInt(parameter, fidsamples, conf = 0.95)
```

Arguments

parameter	a right-sided formula defining the parameter of interest
fidsamples	fiducial samples, the output of <code>gfilogisreg</code>
conf	confidence level

Value

The fiducial confidence interval of the parameter.

Examples

```

y <- c(
  0, 0, 0, 1,
  0, 1, 1, 1
)
group <- gl(2, 4)
fidsamples <- gfilogisreg(y ~ 0 + group, N = 500) # (N=500 is not serious)
expit <- function(x) exp(x) / (1+exp(x))
gfiConfInt(~ expit(group1) - expit(group2), fidsamples)

```

gfilogisreg

Generalized fiducial inference for logistic regression

Description

Simulates the fiducial distribution of a logistic regression model.

Usage

```

gfilogisreg(
  formula,
  data = NULL,
  N,
  thresh = N/2,
  progress = TRUE,
  gmp = FALSE,
  ufactor = .Machine$double.eps^(-0.5),
  vfactor = .Machine$double.eps^(-0.38)
)

```

Arguments

formula	formula describing the model
data	dataframe containing the variables in the model
N	number of fiducial simulations
thresh	threshold criterion for the alteration; expert usage only

progress whether to print messages showing the progress of the algorithm
 gmp whether to use exact arithmetic in the algorithm (experimental)
 ufactor, vfactor these are control parameters of an optimization performed in the algorithm;
 these parameters should not be changed except if you encounter some messages
 about convergence issues

Value

A list with two fields: Beta, the fiducial simulations of the parameters, and Weights, their weight.

Examples

```

y <- c(0, 0, 1, 1, 1)
x <- c(-2, -1, 0, 1, 2)
gf <- gfilogisreg(y ~ x, N = 400) # (N=400 is not serious)
gfiSummary(gf)
glm(y ~ x, family = binomial())

```

<code>gfiQuantile</code>	<i>Fiducial quantiles</i>
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Description

Quantiles of the fiducial distribution of a parameter of interest.

Usage

```
gfiQuantile(parameter, fidsamples, probs)
```

Arguments

parameter a right-sided formula defining the parameter of interest
 fidsamples fiducial samples, the output of `gfilogisreg`
 probs numeric vector of probabilities

Value

Numeric vector of quantiles, of the same length as probs.

Examples

```

y <- c(
  0, 0, 0, 1,
  0, 1, 1, 1
)
group <- gl(2, 4)
fidsamples <- gfilogisreg(y ~ 0 + group, N = 500) # (N=500 is not serious)
gfiQuantile(~ group2 - group1, fidsamples, c(25, 50, 75)/100)

```

`gfiSummary`*Summary of fiducial samples*

Description

Summary of the fiducial samples.

Usage

```
gfiSummary(fidsamples, conf = 0.95)
```

Arguments

<code>fidsamples</code>	fiducial samples, the output of <code>gfilogisreg</code>
<code>conf</code>	confidence level

Value

A matrix with summary statistics: means, medians, and confidence intervals.

Examples

```
y <- c(0, 0, 1, 1, 1)
x <- c(-2, -1, 0, 1, 2)
fidsamples <- gfilogisreg(y ~ x, N = 400) # (N=400 is not serious)
gfiSummary(fidsamples)
```

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