

# Package ‘gfilogisreg’

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**Title** Generalized Fiducial Inference for Binary Logistic Regression Models

**Version** 1.0.1

**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".

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**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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**Repository** CRAN

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`gfiCDF` *Fiducial cumulative distribution function*

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**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)
```

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`gfiConfInt` *Fiducial confidence interval*

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**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)

```

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gfilogisreg

*Generalized fiducial inference for logistic regression*


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**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())

```

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<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)

```

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`gfiSummary`*Summary of fiducial samples*

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**Description**

Summary of the fiducial samples.

**Usage**

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

**Arguments**

<code>fidsamples</code>	fiducial samples, the output of <a href="#">gfilogisreg</a>
<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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