Package ‘qif’

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Title Quadratic Inference Function
Version 1.5
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Depends R (>= 3.5.0)
Description Developed to perform the estimation and inference for regression coefficient parameters in longitudinal marginal models using the method of quadratic inference functions. Like generalized estimating equations, this method is also a quasi-likelihood inference method. It has been showed that the method gives consistent estimators of the regression coefficients even if the correlation structure is misspecified, and it is more efficient than GEE when the correlation structure is misspecified. Based on Qu, A., Lindsay, B.G. and Li, B. (2000) <doi:10.1093/biomet/87.4.823>.

Imports MASS
License GPL-2
Encoding UTF-8
LazyData true

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R topics documented:

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Description
The data set consists of seizure counts for 59 individuals with epilepsy. Counts were recorded for four two-week periods (8 weeks total). Age is the only covariate.

Usage
epil

Format
A data.frame with 236 rows and 9 variables (columns):

- y  the count for the 2-week period.
- trt treatment, "placebo" or "progabide".
- base the counts in the baseline 8-week period.
- age subject’s age, in years.
- V4 0/1 indicator variable of period 4.
- subject subject number, 1 to 59.
- period period, 1 to 4.
- bbase log-counts for the baseline period, centred to have zero mean.
- lage log-ages, centred to have zero mean.

Source

References
Description

MS data

Usage

exacerb

Format

An object of class data.frame with 765 rows and 14 columns.

Source

Thal

References

Venab

print.qif

Print Function for qif Object

Description

Print a qif model object.

Usage

## S3 method for class 'qif'
print(x, digits = NULL, quote = FALSE, prefix = "", 
...)

Arguments

x the qif model object.
digits number of digits to print.
quote logical, indicating whether or not strings should be printed with surrounding quotes.
prefix string, only "" is implemented.
... further arguments passed to or from other methods.
Value

The invisible object from the arguments.

Author(s)

Zhichang Jiang, Alberta Health Services, and Peter X.K. Song, University of Michigan.

See Also

print qif

---

print.summary.qif  Print the Summary of qif Object

Description

Prints the summary of a qif object.

Usage

```r
## S3 method for class 'summary.qif'
print(x, digits = NULL, quote = FALSE,
    prefix = "", ...)  
```

Arguments

- `x`  the qif model object.
- `digits`  number of digits to print.
- `quote`  logical, indicating whether or not strings should be printed with surrounding quotes.
- `prefix`  string, only "" is implemented.
- `...`  further arguments passed to or from other methods.

Value

The invisible object from the arguments.

Author(s)

Zhichang Jiang, Alberta Health Services, and Peter X.K. Song, University of Michigan.

See Also

summary qif
**qif**

*Function to Solve a Quadratic Inference Function Model*

**Description**

Produces an object of class "qif" which is a Quadratic Inference Function fit of the balanced longitudinal data.

**Usage**

```r
qif(formula = formula(data), id = id, data = parent.frame(),
    b = NULL, tol = 1e-08, maxiter = 1000, family = gaussian,
    corstr = "independence", invfun = "finv")
```

**Arguments**

- `formula`: a formula expression as for other regression models, of the form `response ~ predictors`. See the documentation of `lm` and `formula` for details.
- `id`: a vector which identifies the clusters. The length of `id` should be the same as the number of observations. Data are assumed to be sorted so that observations on a cluster are contiguous rows for all entities in the formula.
- `data`: an optional data frame in which to interpret the variables occurring in the formula, along with the `id` variables.
- `b`: an initial estimate for the parameters.
- `tol`: the tolerance used in the fitting algorithm.
- `maxiter`: the maximum number of iterations.
- `family`: a family object: a list of functions and expressions for defining canonical link and variance functions. Families supported in `qif` are gaussian, binomial, poisson, and gamma; see the `glm` and `formula` documentation. Some links are not currently available: probit link for binomial family and log link for gamma family.
- `corstr`: a character string specifying the correlation structure. The following are permitted: "independence", "exchangeable", "AR-1" and "unstructured".
- `invfun`: a character string specifying the matrix inverse function. The following are permitted: "finv" and "ginv".

**Details**

`qif` provides two options of computing matrix inverses. The default is from Fortran math library, and the other one is generalized inverse "ginv" given in R package MASS. You can call option "ginv" through argument "invfun" in "qif()".
Value

A list containing:

- **title**: name of qif
- **version**: the current version of qif
- **model**: analysis model for link function, variance function and correlation structure
- **terms**: analysis model for link function, variance function and correlation structure
- **iteration**: the number of iterations
- **coefficients**: beta estimates value
- **linear.predictors**: linear predictor value
- **fitted.value**: fitted value of y
- **x**: the predicted matrix
- **y**: the response
- **residuals**: y-mu
- **pearson.residuals**: pearson residuals
- **scale**: the scale of fitted model
- **family**: the type of distribution
- **id**: model fitted value
- **max.id**: max number of each steps
- **xnames**: the values are X name of qif
- **statistics**: The qif statistics
- **Xnames**: the name X matrix in qif
- **parameter**: parameter estimates
- **covariance**: Covariance of coefficients

**Note**

This R package is created by transplanting a SAS macro QIF developed originally by Peter Song and Zhichang Jiang (2006). This is version 1.5 of this user documentation file, revised 2019-07-02.

**Author(s)**

Zhichang Jiang, Alberta Health Services, and Peter X.K. Song, University of Michigan.

**References**


See Also

glm, lm, formula.

Examples

## Marginal log-linear model for the epileptic seizures count data

# Read in the epilepsy data set:
data(epil)

# Fit the QIF model:
fit <- qif(y ~ base + trt + lage + V4, id=subject, data=epil,
          family=poisson, corstr="AR-1")

# Alternately, use ginv() from package MASS
fit <- qif(y ~ base + trt + lage + V4, id=subject, data=epil,
          family=poisson, corstr="AR-1", invfun = "ginv")

# Print summary of QIF fit:
summary(fit)

## Second example: MS study
data(exacerb)

qif_BIN_IND<-qif(exacerbation ~ treatment + time + duration + time2, id=id,
                 data=exacerb, family=binomial, corstr="independence")
qif_BIN_AR1<-qif(exacerbation ~ treatment + time + duration + time2, id=id,
                 data=exacerb, family=binomial, corstr="AR-1")
qif_BIN_CS<-qif(exacerbation ~ treatment + time + duration + time2, id=id,
                data=exacerb, family=binomial, corstr="exchangeable")
qif_BIN_UN<-qif(exacerbation ~ treatment + time + duration + time2, id=id,
                data=exacerb, family=binomial, corstr="unstructured")

summary(qif_BIN_CS)
qif_BIN_CS$statistics
qif_BIN_CS$covariance
Usage

```r
## S3 method for class 'qif'
summary(object, correlation = TRUE, ...)
```

Arguments

- `object` an object for which a summary is desired.
- `correlation` binary, include correlation.
- `...` additional arguements to be passed to `summary`.

Value

The `summary.qif` object.

Author(s)

Zhichang Jiang, Alberta Health Services, and Peter X.K. Song, University of Michigan.

See Also

- `qif`
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