The ljr Package

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Description Fits and tests logistic joinpoint models.
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R topics documented:

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**ljr0**

*MLE with 0 joinpoints*

**Description**

Determines the maximum likelihood estimate of model coefficients in the logistic joinpoint regression model with no joinpoints.

**Usage**

```r
ljr0(y, n, tm, X, ofst)
```

**Arguments**

- `y`: the vector of Binomial responses.
- `n`: the vector of sizes for the Binomial random variables.
- `tm`: the vector of observation times.
- `X`: a design matrix containing other covariates.
- `ofst`: a vector of known offsets for the logit of the response.

**Details**

The re-weighted log-likelihood is the log-likelihood divided by the largest component of `n`.

**Value**

- `Coef`: A table of coefficient estimates.
- `wlik`: The maximum value of the re-weighted log-likelihood.

**Author(s)**

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

**References**


**See Also**

`ljr01, ljr01, ljr01, ljr01, ljr01`
Examples

N=20
m=2
k=0
beta=c(0.1,0.1,-0.05)
gamma=c(0.1)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1000000,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr0(y,n,tm,X,ofst)

ljr01

Perform test of 0 vs 1 joinpoints.

Description

This function tests the null hypothesis of 0 joinpoints versus the alternative of one joinpoint based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.

Usage

ljr01(y,n,tm,X,ofst,R=1000,alpha=.05)

Arguments

y the vector of Binomial responses.
n the vector of sizes for the Binomial random variables.
tm the vector of ordered observation times.
X a design matrix containing other covariates.
ofst a vector of known offsets for the logit of the response.
R number of Monte Carlo simulations.
alpha significance level of the test.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of n.
Value

- **pval**: The estimate of the p-value via simulation.
- **Coeff**: A table of coefficient estimates.
- **Joinpoint**: The estimates of the joinpoint, if it is significant.
- **wlik**: The maximum value of the re-weighted log-likelihood.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

- `ljr0`, `ljr0`, `ljr0`, `ljr0`

Examples

```R
N=20
m=2
k=0
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05,0.05)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,1,2,2,3,3,4,4,4.5,5,6,6,7,7,7,7,7,7,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr01(y,n,tm,X,ofst,R=1000)
```
Perform test of 0 vs 2 joinpoints.

Description

This function tests the null hypothesis of 0 joinpoints versus the alternative of two joinpoints based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.

Usage

ljr02(y, n, tm, X, ofst, R = 1000, alpha = .05)

Arguments

- **y**: the vector of Binomial responses.
- **n**: the vector of sizes for the Binomial random variables.
- **tm**: the vector of ordered observation times.
- **X**: a design matrix containing other covariates.
- **ofst**: a vector of known offsets for the logit of the response.
- **R**: number of Monte Carlo simulations.
- **alpha**: significance level of the test.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of n.

Value

- **pval**: The estimate of the p-value via simulation.
- **Coef**: A table of coefficient estimates.
- **Joinpoint**: The estimates of the joinpoint, if it is significant.
- **wlik**: The maximum value of the re-weighted log-likelihood.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

ljr0, ljr0, ljr0, ljr0
Examples

```r
library(ljr, lib.loc='~/myrlibrary')
N=20
m=2
k=2
beta=c(0.1, 0.1, -0.05)
gamma=c(0.1, -0.05, 0.05)
tau=c(3.5, 6.5)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr02(y,n,tm,X,ofst,R=1000)
```

ljr1

MLE with 1 joinpoint

Description

Determines the maximum likelihood estimates of model coefficients in the logistic joinpoint regression model with one joinpoint.

Usage

```r
ljr1(y,n,tm,X,ofst,summ=TRUE)
```

Arguments

- `y` the vector of Binomial responses.
- `n` the vector of sizes for the Binomial random variables.
- `tm` the vector of ordered observation times.
- `X` a design matrix containing other covariates.
- `ofst` a vector of known offsets for the logit of the response.
- `summ` a boolean indicator of whether summary tables should be returned.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of `n`. 
Value

Coef  A table of coefficient estimates.
Joinpoint  The estimate of the joinpoint.
wlik  The maximum value of the re-weighted log-likelihood.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

ljrb2, ljrb2, ljrb2, link(ljr12), ljrb2, ljrb2

Examples

N=20
m=2
k=1
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05)
tau=c(5)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr1(y,n,tm,X,ofst)
ljr11  

*Test coefficients conditioned on K=1 joinpoint.*

**Description**

This function performs the likelihood ratio tests to find p-values in testing the significance of each of the coefficients as well as the intercept and ordered observation times. The p-values are determined by a Monte Carlo method.

**Usage**

```r
ljr11(y,n,tm,X,ofst,R=1000)
```

**Arguments**

- `y` the vector of Binomial responses.
- `n` the vector of sizes for the Binomial random variables.
- `tm` the vector of ordered observation times.
- `X` a design matrix containing other covariates.
- `ofst` a vector of known offsets for the logit of the response.
- `R` number of Monte Carlo simulations.

**Details**

The re-weighted log-likelihood is the log-likelihood divided by the largest component of n.

**Value**

- `pvals` The estimates of the p-values via simulation.

**Author(s)**

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

**References**


**See Also**

- `ljr1`, `ljr1`
**Examples**

```r
N=20
m=2
k=1
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05)
tau=c(5)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr11(y,n,tm,X,ofst,R=1000)
```

---

**ljr12**  
*Perform test of 1 vs 2 joinpoints.*

**Description**

This function tests the null hypothesis of one joinpoint versus the alternative of two joinpoints based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.

**Usage**

```r
ljr12(y,n,tm,X,ofst,R=1000,alpha=.05)
```

**Arguments**

- `y` the vector of Binomial responses.
- `n` the vector of sizes for the Binomial random variables.
- `tm` the vector of ordered observation times.
- `X` a design matrix containing other covariates.
- `ofst` a vector of known offsets for the logit of the response.
- `R` number of Monte Carlo simulations.
- `alpha` significance level of the test.
Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of \( n \).

Value

- **pval**: The estimate of the p-value via simulation.
- **_coef**: A table of coefficient estimates.
- **Joinpoint**: The estimates of the joinpoint, if it is significant.
- **wlik**: The maximum value of the re-weighted log-likelihood.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

ljr1, ljr1, ljr1, ljr1

Examples

```r
N=20
m=2
k=1
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05,0.05)
tau=c(5)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
et=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr12(y,n,nm,X[ofst,R=1000])
```
**Description**

Determines the maximum likelihood estimates of model coefficients in the logistic joinpoint regression model with two joinpoints.

**Usage**

```r
ljr2(y, n, tm, X, ofst)
```

**Arguments**

- `y`: the vector of Binomial responses.
- `n`: the vector of sizes for the Binomial random variables.
- `tm`: the vector of ordered observation times.
- `X`: a design matrix containing other covariates.
- `ofst`: a vector of known offsets for the logit of the response.

**Details**

The re-weighted log-likelihood is the log-likelihood divided by the largest component of `n`.

**Value**

- `Coef`: A table of coefficient estimates.
- `Joinpoints`: The estimates of the joinpoints.
- `wlik`: The maximum value of the re-weighted log-likelihood.

**Author(s)**

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

**References**


**See Also**

`ljrb2`, `ljrb2`, `ljrb2`, `ljrb2`
Examples

N=20
m=2
k=2
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05,0.1)
tau=c(3,7)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr2(y,n,tm,X,ofst)

ljr22

Test coefficients conditioned on K=2 joinpoint.

Description

This function performs the likelihood ratio tests to find p-values in testing the significance of each of
the coefficients as well as the intercept and ordered observation times. The p-values are determined
by a Monte Carlo method.

Usage

ljr22(y,n,tm,X,ofst,R=1000)

Arguments

y         the vector of Binomial responses.
n         the vector of sizes for the Binomial random variables.
tm        the vector of ordered observation times.
X         a design matrix containing other covariates.
ofst      a vector of known offsets for the logit of the response.
R         number of Monte Carlo simulations.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of n.
Value

pvals The estimates of the p-values via simulation.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

ljr2

Examples

N=20
m=2
k=2
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.1,0.05)
tau=c(3,6.5)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
et=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljr22(y,n,tm,X,ofst,R=1000)

ljrb

Perform backward joinpoint selection algorithm with upper bound K.

Description

This function performs the backward joinpoint selection algorithm with K maximum possible number of joinpoints based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.
Usage

\texttt{ljrb(K,y,n,tm,X,ofst,R=1000,\alpha=.05)}

Arguments

\begin{itemize}
\item \texttt{K} - the pre-specified maximum possible number of joinpoints
\item \texttt{y} - the vector of Binomial responses.
\item \texttt{n} - the vector of sizes for the Binomial random variables.
\item \texttt{tm} - the vector of ordered observation times.
\item \texttt{X} - a design matrix containing other covariates.
\item \texttt{ofst} - a vector of known offsets for the logit of the response.
\item \texttt{R} - number of Monte Carlo simulations.
\item \texttt{\alpha} - significance level of the test.
\end{itemize}

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of \texttt{n}.

Value

\begin{itemize}
\item \texttt{pvals} - The estimates of the p-values via simulation.
\item \texttt{Coef} - A table of coefficient estimates.
\item \texttt{Joinpoints} - The estimates of the joinpoint, if it is significant.
\item \texttt{wlik} - The maximum value of the re-weighted log-likelihood.
\end{itemize}

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

\texttt{ljrk,ljrk,ljrk}

Examples

\begin{verbatim}
N=20
m=2
k=0
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05,0.05)
ofst=runif(N,-2.5,-1.5)
\end{verbatim}
```r
x1 = round(runif(N, -0.5, 9.5))
x2 = round(runif(N, -0.5, 9.5))
X = cbind(x1, x2)
n = rep(1e9, N)
tm = c(1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10)
if (m > 0)
  for (i in 1:m)
    eta = eta + beta[i + 1] * X[, i]
if (k > 0)
  for (i in 1:k)
    eta = eta + gamma[i + 1] * pmax(tm - tau[i], 0)
y = rbinom(N, size = n, prob = exp(eta) / (1 + exp(eta)))
temp.ljr = ljrb(2, y, n, tm, X, ofst, R = 1000)
```

### ljrb2

**Perform backward joinpoint selection algorithm with K=2.**

### Description

This function performs the backward joinpoint selection algorithm with K=2 maximum possible number of joinpoints based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.

### Usage

```r
ljrb2(y, n, tm, X, ofst, R = 1000, alpha = .05)
```

### Arguments

- `y`: the vector of Binomial responses.
- `n`: the vector of sizes for the Binomial random variables.
- `tm`: the vector of ordered observation times.
- `X`: a design matrix containing other covariates.
- `ofst`: a vector of known offsets for the logit of the response.
- `R`: number of Monte Carlo simulations.
- `alpha`: significance level of the test.

### Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of `n`.

### Value

- `pvals`: The estimates of the p-values via simulation.
- `Coef`: A table of coefficient estimates.
- `Joinpoints`: The estimates of the joinpoint, if it is significant.
- `wlik`: The maximum value of the re-weighted log-likelihood.
Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

ljr0, ljr0, ljr0, ljr0

Examples

N=20
m=2
k=0
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05,0.05)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
et=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljrb2(y,n,tm,X,ofst,R=1000)

ljrf

Perform forward joinpoint selection algorithm with unlimited upper bound.

Description

This function performs the full forward joinpoint selection algorithm based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.

Usage

ljrf(y,n,tm,X,ofst,R=1000,alpha=.05)
Arguments

- `y`: the vector of Binomial responses.
- `n`: the vector of sizes for the Binomial random variables.
- `tm`: the vector of ordered observation times.
- `X`: a design matrix containing other covariates.
- `ofst`: a vector of known offsets for the logit of the response.
- `R`: number of Monte Carlo simulations.
- `alpha`: significance level of the test.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of `n`.

Value

- `pvals`: The estimates of the p-values via simulation.
- `Coef`: A table of coefficient estimates.
- `Joinpoints`: The estimates of the joinpoint, if it is significant.
- `wlik`: The maximum value of the re-weighted log-likelihood.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

`ljrk`, `ljrk`, `ljrk`

Examples

```R
N=20
m=2
k=0
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05,0.05)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
 tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
```
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
    for (i in 1:m)
        eta=eta+beta[i+1]*X[,i]
if (k>0)
    for (i in 1:k)
        eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljrf(y,n,tm,X,ofst,R=1000)

ljrf2

Perform forward joinpoint selection algorithm with K=2.

Description

This function performs the forward joinpoint selection algorithm with K=2 maximum possible number of joinpoints based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.

Usage

ljrf2(y,n,tm,X,ofst,R=1000,alpha=.05)

Arguments

y the vector of Binomial responses.
n the vector of sizes for the Binomial random variables.
tm the vector of ordered observation times.
X a design matrix containing other covariates.
ofst a vector of known offsets for the logit of the response.
R number of Monte Carlo simulations.
alpha significance level of the test.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of n.

Value

pvals The estimates of the p-values via simulation.
Coef A table of coefficient estimates.
Joinpoints The estimates of the joinpoint, if it is significant.
wlik The maximum value of the re-weighted log-likelihood.
**Author(s)**

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

**References**


**See Also**

ljr0, ljr0, ljr0, ljr0

**Examples**

```r
N=20
m=2
k=0
beta=c(0.1, 0.1, -0.05)
gamma=c(0.1, -0.05, 0.05)
ofst=runif(N, -2.5, -1.5)
x1=round(runif(N, -0.5, 9.5))
x2=round(runif(N, -0.5, 9.5))
X=cbind(x1, x2)
n=rep(1e9, N)
tm=c(1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 7, 7, 8, 8, 9, 9, 10, 10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i], 0)
y=rbinom(N, size=n, prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljrf2(y, n, tm, X, ofst, R=1000)
```

**Description**

This function tests the null hypothesis of \( j \) joinpoint(s) versus the alternative of \( k \) joinpoint(s) based on the likelihood ratio test statistic. The p-value is determined by a Monte Carlo method.

**Usage**

```r
ljrjk(j, k, y, n, tm, X, ofst, R=1000, alpha=.05)
```
Arguments

j, k  
pre-specified number of joinpoints in the null and alternative hypotheses (the smaller is used for the null).

y  
the vector of Binomial responses.

n  
the vector of sizes for the Binomial random variables.

tm  
the vector of ordered observation times.

X  
a design matrix containing other covariates.

ofst  
a vector of known offsets for the logit of the response.

R  
number of Monte Carlo simulations.

alpha  
significance level of the test.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of n.

Value

pval  
The estimate of the p-value via simulation.

Coef  
a table of coefficient estimates.

Joinpoint  
The estimates of the joinpoint, if it is significant.

wlik  
The maximum value of the re-weighted log-likelihood.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

ljrk

Examples

N=20
m=2
k=0
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05,0.05)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljrjk(0,1,y,n,tm,X,ofst,R=1000)

ljrk

\textit{MLE with k joinpoints}

\textbf{Description}

Determines the maximum likelihood estimates of model coefficients in the logistic joinpoint regression model with k joinpoints.

\textbf{Usage}

\texttt{ljrk(k,y,n,tm,X,ofst)}

\textbf{Arguments}

- \texttt{k} the pre-specified number of joinpoints (with unknown locations).
- \texttt{y} the vector of Binomial responses.
- \texttt{n} the vector of sizes for the Binomial random variables.
- \texttt{tm} the vector of ordered observation times.
- \texttt{X} a design matrix containing other covariates.
- \texttt{ofst} a vector of known offsets for the logit of the response.

\textbf{Details}

The re-weighted loglikelihood is the loglikelihood divided by the largest component of n.

\textbf{Value}

- \texttt{Coef} A table of coefficient estimates.
- \texttt{Joinpoints} The estimates of the joinpoints.
- \texttt{wlik} The maximum value of the re-weighted loglikelihood.

\textbf{Author(s)}

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).
References


See Also

ljrb, ljrb

Examples

N=20
m=2
k=1
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05)
tau=c(5)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
if (k>0)
  for (i in 1:k)
    eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljrk(1,y,n,tm,X,ofst)

tljk

Test coefficients conditioned on K=k joinpoint.

Description

This function performs the likelihood ratio tests to find p-values in testing the significance of each of the coefficients as well as the intercept and ordered observation times. The p-values are determined by a Monte Carlo method.

Usage

ljrkk(k,y,n,tm,X,ofst,R=1000)
Arguments

- **k**: the pre-specified number of joinpoints (with unknown locations).
- **y**: the vector of Binomial responses.
- **n**: the vector of sizes for the Binomial random variables.
- **tm**: the vector of ordered observation times.
- **X**: a design matrix containing other covariates.
- **ofst**: a vector of known offsets for the logit of the response.
- **R**: number of Monte Carlo simulations.

Details

The re-weighted log-likelihood is the log-likelihood divided by the largest component of \( n \).

Value

- **pvals**: The estimates of the p-values via simulation.

Author(s)

The authors are Michal Czajkowski, Ryan Gill, and Greg Rempala. The software is maintained by Ryan Gill (rsgill01@louisville.edu).

References


See Also

- **ljrk**

Examples

```r
N=20
m=2
k=1
beta=c(0.1,0.1,-0.05)
gamma=c(0.1,-0.05)
tau=c(5)
ofst=runif(N,-2.5,-1.5)
x1=round(runif(N,-0.5,9.5))
x2=round(runif(N,-0.5,9.5))
X=cbind(x1,x2)
n=rep(1e9,N)
tm=c(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10)
eta=ofst+beta[1]+gamma[1]*tm
if (m>0)
  for (i in 1:m)
    eta=eta+beta[i+1]*X[,i]
```
if (k>0)
    for (i in 1:k)
        eta=eta+gamma[i+1]*pmax(tm-tau[i],0)
y=rbinom(N,size=n,prob=exp(eta)/(1+exp(eta)))
temp.ljr=ljrkk(1,y,n,tm,X,ofst,R=1000)
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