

Package ‘optMaxlik’

March 28, 2017

Type Package

Title What the Package Does (Title Case)

Version 0.1.0

Description Extension to the maxLik package for numerical minimization of Kullback-Leibler divergence. Applies a general to specific approach to custom Likelihood functions.

Depends R (>= 3.2.1),
maxLik(>= 1.3.0)

URL <https://github.com/BPJandree/optMaxlik>

BugReports <https://github.com/BPJandree/optMaxlik>

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ByteCompile TRUE

LazyData TRUE

RoxygenNote 5.0.1

Imports maxLik

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aicc	<i>Corrected AIC</i>
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Description

Compute the corrected AIC from a maxLik object.

Usage

```
aicc(x, n = Inf)
```

Arguments

x	maxLik object
n	number of observations for correction. Defaults to Inf, which coincides with the AIC.

Value

numeric

areFixed	<i>Mainly auxiliary. Returns a vector indicating which parameters are fixed at zero.</i>
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Description

Returns a vector indicating which parameters are fixed at zero.

Usage

```
areFixed(x)
```

Arguments

x	vector
---	--------

Value

vector

as.numeric.matrix	Mainly auxiliary. Same as as.numeric() but for matrices.
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Description

Function to return a matrix with numericals.

Usage

```
## S3 method for class 'matrix'  
as.numeric(mat)
```

Arguments

mat	matrix
-----	--------

Value

matrix

breads	Get the breads to build standard errors.
--------	--

Description

Computes the inverse Fischer Information matrix

Usage

```
breads(model)
```

Arguments

model	maxLik object
-------	---------------

Value

matrix

dropna	<i>Drop NA values from a vector.</i>
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Description

Removes NA values from a vector.

Usage

```
dropna(x)
```

Arguments

x	vector
---	--------

Value

vector

freePars	<i>Get number of unrestricted parameters from a maxLik object.</i>
----------	--

Description

Get number of unrestricted parameters from a maxLik object.

Usage

```
freePars(x)
```

Arguments

x	maxLik object,
---	----------------

Value

numeric

insert.at	<i>Mainly auxiliary. Inserts the content of an object into the supplied vector.</i>
-----------	---

Description

Function to insert values into a vector.

Usage

```
insert.at(a, pos, ...)
```

Arguments

a	vector in which to insert a value
pos	numeric indicating the position where to insert a value.
...	objects to be inserted.

Value

vector

Examples

```
a <- 1:10
insert.at(a, 5, 0)
```

opt.maxLik	<i>Main function of the package. Automated general to specific approach for custom Likelihood functions.</i>
------------	--

Description

Numerical minimization of AICc by optimization of a likelihood function and automated constraining of parameters.

Usage

```
opt.maxLik(LL, start, initialfix = numeric(), nobs = Inf, method = "BFGS")
```

Arguments

LL	a log likelihood function.
start	named vector of starting values.
initialfix	vector indicating the parameters that should be treated as constants with values supplied in the start vector.
nobs	number of observations to be used in the correction of the AIC(c), defaults to Inf.
method	numerical algorithm. See maxLik package. Defaults to BFGS

Value

maxLik object of final model.

Examples

```
library(maxLik)
library(compiler)
# Fill a matrix with some random data.
mydata<-matrix(rnorm(1000), ncol=10, nrow=100)

# Create you own Log likelihood function.
crossectionalARMA_44 <- function(pars, ret="LL", Y){
  data=Y
  Log.L <-numeric()[1:T]
  b0    <-pars[1]

  B.y   <-pars[2]
  B.y2  <-pars[3]
  B.y3  <-pars[4]
  B.y4  <-pars[5]

  B.e   <-pars[6]
  B.e2  <-pars[7]
  B.e3  <-pars[8]
  B.e4  <-pars[9]

  nu    <-pars[10]#pars[7]
  sigma <-pars[11]

  df = as.numeric.matrix(data)
  T=nrow(df)
  N=ncol(df)

  p=4

  e = matrix(0,T,N)
  e[1:p,] <- 0 ## Initialize with e1 = 0

  Log.L[1:p]<-0

  A =N*log((gamma((nu+1)/2))/(((pi*(nu-2))^0.5)*gamma(nu/2))) - 0.5*N*log(max(0,sigma)^2)
  A2=((nu+1)/2)
  A3=(max(0,sigma)^2*(nu-2))

  for (t in (p+1):T) {
    y = df[t,]#as.numeric(matrix(c(df[t,])))
    ymin = df[t-1,]#as.numeric(matrix(c(df[t-1,])))
    ymin2 = df[t-2,]#as.numeric(matrix(c(df[t-2,])))
    ymin3 = df[t-3,]#as.numeric(matrix(c(df[t-3,])))
    ymin4 = df[t-4,]#as.numeric(matrix(c(df[t-4,])))

    emin=e[t-1,]
    emin2=e[t-2,]
    emin3=e[t-3,]
    emin4=e[t-4,]
```

```

e[t,] = y - b0 - B.y*ymin - B.e*emin - B.y2*ymin2 - B.e2*emin2 - B.y3*ymin3 - B.e3*emin3 - B.y4*ymin4 - B.e4*emin4
}

Log.L <- A - A2*(rowSums(log(1+ (e)^2 / A3)))
Log.L[1:p]<-0

if(ret=="e"){return(e)}else if (ret == "LLvec") {return(Log.L)} else(sum(Log.L))

}

# Optionally compile your function

crossectionalARMA_44<-cmpfun(crossectionalARMA_44)

# opt.Maxlik takes only functions that have only a parameter vector as input.
# fix the data argument.

LL <- function(pars){crossectionalARMA_44(pars, ret="LL", Y=mydata)}

# create a vector of names parameter starting values.

start =c(b0=0, b1=0, b2=0, b3=0,b4=0, ma1=0, ma2=0, ma3=0, ma4=0, nu=120, sigma=sd(mydata))

# t-estimation
results <- opt.maxLik (LL=LL, start=start,initialfix=c(), nobs=dim(mydata)[1]*dim(mydata)[2], method="BFGS")
summary(results)

estimates=coef(results)

parsToOriginal(estimates, start)

# approximate normal estimation by fixing the degrees of freedom
results2 <- opt.maxLik (LL=LL, start=start,initialfix=c(10), nobs=dim(mydata)[1]*dim(mydata)[2], method="BFGS")
summary(results2)

estimates2=coef(results2)

parsToOriginal(estimates2, start)
parsToOriginal2(estimates2, start)

```

parsToOriginal	<i>Mainly auxiliary. Function to convert final parameters back into the format of the starting parameter vectors.</i>
----------------	---

Description

Function to convert final parameters back into the format of the starting parameter vectors. Sets parameters that are constrained in the final results to zero.

Usage

```
parsToOriginal(results, start)
```

Arguments

`results` vector of parameters
`start` vector of the original starting values.

Value

vector

<code>parsToOriginal2</code>	<i>Mainly auxiliary. Function to convert final parameters back into the format of the starting parameter vectors.</i>
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Description

Function to convert final parameters back into the format of the starting parameter vectors. Sets parameters that are constrained in the final results to supplied starting values.

Usage

```
parsToOriginal2(results, start)
```

Arguments

`results` vector of parameters
`start` vector of the original starting values.

Value

vector

<code>se</code>	<i>Get standard errors.</i>
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Description

Computes the standard errors from the Hessian.

Usage

```
se(model)
```

Arguments

`model` maxLik object

Value

matrix

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