Package 'imPois'

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Title Imprecise Inferential Framework for Poisson Sampling Model

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Description A collection of tools for conducting an imprecise inference is provided. Imprecise prior is used for this inference, and imprecise probability theory introduced by Peter Walley (1991) is its underlying theoretical foundation. The package is developed based on the PhD thesis work of Lee (2014). Poisson and zero-truncated Poisson sampling models are mainly studied with two types of prior distributions.

Depends R (>= 2.7.0)

Imports geometry, grDevices, graphics, stats, utils, rgl

License GPL (>= 2)

LazyData true

Type Package

URL http://r-forge.r-project.org/projects/ipeglim/

BugReports Chel Hee Lee <chl948@mail.usask.ca>

NeedsCompilation no

Repository CRAN

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R topics documented:

`cgf` *Comupting Normalizing Constant of Bickis and Lee's Probability Distribution*

Description

Given parameters, a normalizing constant for Bickis and Lee's probability distribution is computed.

Usage

```
cgf(xi2, xi1, xi0, log = TRUE)

cgf.ztrunc(xi2, xi1, xi0, ny)
```

Arguments

`xi2`	parameter associated with precision
`xi1`	parameter associated with linear combination
`xi0`	effective sample size
`log`	a logical value; if TRUE, probabilities are given as $log(p)$.
`ny`	number of observations

Author(s)

Chel Hee Lee <chl948@mail.usask.ca>

`dcpm` *Imprecise Probability Distribution*

Description

Density and distribution function for the Bickis and Lee's distribution with three parameters xi_2, xi_1, and xi_0.

Usage

```
dcpm(x, pars)

pcpm(q, pars)

dcpm.ztrunc(m, pars, ny)

pcpm.ztrunc(q, pars, ny)
```

Arguments

x	quantiles
pars	a numeric vector of parameters
q	quantiles
m	random variable
ny	number of observations

Author(s)

Chel Hee Lee <chl948@mail.usask.ca>

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evfn *Expected Value of Canonical Variable*

Description

Expected value of canonical variable is computed using `integrate` function.

Usage

```
evfn(y, pars)

evfn.ztrunc(y, pars)

mh.ztrunc(y, pars, len.chain = 10000, len.burnin = 1000)

lapprox.ztrunc(y, pars, const)
```

Arguments

y	a vector of observations
pars	a numeric vector of parameters
len.chain	a length of MH chain
len.burnin	a length of burn-in period
const	adjustment constant

Author(s)

Chel Hee Lee <chl948@mail.usask.ca>

`fn.evfn` *Objective And Gradient Vector Needed For Optimization*

Description

Objective And Gradient Vector Needed For Optimization

Usage

```
fn.evfn(x)

gr.evfn(x)
```

Arguments

`x`	parameter needs to be optimized

`imPois` *Imprecise Inferential Framework for Poisson Sampling Model*

Description

Imprecise probabilities introduced by Peter Walley in 1991 is the basis of this imprecise inferential framework. The package provides a collection of tools for conducting analysis of epistemic uncerstainty with Poisson and zero-truncated Poisson sampling parameter estimation.

`iprior` *Characterize Imprecise Prior*

Description

A set of linear inequalities is used for characterizing a polygonal convex set. The `chull` function in the `grDevices` package and the `convhulln` function in the `geometry` package are used to search for extreme points constructing a convex hull.

Usage

```
iprior(ui, ci, pmat)
```

Arguments

ui	constraint matrix (k x p), see below.
ci	constrain vector of length k, see below.
pmat	matrix (k x p) containig coordinate information in d-dimensions.

Author(s)

Chel Hee Lee <gnustats@gmail.com>

Examples

```
# lc0 <- list(lhs=rbind(diag(2), -diag(2)), rhs=c(0,0,-1,-1))
# op <- iprior(ui=rbind(diag(2), -diag(2)), ci=c(0,0,-1,-1))
# op <- iprior(ui=rbind(c(1,0),c(0,1),c(-1,-1)), ci=c(0,0,-5))
op <- iprior(ui=rbind(c(1,0),c(0,1),c(0,-1),c(1,1),c(-2,-1)),
   ci=c(1,2,-8,5,-14)) # (3,8),(1,8), (1,4),(3,2)(6,2)
```

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kcpm *Kernel of Imprecise Probability Measure Formulated By Bickis and Lee*

Description

Imprecise probability density function proposed by Bickis and Lee (2014) is defined. See 'Details'.

Usage

```
kcpm(t, xi2, xi1, xi0, log = FALSE)

kcpm_m(m, xi2, xi1, xi0, log = FALSE)

kcpm.ztrunc(m, xi2, xi1, xi0, ny, log = FALSE)

kcpm.ztrunc_t(t, xi2, xi1, xi0, ny, log = TRUE)
```

Arguments

t	random variable
xi2	parameter associated with precision
xi1	parameter associated with linear combination
xi0	parameter associated with effective sample size
log	logical; if TRUE (default), a returned value is given in logarithm scale.
m	random variable
ny	number of observations

Details

The formal definition of Bickis and Lee's conjugate formulation is

$$e^(- \xi_2\theta^2 + \xi_1\theta - \xi_0 \exp(\theta))$$

θ is ranged from `-Inf` to `Inf`.

Author(s)

Chel Hee Lee <chl948@mail.usask.ca>

References

Lee, C.H. (2014) Imprecise Prior for Imprecise Inference on Poisson Sampling Model, PhD Thesis, Biostatistics Program, University of Saskatchewan

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`plot.impinf` *Plotting Imprecise Objects*

Description

Generic function for plotting `imprecise` objects.

Constructing Probability Band

Usage

```
## S3 method for class 'impinf'
plot(x, after.obs = FALSE, ...)

pbox(x, min, max, ...)
```

Arguments

`x`	an object for which a plot is needed.
`after.obs`	logical indicating imprecise prior or posterior.
`...`	additional arguments affecting the plot produced.
`min`	lower limit of a distribution
`max`	upper limit of a distribution

print.summary.impinf *Print Imprecise Objects*

Description

Print Imprecise Objects

Usage

```
## S3 method for class 'summary.impinf'
print(x, ...)
```

Arguments

x	an object used to select a method
...	further arguments passed to or from other methods

summary.impinf *Summary of* impinf *object*

Description

Summary of impinf object

Usage

```
## S3 method for class 'impinf'
summary(object, ...)
```

Arguments

object	an object for which a summary is needed.
...	additional arguments affecting the summary produced.

Author(s)

Chel Hee Lee <chl948@mail.usask.ca>

update.impinf *Applying Bayes Rule*

Description

Applying Bayes Rule

Usage

```
## S3 method for class 'impinf'
update(object, y, ztrunc = FALSE, ...)
```

Arguments

object	an object for which the Bayes rule is needed.
y	a vector of observations
ztrunc	logical value indicating truncation at zero.
...	further arguments passed to methods

Author(s)

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