

Package: PEcAn.priors (via r-universe)

August 15, 2024

Type Package
Title PEcAn Functions Used to Estimate Priors from Data
Version 1.7.3.9000
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Description Functions to estimate priors from data.
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LazyLoad yes
LazyData FALSE
Imports PEcAn.logger, PEcAn.MA, ggplot2, MASS
Suggests PEcAn.visualization, testthat
Encoding UTF-8
RoxygenNote 7.3.2
Repository <https://pecanproject.r-universe.dev>
RemoteUrl <https://github.com/PecanProject/pecan>
RemoteRef HEAD
RemoteSha bb2cda9dddc97fc39b663de3016d49e0dd682a3a

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create.density.df	Create Density Data Frame from Sample
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Description

Returns a data frame from [stats::density](#) function

Usage

```
create.density.df(  
  samps = NULL,  
  zero.bounded = FALSE,  
  distribution = NULL,  
  n = 1000,  
  ...  
)
```

Arguments

- samps a vector of samples from a distribution
- zero.bounded
- distribution list with elements distn, parama, paramb, e.g. list('norm', 0, 1)

Value

data frame with x and y = dens(x)

Author(s)

David LeBauer

Examples

```
prior.df <- create.density.df(distribution = list('norm',0,1))  
plot(prior.df)  
samp.df <- create.density.df(samps = rnorm(100))  
lines(samp.df)
```

fit.dist	<i>Fit distribution to data</i>
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Description

Fit a distribution to data

Usage

```
fit.dist(  
  trait.data,  
  trait = colnames(trait.data),  
  dists = c("weibull", "lognormal", "gamma"),  
  n = NULL  
)
```

Arguments

trait.data	data for distribution
dists	list of distribution names

Value

best fit distribution

Author(s)

David LeBauer

get.quantiles.from.density	<i>Get the quantiles from prior density</i>
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Description

Find quantiles on a density data frame

Usage

```
get.quantiles.from.density(density.df, quantiles = c(0.025, 0.5, 0.975))
```

Arguments

quantiles	default is the median and 95% CI;
priordensity	density dataframe generated by create.density.df

Author(s)

David LeBauer

Examples

```
prior.df <- create.density.df(distribution = list('norm',0,1))
get.quantiles.from.density(prior.df)
samp.df <- create.density.df(samps = rnorm(100))
get.quantiles.from.density(samp.df)
```

get.sample

Get Samples

Description

Take n random samples from prior

Usage

```
get.sample(prior, n = NULL, p = NULL)
```

Arguments

prior	data.frame with distn, parama, and optionally paramb.
n	number of samples to return from a random sample of the rdistn family of functions (e.g. rnorm)
p	vector of quantiles from which to sample the distribution; typically pre-generated upstream in the workflow to be used by the qdistn family of functions (e.g. qnorm)

Details

Similar to the prior sample function [pr.samp](#), except 1) it takes the prior as a named dataframe or list and it can return either a random sample of length n OR a sample from a quantile specified as p

Value

vector with n random samples from prior

See Also

[pr.samp](#)

Examples

```
## Not run:
# return 1st through 99th quantile of standard normal distribution:
PEcAn.priors::get.sample(
  prior = data.frame(distn = 'norm', parama = 0, paramb = 1),
  p = 1:99/100)
# return 100 random samples from standard normal distribution:
PEcAn.priors::get.sample(
  prior = data.frame(distn = 'norm', parama = 0, paramb = 1),
  n = 100)

## End(Not run)
```

plot_densities	<i>Plot probability density and data</i>
----------------	--

Description

Plot probability density and data

Usage

```
plot_densities(density.plot_inputs, outdir, ...)
```

Arguments

density.plot_inputs	list containing trait.samples and trait.df
outdir	directory in which to generate figure as pdf
...	passed on to plot_density

Value

outputs plots in outdir/sensitivity.analysis.pdf file

Author(s)

David LeBauer

`plot_posterior.density`*Add posterior density to a plot*

Description

Add posterior density to a plot

Usage

```
plot_posterior.density(posterior.density, base.plot = NULL)
```

Arguments

`posterior.density`

data frame containing columns x and y

`base.plot`

a ggplot object (grob), created if none provided

Value

plot with posterior density line added

Author(s)

David LeBauer

`plot_prior.density`*Plots a prior density from a parameterized probability distribution*

Description

Plots a prior density from a parameterized probability distribution

Usage

```
plot_prior.density(prior.density, base.plot = NULL, prior.color = "black")
```

Arguments

`prior.density`

data frame containing columns x and y

`base.plot`

a ggplot object (grob), created if none provided

`prior.color`

color of line to be plotted

Value

plot with prior density added

Author(s)

David LeBauer

See Also[pr.dens](#)**Examples**

```
## Not run:
plot_prior.density(pr.dens('norm', 0, 1))

## End(Not run)
```

plot_trait

*Plot trait density and data***Description**

Plot trait density and data

Usage

```
plot_trait(
  trait,
  prior = NULL,
  posterior.sample = NULL,
  trait.df = NULL,
  fontsize = list(title = 18, axis = 14),
  x.lim = NULL,
  y.lim = NULL,
  logx = FALSE
)
```

Arguments

trait	dataframe with id, figid and units of the trait to be plotted
prior	named distribution with parameters
posterior.sample	samples from posterior distribution whose density should be plotted
trait.df	data to be plotted, in a format accepted by jagify
fontsize, x.lim, y.lim, logx	passed on to ggplot

Value

plot (grob) object

Author(s)

David LeBauer

Examples

```
## Not run:
prior1 <- data.frame(distn = 'norm',
                     parama = 20,
                     paramb = 5)
data1 <- data.frame(Y = c(19, 21), se = c(1,1))
trait1 <- data.frame(id = 'Vcmax', figid = 'Vcmax', units = 'umol CO2 m-2 s-1')
plot_trait(trait = trait1,
           prior = prior1,
           trait.df = data1)

## End(Not run)
```

pr.dens

*Calculate densities***Description**

Calculates density at n points across the range of a parameter

Usage

```
pr.dens(distn, parama, paramb, n = 1000, alpha = 0.001)
```

Arguments

distn	distribution
parama	parameter
paramb	parameter
n	length of vector to be returned
alpha	sets range at which the distribution will be evaluated (e.g. from alpha to 1-alpha)

Details

For a distribution and parameters, return the density for values ranging from alpha to 1-alpha

Value

dataframe with equally spaced x values and the corresponding densities

Author(s)

David LeBauer

pr.samp	<i>Sample from prior</i>
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Description

Take n random samples from prior

Usage

```
pr.samp(distn, parama, paramb, n)
```

Arguments

distn	
parama	
paramb	
n	number of samples to return

Value

vector with n random samples from prior

See Also

{code[get.sample](#)

prior.fn	<i>prior.fn</i>
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Description

Prior fitting function for optimization

Usage

```
prior.fn(parms, x, alpha, distn, central.tendency = NULL, trait = NULL)
```

Arguments

parms	target for optimization
x	vector with c(lcl, ucl, ct) lcl / ucl = confidence limits, ct = entral tendency
alpha	quantile at which lcl/ucl are estimated (e.g. for a 95% CI, alpha = 0.5)
distn	named distribution, one of 'lnorm', 'gamma', 'weibull', 'beta'; support for other distributions not currently implemented
central.tendency	one of 'mode', 'median', and 'mean'
trait	name of trait, can be used for exceptions (currently used for trait == 'q')

Details

This function is used within [DEoptim](#) to parameterize a distribution to the central tendency and confidence interval of a parameter. This function is not very robust; currently it needs to be tweaked when distributions require starting values (e.g. beta, f)

Value

parms

Author(s)

David LeBauer

Examples

```
## Not run:
DEoptim(fn = prior.fn,
        lower = c(0, 0),
        upper = c(1000, 1000),
        x=c(2, 6, 3.3),
        alpha = 0.05,
        distn = 'lnorm')$optim$bestmem

## End(Not run)
```

priorfig

Prior Figure

Description

Plot prior density and data

Usage

```
priorfig(
  priordata = NA,
  priordensity = NA,
  trait = NA,
  xlim = "auto",
  fontsize = 18
)
```

Arguments

priordata	observations to be plotted as points
priordensity	density of prior distribution, calculated by prior.density
trait	dataframe with id, figid and units of the trait
xlim	limits for x axis

Value

plot / grob of prior distribution with data used to inform the distribution

Author(s)

David LeBauer

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