

Package: PEcAn.emulator (via r-universe)

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Type Package

Title Gaussian Process Emulator

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Imports methods, mvtnorm, coda (≥ 0.18), MCMCpack

Description Implementation of a Gaussian Process model (both likelihood and bayesian approaches) for kriging and model emulation. Includes functions for sampling design and prediction.

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arate	<i>arate</i>
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Description

Acceptance rate

Usage

arate(x)

Arguments

x vector of MCMC samples

Author(s)

Michael Dietze

calcSpatialCov	<i>calcSpatialCov</i>
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Description

calcSpatialCov

Usage

calcSpatialCov(x, ...)

Arguments

x either a spatial distance matrix or a list of component spatial distance matrices
... Additional arguments

Author(s)

Michael Dietze

`calcSpatialCov.list` *calcSpatialCov.list*

Description

Currently assumes an exponential spatial dependency

Usage

```
## S3 method for class 'list'  
calcSpatialCov(d, psi, tau)
```

Arguments

d list of component spatial distance matrices
psi spatial corr
tau spatial var

Details

can make gaussian by passing squared distance matrix

Author(s)

Michael Dietze

`calcSpatialCov.matrix` *calcSpatialCov.matrix*

Description

Currently assumes an exponential spatial dependency

Usage

```
## S3 method for class 'matrix'
calcSpatialCov(d, psi, tau)
```

Arguments

<code>d</code>	spatial distance matrix
<code>psi</code>	spatial corr
<code>tau</code>	spatial var

Details

can make gaussian by passing squared distance matrix

Author(s)

Michael Dietze

`distance` *distance*

Description

distance

Usage

```
distance(x, power = 1)
```

Arguments

<code>x</code>	matrix of locations in physical or parameter space
<code>power</code>	exponent used for calculating distance, default value of 2 = Pythagorean distance

Value

`dst`

Author(s)

Michael Dietze

`distance.martix` *distance.matrix*

Description

`distance.matrix`

Usage

```
distance.matrix(x, power = 1, dim = 2)
```

Arguments

<code>x</code>	matrix of locations in physical or parameter space
<code>power</code>	exponent used for calculating distance, default value of 2 = Pythagorean distance
<code>dim</code>	dimension

Value

`d`

Author(s)

Michael Dietze

`distance12.martix` *distance12.matrix*

Description

`distance12.matrix`

Usage

```
distance12.matrix(x, n1, power = 1)
```

Arguments

<code>x</code>	matrix of locations in parameter space
<code>n1</code>	number of rows in the original dataset
<code>power</code>	exponent used for calculating distance, default value of 2 = Pythagorean distance

Value

d

Author(s)

Michael Dietze

GaussProcess*GaussProcess*

Description

GaussProcess

Usage

```
GaussProcess(
  x,
  y,
  isotropic = TRUE,
  nugget = TRUE,
  method = "bayes",
  ngibbs = 5000,
  burnin = 1000,
  thin = 1,
  jump.ic = c(1.1, 0.2),
  prior = "IG",
  mix = "joint",
  psi = NULL,
  zeroMean = FALSE,
  exclude = NULL,
  ...
)
```

Arguments

x	set of independent variables
y	dependent variable
isotropic	Boolean indicating whether the GP is fit isotropically. If FALSE, distances are calculated deparately for each direction
nugget	allows additional error in Y rather than fix interpolation to go through points
method	method for calculating correlations
ngibbs	number of MCMC iterations (per chain) to run
burnin	Number of samples to discard as burnin (auto must be FALSE)
thin	thinning of the matrix to make things faster. Default is to thin to 1

jump.ic	initial condition for jump standard deviation.
prior	'unif', 'IG'
mix	joint=mix over psi simultaneously, each=mix over psi individually
psi	spatial corr
zeroMean	True if mean is 0, else false
exclude	<- isn't used anywhere, should be dropped
...	Additional arguments

Author(s)

Michael Dietze

*gp_mle**gp_mle*

Description*gp_mle***Usage***gp_mle*(theta, d, nugget, myY, maxval = Inf)**Arguments**

theta	proposed parameter vector: [mu, tauw, tauv, phi1...phiK]
d	spatial distance matrix
nugget	allows additional error in Y rather than fix interpolation to go through points
myY	vector of observed data
maxval	maximum value

Value

val

Author(s)

Michael Dietze

 gp_mle2

gp_mle2

Description

zero mean version

Usage

```
gp_mle2(theta, d, nugget, myY, maxval = Inf)
```

Arguments

theta	proposed parameter vector: [mu, tauw, tauv, phi1...phiK]
d	spatial distance matrix
nugget	allows additional error in Y rather than fix interpolation to go through points
myY	vector of observed data
maxval	maximum value

 groupid

groupid

Description

groupid

Usage

```
groupid(x)
```

Arguments

x	matrix of parameter values
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Author(s)

Michael Dietze

jump	<i>jump</i>
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Description

jump

Usage

```
jump(ic = 0, rate = 0.4, ...)
```

Arguments

ic	optional data vector
rate	target acceptance rate
...	Additional arguments

Author(s)

Michael Dietze

jump-class	<i>define a class for automatically tuning jump distributions</i>
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Description

define a class for automatically tuning jump distributions

Author(s)

Michael Dietze

ldinvgamma *ldinvgamma*

Description

Log-dinvgamma, based on MCMCpack

Usage

```
ldinvgamma(x, shape, scale = 1)
```

Arguments

x vector of quantiles
shape, scale shape and scale parameters for the inverse Gamma distribution

Value

log.density

Author(s)

Michael Dietze

lhc *lhc*

Description

Latin Hyper Cube

Usage

```
lhc(x, n.samp)
```

Arguments

x <- list (n.dim x 2)
n.samp number of samples

Details

Simple uniform sampling with LHC permutation

Author(s)

Michael Dietze

mvjump	<i>mvjump</i>
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Description

multivariate version

Usage

```
mvjump(ic = 0, rate = 0.4, nc = 2, ...)
```

Arguments

ic	optional data vector
rate	target acceptance rate
nc	NetCDF object containing target variable
...	Additional arguments

mvjump-class	<i>multivariate version of jump class</i>
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Description

multivariate version of jump class

nderiv	<i>nderiv</i>
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Description

nderiv

Usage

```
nderiv(x, y)
```

Arguments

x	Name of variable to plot on X axis
y	Name of variable to plot on Y axis

Value

der

Author(s)

Michael Dietze

p

p

Description*p***Usage***p(x, ...)***Arguments***x*

jump distribution

...

Additional arguments

p.jump

p.jump

Description*p.jump***Usage**

```
## S3 method for class 'jump'  
p(jmp)
```

Arguments*jmp*

jump parameter

Author(s)

Michael Dietze

p.mvjump

p.mvjump

Description

p.mvjump

Usage

```
## S3 method for class 'mvjump'  
p(jmp)
```

Arguments

jmp jump parameter

plot.jump

plot.jump

Description

plot.jump

Usage

```
## S3 method for class 'jump'  
plot(jmp)
```

Arguments

jmp jump parameter

Author(s)

Michael Dietze

`plot.mvjump`*plot.mvjump*

Description`plot.mvjump`**Usage**

```
## S3 method for class 'mvjump'  
plot(jmp)
```

Arguments

<code>jmp</code>	jump parameter
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Author(s)

Michael Dietze

`predict.density`*predict.density*

Description

Simple interpolation of a density object to new points

Usage

```
## S3 method for class 'density'  
predict(den, xnew)
```

Arguments

<code>den</code>	density object
<code>xnew</code>	new x coordinate

Value`ynew`**Author(s)**

Michael Dietze

predict.GP	<i>predict.GP</i>
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Description

predict.GP

Usage

```
## S3 method for class 'GP'
predict(gp, xpred, cI = NULL, pI = NULL, splinefcns = NULL)
```

Arguments

gp	Gaussian Process
xpred	value of x where prediction should be made
cI	credible interval
pI	prediction interval
splinefcns	spline functions

Author(s)

Michael Dietze

summarize.GP	<i>summarize.GP</i>
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Description

summarize.GP

Usage

```
summarize.GP(gp, pdf_file = NULL, txt_file = NULL)
```

Arguments

gp	Gaussian Process
pdf_file	filename you want figures written out to
txt_file	filename you want figures written out to

Author(s)

Michael Dietze

update.jump

update.jump

Description

update.jump

Usage

```
## S3 method for class 'jump'  
update(jmp, chain)
```

Arguments

jmp	jump parameter
chain	mcmc chain

Value

jmp updated jump parameter

Author(s)Michael Dietze

update.mvjump

update.mvjump

Description

update.mvjump

Usage

```
## S3 method for class 'mvjump'  
update(jmp, chain)
```

Arguments

jmp	jump parameter
chain	mcmc chain

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