Package 'sbgcop'

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Title Semiparametric Bayesian Gaussian copula estimation

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Author Peter Hoff

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Description This package estimates parameters of a Gaussian copula, treating the univariate marginal distributions as nuisance parameters as described in Hoff(2007). It also provides a semiparametric imputation procedure for missing multivariate data.

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URL http://www.stat.washington.edu/hoff

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sbgcop-package *Semiparametric Bayesian Gaussian copula estimation*

Description

This package estimates parameters of a Gaussian copula, treating the univariate marginal distributions as nuisance parameters as described in Hoff(2007). It also provides a semiparametric imputation procedure for missing multivariate data.

Details

Package:	sbgcop
Type:	Package
Version:	0.95
Date:	2007-03-09
License:	GPL Version 2 or later

This function produces MCMC samples from the posterior distribution of a correlation matrix, using a scaled inverse-Wishart prior distribution and an extended rank likelihood. It also provides imputation for missing values in a multivariate dataset.

Author(s)

Peter Hoff <hoff@stat.washington.edu>

References

Hoff (2007) "Extending the rank likelihood for semiparametric copula estimation"

Examples

```
fit<-sbgcop.mcmc(swiss)
summary(fit)
plot(fit)
```

ldmvnorm *Log Multivariate Normal Density*

Description

Computes the log of the multivariate normal density

Usage

```
ldmvnorm(Y, S)
```

Arguments

Y	an n x p matrix
S	a p x p positive definite matrix

Details

This function computes the log density of the data matrix Y under the model that the rows are independent samples from a mean-zero multivariate normal distribution with covariance matrix S.

Value

A real number.

Author(s)

Peter Hoff

Examples

```
Y<-matrix(rnorm(9*7),9,7)
ldmvnorm(Y,diag(7))
```

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plotci.sA *Plot Confidence Bands for Association Parameters*

Description

Plots 95 parameters

Usage

```
plotci.sA(sA, ylabs = colnames(sA[, , 1]), mgp = c(1.75, 0.75, 0))
```

Arguments

sA	a p x p x nsamp array
ylabs	a p x 1 vector of names for plotting labels
mgp	margin parameters

Author(s)

Peter Hoff

qM.sM *Matrix Quantiles*

Description

Computes quantiles along the third dimension of a 3-d array.

Usage

```
qM.sM(sM, quantiles = c(0.025, 0.5, 0.975))
```

Arguments

sM	an m x n x s array
quantiles	quantiles to be computed

Value

an array of dimension m x n x l, where l is the length of `quantiles`

Author(s)

Peter Hoff

rwish *Sample from the Wishart Distribution*

Description

Generate a random sample from the Wishart distribution.

Usage

```
rwish(S0, nu)
```

Arguments

S0	a positive definite matrix
nu	a positive integer

Details

Return the sum of nu i.i.d. rank-one matrices generated as `z%*%t(z)`, where `z` is a sample from a multivariate normal distribution with covariance `S0`. The resulting random variable has mean `nu*S0`.

Value

a positive definite matrix.

Author(s)

Peter Hoff

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sbgcop.mcmc *Semiparametric Bayesian Gaussian copula estimation*

Description

`sbgcop.mcmc` is used to semiparametrically estimate the parameters of a Gaussian copula. It can be used for posterior inference on the copula parameters, or for imputation of missing values in matrix-valued data.

Usage

```
sbgcop.mcmc(Y, S0 = diag(dim(Y)[2]), n0 = dim(Y)[2] + 2, nsamp = 100,
  odens = max(1, round(nsamp/1000)), seed = 1, verb = TRUE)
```

Arguments

`Y`	an n x p matrix. Missing values are allowed.
`S0`	a p x p positive definite matrix
`n0`	a positive integer
`nsamp`	number of iterations of the Markov chain.
`odens`	output density: number of iterations between saved samples.
`seed`	an integer for the random seed
`verb`	print progress of MCMC(TRUE/FALSE)?

Details

This function produces MCMC samples from the posterior distribution of a correlation matrix, using a scaled inverse-Wishart prior distribution and an extended rank likelihood. It also provides imputation for missing values in a multivariate dataset.

Value

An object of class `psgc` containing the following components:

`C.psamp`	an array of size p x p x `nsamp/odens`, consisting of posterior samples of the correlation matrix.
`Y.pmean`	the original datamatrix with imputed values replacing missing data
`LPC`	the log-probability of the latent variables at each saved sample. Used for diagnostic purposes.

Author(s)

Peter Hoff

References

http://www.stat.washington.edu/hoff/

Examples

```
fit<-sbgcop.mcmc(swiss)
summary(fit)
plot(fit)
```

---

sR.sC *Compute Regression Parameters*

Description

Compute an array of regression parameters from an array of correlation parameters.

Usage

```
sR.sC(sC)
```

Arguments

sC	a p x p x nsamp array of, made up of nsamp correlation matrices.

Details

For each of the nsamp correlation matrices C, a matrix of regression parameters is computed via `R[j,-j]<- C[j,-j]%*%solve(C[-j,-j])`

Value

a p x p x nsamp array of regression parameters.

Author(s)

Peter Hoff

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