Package 'TTmoment'

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Type Package

Title Sampling and Calculating the First and Second Moments for the
Doubly Truncated Multivariate t Distribution

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Description Computing the first two moments of the truncated multivariate t (TMVT) distribution under the double truncation. Appling the slice sampling algorithm to generate random variates from the TMVT distribution.

License GPL-2

Depends mvtnorm

NeedsCompilation no

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1

TTmoment-package   *Truncated Multivariate t (TMVT) Distribution*

Description

This package includes two functions related to the truncated multivariate t (TMVT) distribution described in Kotz and Nadarajah (2004) with the double truncation. One is to generate random variates from the TMVT distribution, and the other is to compute the first two moments theoretically.

Details

Package:	TTmoment
Type:	Package
Version:	1.0
Date:	2015-05-04
License:	GPL-2

Author(s)

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References

Hsiu J. Ho, Tsung-I Lin, Hsuan-Yu Chen, Wan-Lun Wang (2012), Some results on the truncated multivariate t distribution. Journal of Statistical Planning and Inference, 142, 25-40.

See Also

TT.GS, TT.moment

Examples

```
# A test example
rho=0.9
S=matrix(c(1, rho ,rho, 1),2,2)
nu=5
p=2
mu = rep(0, p)
Y= TT.GS(n=10000, mu, S, nu, lower=c(1,2), upper=c(4,6))
# Empirical first moment
y.bar=colMeans(Y)
y.bar
# Sample covariance matrix
```

```
S.y=cov(Y)
S.y

M.Y=TT.moment(R=S, nu, lower=c(1,2), upper=c(4,6))
# First two moments
M.Y$EX
M.Y$EXX
# Covariance matrix
M.Y$EXX-M.Y$EX%*%t(M.Y$EX)
```

TT.GS   *Slice Sampling for the Truncated Multivariate t (TMVT) Distribution*

Description

This function generates random variates from the truncated multivariate t (TMVT) distribution by using the slice sampling algorithm.

Usage

```
TT.GS(n, mu=rep(0,nrow(S)), S=diag(length(mu)), nu=2,
lower=rep(-Inf, length(mu)), upper=rep(Inf, length(mu)))
```

Arguments

n	Number of observations.
mu	Location vector, default is rep(0, length = nrow(S)).
S	Scale matrix, default is diag(length(mu)).
nu	Degree of freedom, nu>2 is required to confirm the existence of the first two moments of TMVT distribution under slice sampling.
lower, upper	Truncation bounds on the random vectors, default is rep(-Inf, length(mu)), rep(Inf, length(mu)).

Value

An n by p matrix

Author(s)

Hsiu J. Ho, Tsung-I Lin, Wan-Lun Wang, Aldo M. Garay, Victor H. Lachos, and Mauricio Castro

References

Hsiu J. Ho, Tsung-I Lin, Hsuan-Yu Chen, Wan-Lun Wang (2012), Some results on the truncated multivariate t distribution. Journal of Statistical Planning and Inference, 142, 25-40.

Examples

```
# A test example
rho=0.9
S=matrix(c(1, rho ,rho, 1),2,2)
nu=5
p=2
mu = rep(0, p)
Y= TT.GS(n=10000, mu, S, nu, lower=c(1,2), upper=c(4,6))
# Empirical first moment
y.bar=colMeans(Y)
y.bar
# Sample covariance matrix
S.y=cov(Y)
S.y

M.Y=TT.moment(R=S, nu, lower=c(1,2), upper=c(4,6))
# First two moments
M.Y$EX
M.Y$EXX
# Covariance matrix
M.Y$EXX-M.Y$EX%*%t(M.Y$EX)
```

TT.moment   *First Two Moments of Truncated Multivariate t (TMVT) Distribution*

Description

This function calculates the first two moments of the TMVT distribution with zero location vector
and correlation matrix.

Usage

```
TT.moment(R=diag(length(lower)), nu=5, lower=rep(-Inf, nrow(R)), upper=rep(Inf, nrow(R)))
```

Arguments

R	Nonsingular correlation matrix, default is diag(length(a)).
nu	Degree of freedom, must be a positive integer, nu>4 is required to calculate the second moment of TMVT distribution.
lower	Lower (left) truncation bound on the random vector, default is rep(-Inf, nrow(R)).
upper	Upper (right) truncation bound on the random vector, default is rep(Inf, nrow(R)).

Value

EX	The first moment
EXX	The second moment

Author(s)

Hsiu J. Ho, Tsung-I Lin, Wan-Lun Wang, Aldo M. Garay, Victor H. Lachos, and Mauricio Castro

References

Hsiu J. Ho, Tsung-I Lin, Hsuan-Yu Chen, Wan-Lun Wang (2012), Some results on the truncated multivariate t distribution. Journal of Statistical Planning and Inference, 142, 25-40.

Examples

```
# A test example
rho=0.9
S=matrix(c(1, rho ,rho, 1),2,2)
nu=5
p=2
mu = rep(0, p)
Y= TT.GS(n=10000, mu, S, nu, lower=c(1,2), upper=c(4,6))
# Empirical first moment
y.bar=colMeans(Y)
y.bar
# Sample covariance matrix
S.y=cov(Y)
S.y

M.Y=TT.moment(R=S, nu, lower=c(1,2), upper=c(4,6))
# First two moments
M.Y$EX
M.Y$EXX
# Covariance matrix
M.Y$EXX-M.Y$EX%*%t(M.Y$EX)
```

Index