Package: randcorr (via r-universe)

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Type Package

Title Generate a Random p x p Correlation Matrix

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Description Implements the algorithm by Pourahmadi and Wang (2015) <doi:10.1016/j.spl.2015.06.015> for generating a random p x p correlation matrix. Briefly, the idea is to represent the correlation matrix using Cholesky factorization and p(p-1)/2 hyperspherical coordinates (i.e., angles), sample the angles from a particular distribution and then convert to the standard correlation matrix form. The angles are sampled from a distribution with pdf proportional to sin^k(theta) (0 < theta < pi, k >= 1) using the efficient sampling algorithm described in Enes Makalic and Daniel F. Schmidt (2018) <arXiv:1809.05212>.

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RoxygenNote 6.0.1

NeedsCompilation no

Repository CRAN

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Contents

randcorr-package *The randcorr package*

Description

This package contains a function to generate a random p x p correlation matrix. This function implements the algorithm by Pourahmadi and Wang [1] for generating a random p x p correlation matrix. Briefly, the idea is to represent the correlation matrix using Cholesky factorization and p(p-1)/2 hyperspherical coordinates (i.e., angles), sample the angles from a particular distribution and then convert to the standard correlation matrix form. The angles are sampled from a distribution with a probability density function proportional to sin^k(theta) (0 < theta < pi, k >= 1) using the efficient sampling algorithm described in [2].

Details

For usage, see the examples in `randcorr` and `randcorr.sample.sink`.

Note

To cite this package please reference:

Makalic, E. & Schmidt, D. F. An efficient algorithm for sampling from sin^k(x) for generating random correlation matrices arXiv:1809.05212, 2018 https://arxiv.org/abs/1809.05212

A MATLAB-compatible implementation of the sampler in this package can be obtained from:

https://au.mathworks.com/matlabcentral/fileexchange/68810-randcorr

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References

[1] Mohsen Pourahmadi and Xiao Wang, Distribution of random correlation matrices: Hyperspherical parameterization of the Cholesky factor, Statistics & Probability Letters, Volume 106, Pages 5-12, 2015.

[2] Enes Makalic and Daniel F. Schmidt An efficient algorithm for sampling from sin^k(x) for generating random correlation matrices, arXiv:1809.05212, 2018.

See Also

`randcorr`, `randcorr.sample.sink`

randcorr *Generate a random p x p correlation matrix*

Description

Generate a random p x p correlation matrix

Usage

```
randcorr(p)
```

Arguments

p	A scalar positive integer denoting the size of the correlation matrix

Value

A random p x p correlation matrix

Details

This function implements the algorithm by Pourahmadi and Wang [1] for generating a random p x p correlation matrix. Briefly, the idea is to represent the correlation matrix using Cholesky factorization and p(p-1)/2 hyperspherical coordinates (i.e., angles), sample the angles form a particular distribution and then convert to the standard correlation matrix form. The angles are sampled from a distribution with probability density function sin^k(theta) (0 < theta < pi, k >= 1) using the efficient sampling algorithm described in [2].

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[1] Mohsen Pourahmadi and Xiao Wang, Distribution of random correlation matrices: Hyperspherical parameterization of the Cholesky factor, Statistics & Probability Letters, Volume 106, Pages 5-12, 2015.

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See Also

randcorr.sample.sink

Examples

```
# ----------------------------------------------------------------
# Example 1: Generate a 5x5 correlation matrix
C = randcorr(5)

# Example 2: Generate a 1000x1000 correlation matrix
C = randcorr(1000)
```

`randcorr.sample.sink` *Sample from the (unnormalized) distribution sin(x)^k, 0 < x < pi, k >= 1*

Description

Sample from the (unnormalized) distribution sin(x)^k, 0 < x < pi, k >= 1

Usage

```
randcorr.sample.sink(k)
```

Arguments

k	The k parameter of the distribution. If this is a vector, the function draws a random variate for every entry in k.

Value

A vector of samples with length equal to the length of k

Details

This code generates samples from the sin(x)^k distribution using the specified vector k.

References

Enes Makalic and Daniel F. Schmidt An efficient algorithm for sampling from sin^k(x) for generating random correlation matrices, arXiv:1809.05212, 2018.

See Also

randcorr

Examples

```
# ------------------------------------------------------------------
# Example 1: Draw a random variate from sin(x), 0<x<pi
x = randcorr.sample.sink(1)

# Example 2: Draw a million random variate from sin^3(x), 0<x<pi
x = randcorr.sample.sink( matrix(3, 1e6,1) )
mean(x)
var(x)
```

Index