Package: neojags (via r-universe)

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Type Package

Title Neo-Normal Distributions Family for Markov Chain Monte Carlo (MCMC) Models in 'JAGS'

Version 0.1.5

Description A 'JAGS' extension module provides neo-normal distributions family including MSNBurr, MSNBurr-IIa, GMSNBurr, Lunetta Exponential Power, Fernandez-Steel Skew t, Fernandez-Steel Skew Normal, Fernandez-Osiewalski-Steel Skew Exponential Power, Jones Skew Exponential Power. References: Choir, A. S. (2020). ``The New Neo-Normal Distributions and Their Properties''.Unpublished Dissertation. Denwood, M.J. (2016) <doi:10.18637/jss.v071.i09>. Fernandez, C., Osiewalski, J., & Steel, M. F. (1995) <doi:10.1080/01621459.1995.10476637>. Fernandez, C., & Steel, M. F. (1998) <doi:10.1080/01621459.1998.10474117>. Iriawan, N. (2000). ``Computationally Intensive Approaches to Inference in NeoNormal Linear Models''.Unpublished Dissertation. Mineo, A., & Ruggieri, M. (2005) <doi:10.18637/jss.v012.i04>. Rigby, R. A., & Stasinopoulos, D. M. (2005) <doi:10.1111/j.1467-9876.2005.00510.x>. Lunetta, G. (1963). ``Di una Generalizzazione dello Schema della Curva Normale''. Rigby, R. A., Stasinopoulos, M. D., Heller, G. Z., & Bastiani, F. D. (2019) <doi:10.1201/9780429298547>.

URL `https://github.com/madsyair/neojags`

BugReports `https://github.com/madsyair/neojags/issues`

License GPL-2

Encoding UTF-8

RoxygenNote 7.3.2

SystemRequirements JAGS >= 4.3.0 (https://mcmc-jags.sourceforge.io/)

Depends R (>= 2.14.0)

Imports runjags, stats, utils, rjags,coda

Suggests testthat (>= 3.0.0), knitr, rmarkdown, markdown, spelling

Config/testthat/edition 3

VignetteBuilder knitr

Language en-US

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Contents

`load.neojagsmodule` *Load the internal JAGS module provided by neojags*

Description

The neojags package contains a JAGS extension module that provides several additional distributions for use within JAGS (see details below). This function is a simple wrapper to load this module. The version of the module supplied within the neojags package can only be used with the rjags package, or with the rjags or rjparallel methods within runjags. For a standalone JAGS module for use with any JAGS method (or independent JAGS runs) please see: https://sourceforge.net/projects/neojags/

Usage

```
load.neojagsmodule(fail = TRUE, silent = FALSE)

unload.neojagsmodule()

load.neoJAGSmodule(fail = TRUE, silent = FALSE)

unload.neoJAGSmodule()
```

Arguments

`fail`	should the function fail using stop() if the module cannot be loaded?
`silent`	if !fail, the function will by default print a diagnostic message if the module cannot be loaded - the silent option suppresses this message.

Details

This module provides the following distributions for JAGS:

Jones'S Skew Exponential Power: djskew.ep(mu, tau, nu1, nu2)

For $y < \mu$:

$$p(y) = c\sqrt{\tau}\exp\left[-\left|\sqrt{\tau}(y-\mu)\right|^{\nu_1}\right]$$

For $y \geq \mu$:

$$p(y) = c\sqrt{\tau}\exp\left[-\left|\sqrt{\tau}(y-\mu)\right|^{\nu_2}\right]$$

where

$$c = \left[\Gamma\left(1+{\nu_1}^{-1}\right)+\Gamma\left(1+{\nu_2}^{-1}\right)\right]^{-1}$$

$$-\infty < \mu < \infty, \tau > 0, \nu_1 > 0, \nu_2 > 0$$

GMSNBurr: dgmsnburr(mu, tau,alpha1,alpha2)

$$p(y) = \frac{\tau\omega\left(\alpha_1,\alpha_2\right)}{B\left(\alpha_1,\alpha_2\right)}\left(\frac{\alpha_2}{\alpha_1}\right)^{\alpha_2}\frac{\exp\left(-\alpha_2\tau\omega\left(\alpha_1,\alpha_2\right)\left(y-\mu\right)\right)}{\left(1+\frac{\alpha_2}{\alpha_1}\exp\left(-\tau\omega\left(\alpha_1,\alpha_2\right)\left(y-\mu\right)\right)\right)^{(\alpha_1+\alpha_2)}}$$

where

$$\omega\left(\alpha_1,\alpha_2\right) = \frac{B\left(\alpha_1,\alpha_2\right)}{\sqrt{2\pi}}\left(1+\frac{\alpha_2}{\alpha_1}\right)^{(\alpha_1+\alpha_2)}\left(\frac{\alpha_2}{\alpha_1}\right)^{-\alpha_2}\omega\left(\alpha_1,\alpha_2\right) = \frac{B\left(\alpha_1,\alpha_2\right)}{\sqrt{2\pi}}\left(1+\frac{\alpha_2}{\alpha_1}\right)^{(\alpha_1+\alpha_2)}\left(\frac{\alpha_2}{\alpha_1}\right)^{-\alpha_2}$$

$$-\infty < \mu < \infty, \tau > 0, \alpha_1 > 0, \alpha_2 > 0$$

MSNBurr: dmsnburr(mu, tau,alpha)

$$p(y) = \frac{\tau\omega(\alpha)\exp\left(-\tau\omega(\alpha)(y-\mu)\right)}{\left(1+\frac{\exp(-\tau\omega(\alpha)(y-\mu))}{\alpha}\right)^{(\alpha+1)}}$$

where

$$\omega\left(\alpha\right) = \frac{1}{\sqrt{2\pi}}\left(1+\frac{1}{\alpha}\right)^{(\alpha+1)}\omega\left(\alpha\right) = \frac{1}{\sqrt{2\pi}}\left(1+\frac{1}{\alpha}\right)^{(\alpha+1)}$$

$$-\infty < \mu < \infty, \tau > 0, \alpha > 0$$

MSNBurr-IIa: dmsnburr2a(mu, tau, alpha)

$$p(y) = \frac{\tau\omega(\alpha)\exp\left(\tau\omega(\alpha)\left(y-\mu\right)\right)}{\left(1+\frac{\exp(\tau\omega(\alpha)(y-\mu))}{\alpha}\right)^{(\alpha+1)}}$$

$$-\infty < \mu < \infty, \tau > 0, \alpha > 0$$

Fernandez-Osiewalski-Steel Skew Exponential Power: dfskew.ep(mu, tau, nu, alpha)

For $y < \mu$:

$$p(y) = c\sqrt{\tau}\exp\left[-\frac{1}{2}\left|\alpha\sqrt{\tau}\,(y-\mu)\right|^{\nu}\right]$$

For $y \geq \mu$:

$$p(y) = c\sqrt{\tau}\exp\left[-\frac{1}{2}\left|\frac{\sqrt{\tau}\,(y-\mu)}{\alpha}\right|^{\nu}\right]$$

where

$$c = \alpha\nu\Big[\left(1+\alpha^2\right)2^{1/\tau}\Gamma(1/\nu)\Big]^{-1}$$

$$-\infty < \mu < \infty, \tau > 0, \nu > 0, \alpha > 0$$

Fernandes Steel Skew-t: dfskew.t(mu, tau, nu, alpha)

For $y < \mu$:

$$p(y) = c\sqrt{\tau}\left(1 + \frac{\alpha^2\tau(y-\mu)^2}{\nu}\right)^{-(\nu+1)/2}$$

For $y \geq \mu$:

$$p(y) = c\sqrt{\tau}\left(1 + \frac{\tau(y-\mu)^2}{\alpha^2\nu}\right)^{-(\nu+1)/2}$$

where

$$c = 2\alpha\Big[\left(1+\alpha^2\right)B(1/2,\nu/2)\nu^{1/2}\Big]^{-1}$$

$$-\infty < \mu < \infty, \tau > 0, \nu > 0, \alpha > 0$$

Fernandes Steel Skew Normal: dfskew.norm(mu, tau, alpha)

For $y < \mu$:

$$p(y) = \frac{2\alpha\sqrt{\tau}}{\sqrt{2\pi}(1+\alpha^2)}\exp\left(-\frac{\alpha^2\tau}{2}(y-\mu)^2\right)$$

For $y \geq \mu$:

$$p(y) = \frac{2\alpha\sqrt{\tau}}{\sqrt{2\pi}(1+\alpha^2)}\exp\left(-\frac{\tau}{2\alpha^2}(y-\mu)^2\right)$$

$$-\infty < \mu < \infty, \tau > 0, \alpha > 0$$

Lunetta Exponential Power : dlep(mu, tau, nu)

$$p(y) = \frac{\sqrt{\tau}}{2\nu^{1/\nu}\Gamma(1+1/\nu)} e^{-\frac{1}{\nu}\left|\sqrt{\tau}(y-\mu)\right|^{\nu}}$$

$$-\infty < \mu < \infty, \tau > 0, \nu > 0$$

For an easier to read version of these PDF equations, see the userguide vignette.

Value

Invisibly returns TRUE if able to (un)load the module, or FALSE otherwise

References

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See Also

load.module

Examples

```
# Load the module for use with any rjags model:
available <- neojags::load.neojagsmodule(fail=FALSE)
if(available){
# A simple model to sample from a Jones's Skew Exponential Power Distribution distribution.
# (Requires the rjags or rjparallel methods)
m <- "model{
 L ~ djskew.ep(0,1,2,2)
  }"

library(runjags)
```

```
neojags::load.neojagsmodule()
results <- run.jags(m, monitor="L", method="rjags")

}
```

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