

# Package ‘ssmsn’

October 14, 2022

**Type** Package

**Title** Scale-Shape Mixtures of Skew-Normal Distributions

**Version** 0.2.0

**Date** 2017-01-31

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**Imports** MCMCpack

**Description**

It provides the density and random number generator for the Scale-Shape Mixtures of Skew-Normal Distributions proposed by Jamalizadeh and Lin (2016) <[doi:10.1007/s00180-016-0691-1](https://doi.org/10.1007/s00180-016-0691-1)>.

**License** GPL (>= 2)

**Repository** CRAN

**NeedsCompilation** no

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## Description

It provides the density and random number generator.

## Details

Package: ssmsn  
 Type: Package  
 Version: 0.2  
 Date: 2017-01-31  
 License: GPL (>=2)

### Author(s)

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### References

Jamalizadeh, Ahad and Lin, Tsung-I (2016). A general class of scale-shape mixtures of skew-normal distributions: properties and estimation. *Computational Statistics*, 1-24.

### See Also

[ssmsn](#),

### Examples

#See examples for the ssmsn function linked above.

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ssmsn

*Scale-Shape Mixtures of Skew-Normal Distributions*

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### Description

It provides the density and random number generator.

### Usage

```
dssmsn(x, mu= NULL, sigma2= NULL, lambda= NULL, nu= NULL, family="skew.t.t")
rssmsn(n, mu= NULL, sigma2= NULL, lambda= NULL, nu= NULL, family="skew.t.t")
```

### Arguments

x	vector of observations.
n	numbers of observations.
mu	location parameter.
sigma2	scale parameter.
lambda	skewness parameter.
nu	degree freedom
family	distribution family to be used in fitting ("skew.t.t", "skew.generalized.laplace.normal", "skew.slash.normal")

## Details

As discussed in Jamalizadeh and Lin (2016) the scale-shape mixture of skew-normal (SSMSN) distribution admits the following conditioning-type stochastic representation

$$Y = \mu + \sigma \tau_1^{-1/2} [Z_1 | (Z_2 < \lambda f^{-1/2} Z_1)],$$

where  $f = \tau_1/\tau_2$  and  $(Z_1, Z_2)$  and  $(\tau_1, \tau_2)$  are independent. Alternatively the SSMSN distribution can be generated via the convolution-type stochastic representation, given by

$$Y = \mu + \sigma \left( \frac{\tau_1^{-1/2} f^{1/2}}{\sqrt{f + \lambda^2}} Z_2 + \frac{\lambda \tau_1^{-1/2}}{\sqrt{f + \lambda^2}} |Z_1| \right).$$

## Value

`dssmsn` gives the density, `rssmsn` generates a random sample.

The length of the result is determined by `n` for `rssmsn`, and is the maximum of the lengths of the numerical arguments for the other functions `dssmsn`.

## Author(s)

Rocio Maehara <rmaeharaa@gmail.com> and Luis Benites <lbenitesanchez@gmail.com>

## References

Jamalizadeh, Ahad and Lin, Tsung-I (2016). A general class of scale-shape mixtures of skew-normal distributions: properties and estimation. *Computational Statistics*, 1-24.

## Examples

```
rSTT <- rssmsn(n=1000,mu=-4,sigma2=1,lambda=1,nu=c(3,4),"skew.t.t");hist(rSTT)
rSGLN <- rssmsn(n=1000,mu=-4,sigma2=1,lambda=1,nu=3,"skew.generalized.laplace.normal");hist(rSGLN)
rSSN <- rssmsn(n=1000,mu=-4,sigma2=1,lambda=1,nu=3,"skew.slash.normal");hist(rSSN)

dSTT <- dssmsn(0.5,mu=-4,sigma2=1,lambda=1,nu=c(3,4),"skew.t.t")
dSGLN <- dssmsn(0.5,mu=-4,sigma2=1,lambda=1,nu=3,"skew.generalized.laplace.normal")
dSSN <- dssmsn(0.5,mu=-4,sigma2=1,lambda=1,nu=3,"skew.slash.normal")
```

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