Package 'SMR'

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Title Externally Studentized Midrange Distribution

Version 2.0.2

Description Computes the studentized midrange distribution (pdf, cdf and quantile) and generates random numbers.

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URL https://bendeivide.github.io/SMR/,
https://github.com/bendeivide/SMR

BugReports https://github.com/bendeivide/SMR/issues

NeedsCompilation no

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R topics documented:

SMR *The externally studentized normal midrange distribution*

Description

Computes the probability density, the cumulative distribution function and the quantile function and generates random samples for the externally studentized normal midrange distribution with the numbers means equal to `size`, the degrees of freedom equal to `df` and the number of points of the Gauss-Legendre quadrature equal to `np`.

Usage

```
dSMR(x, size, df, np=32, log = FALSE)
pSMR(q, size, df, np=32, lower.tail = TRUE, log.p = FALSE)
qSMR(p, size, df, np=32, eps = 1e-13, maxit = 5000, lower.tail = TRUE, log.p = FALSE)
rSMR(n, size,  df = Inf)
```

Arguments

x, q	vector of quantiles $x \in R$ and $q \in R$.
p	vector of probabilities $(0, 1)$.
size	sample size. Only for $size > 1$.
n	vector size to be simulated $n > 1$.
df	degrees of freedom $df > 0$.
np	number of points of the gaussian quadrature $np > 2$.
log, log.p	logical argument; if TRUE, the probabilities p are given as $log(p)$.
lower.tail	logical argument; if TRUE, the probabilities are $P[X \leq x]$ otherside, $P[X \geq x]$.
eps	stopping criterion for Newton-Raphson's iteraction method.
maxit	maximum number of interaction in the Newton-Raphson method.

Details

Assumes np = 32 as default value for dSMR, pSMR and qSMR. If df is not specified, it assumes the default value Inf in rSMR. When df=1, the convergence of the routines requires np>250 to obtain the desired result accurately. The Midrange distribution has density

$$f(\overline{q}; n, \nu) = \int_0^{\infty} \int_{-\infty}^{x\overline{q}} 2n(n-1)x\phi(y)\phi(2x\overline{q} - y)[\Phi(2x\overline{q} - y) - \Phi(y)]^{n-2} f(x; \nu) dy dx,$$

where, q is the quantile of externally studentized midrange distribution, n (size) is the sample size and ν is the degrees of freedon.

The externally studentized midrange distribution function is given by

$$F(\overline{q}; n, \nu) = \int_{-\infty}^{\overline{q}} \int_0^{\infty} \int_{-\infty}^{x\overline{q}} 2n(n-1)x\phi(y)\phi(2xz - y)[\Phi(2xz - y) - \Phi(y)]^{n-2} f(x; \nu) dy dx dz.$$

where, q is the quantile of externally studentized midrange distribution, n (size) is the sample size and ν is the degrees of freedon.

Value

dSMR gives the density, pSMR gives the cumulative distribution function, qSMR gives the quantile function, and rSMR generates random deviates.

References

Batista, BDO; Ferreira, DF. The externally studentized normal midrange distribution. Submmited for publications. 2012.

Examples

```
library(SMR)

#example 1:
x  <- 2
q  <- 1
p  <- 0.9
n  <- 30
size  <- 5
df <- 3
np <- 32
dSMR(x, size, df, np)
pSMR(q, size, df, np)
qSMR(p, size, df, np)
rSMR(n, size, df)

#example 2:
x  <- c(-1, 2, 1.1)
q  <- c(1, 0, -1.5)
p  <- c(0.9, 1, 0.8)
n  <- 10
size  <- 5
df <- 3
np <- 32
dSMR(x, size, df, np)
pSMR(q, size, df, np)
qSMR(p, size, df, np)
rSMR(n, size, df)
```

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