

Package ‘sinib’

October 14, 2022

Type Package

Title Sum of Independent Non-Identical Binomial Random Variables

Version 1.0.0

Date 2017-05-06

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Description Density, distribution function, quantile function
and random generation for the sum of independent non-identical
binomial distribution with parameters `{size}` and `{prob}`.

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RoxygenNote 6.0.1

NeedsCompilation no

Repository CRAN

Date/Publication 2017-05-12 06:11:13 UTC

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sinib-package	<i>Sum of Independent Non-Identical Binomial Random Variables</i>
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Description

Density, distribution function, quantile function and random generation for the sum of independent non-identical binomial distribution with parameters `size` and `prob`.

Author(s)

Boxiang Liu

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psinib*Distribution of Sum of Independent Non-Identical Binomial Random Variables*

Description

Density, distribution function, quantile function, and random number generation for the sum of independent non-identical binomial random variables

Usage

```
psinib(q, size, prob, lower.tail = TRUE, log.p = FALSE)
```

```
dsinib(x, size, prob, log = FALSE)
```

```
rsinib(n, size, prob)
```

```
qsinib(p, size, prob)
```

Arguments

size	integer vector of number of trials (see detail).
prob	numeric vector of success probabilities (see detail).
lower.tail	logical; if TRUE, probabilities are $P[S \leq s]$, otherwise, $P[S > s]$.
x, q	integer vector of quantiles.
log, log.p	logical; if TRUE, probabilities p are given as $\log(p)$.
n	numeric scalar to indicate number of observations.
p	numeric vector of probabilities.

Details

Suppose S is a random variable formed by summing R independent non-identical random variables $X_r, r = 1, \dots, R$.

$$S = \sum_{r=1}^R X_r$$

size and prob should both be vectors of length R . The first elements of size and prob specifies X_1 , the second elements specifies X_2 , so on and so forth. The probability $F(S)$ is calculated using Daniels' second-order continuity-corrected saddlepoint approximation. The density $p(S)$ is calculated using second-order saddlepoint mass approximation with Butler's normalization.

Value

qsinib gives the cumulative distribution of sum of independent non-identical random variables.

Source

See Eisinga et al (2012) Saddlepoint approximations for the sum of independent non-identically distributed binomial random variables. Available from <http://onlinelibrary.wiley.com/doi/10.1111/stan.12002/full>

Examples

```
# Calculating the density and probability:
size <- as.integer(c(12, 14, 4, 2, 20, 17, 11, 1, 8, 11))
prob <- c(0.074, 0.039, 0.095, 0.039, 0.053, 0.043, 0.067, 0.018, 0.099, 0.045)
q <- x <- as.integer(seq(1, 19, 2))
dsinib(x, size, prob)
psinib(q, size, prob)

# Generating random samples:
rsinib(100, size, prob)

# Calculating quantiles:
p <- psinib(q, size, prob)
qsinib(p, size, prob)
```

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