Package ‘rBeta2009’

October 14, 2022

Type Package
Title The Beta Random Number and Dirichlet Random Vector Generating Functions
Version 1.0
Date 2012-02-25
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Description The package contains functions to generate random numbers from the beta distribution and random vectors from the Dirichlet distribution.
License GPL-2
LazyLoad yes
Repository CRAN
Date/Publication 2012-03-01 09:33:12
NeedsCompilation yes

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rbeta The Beta Random Number Generating Function

Description
Random generation for the beta distribution with parameters shape1 and shape2.
rbeta

Usage

rbeta(n, shape1, shape2)

Arguments

n Number of beta random numbers to generate. If length(n) > 1, the length is taken to be the number required.
shape1, shape2 Positive shape parameters.

Details

The beta distribution with parameters shape1 = a and shape2 = b has density
\[
\frac{\Gamma(a + b)}{\Gamma(a)\Gamma(b)} x^{a-1} (1 - x)^{b-1}
\]
for a > 0, b > 0 and 0 ≤ x ≤ 1.
The mean is \(\frac{a}{a+b}\) and the variance is \(\frac{ab}{(a+b)(a+b+1)}\).
rbeta basically utilizes the following guideline primarily proposed by Hung et al. (2009) for generating beta random numbers.

- When max(shape1,shape2) < 1, the B00 algorithm (Sakasegawa, 1983) is used;
- When shape1 < 1 < shape2 or shape1 > 1 > shape2, the B01 algorithm (Sakasegawa, 1983) is used;
- When min(shape1,shape1) > 1, the B4PE algorithm (Schmeiser and Babu, 1980) is used if one parameter is close to 1 and the other is large (say > 4); otherwise, the BPRS algorithm (Zechner and Stadlober, 1993) is used.

Value

rbeta generates beta random numbers.

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Source

rbeta uses a C translation of
Y. C. Hung and N. Balakrishnan and Y. T. Lin (2009), Evaluation of beta generation algorithms, 
rdirichlet

References


See Also

rbeta in package stats.

Examples

library(rBeta2009)
rbeta(10, 0.7, 1.5)

rdirichlet

The Dirichlet Random Vector Generating Function

Description

The function to generate random vectors from the Dirichlet distribution.

Usage

rdirichlet(n, shape)

Arguments

n Number of Dirichlet random vectors to generate. If length(n) > 1, the length is taken to be the number required.

shape Vector with length(shape) >= 2 containing positive shape parameters of the Dirichlet distribution. If length(shape) = 2, it reduces to the beta generating function.

Details

The Dirichlet distribution is the multidimensional generalization of the beta distribution.

A k-variate Dirichlet random vector \((x_1, \ldots, x_k)\) has the joint probability density function

\[
\frac{\Gamma(\alpha_1 + \ldots + \alpha_{k+1})}{\Gamma(\alpha_1) \ldots \Gamma(\alpha_{k+1})} x_1^{\alpha_1-1} \ldots x_k^{\alpha_k-1} \left(1 - \sum_{i=1}^k x_i\right)^{\alpha_{k+1}-1},
\]
where $x_i \geq 0$ for all $i = 1, \ldots, k$, $\sum_{i=1}^{k} x_i \leq 1$, and $\alpha_1, \ldots, \alpha_{k+1}$ are positive shape parameters. rdirichlet generates the Dirichlet random vector by utilizing the transformation method based on beta variates and three guidelines introduced by Hung et al. (2011). The three guidelines include: how to choose the fastest beta generation algorithm, how to best re-order the shape parameters, and how to reduce the amount of arithmetic operations.

Value

rdirichlet() returns a matrix with $n$ rows, each containing a single Dirichlet random vector.

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Source

rdirichlet uses a C translation of

References


See Also

rdirichlet in package MCMCpack.
rdirichlet in package gtools.

Examples

```r
library(rBeta2009)
rdirichlet(10, c(1.5, 0.7, 5.2, 3.4))
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