Package 'BayesLogit'

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Title PolyaGamma Sampling

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Description Tools for sampling from the PolyaGamma distribution based on Polson, Scott, and Windle (2013) <doi:10.1080/01621459.2013.829001>. Useful for logistic regression.

License GPL (>= 3)

Depends R (>= 3.6.0)

BugReports https://github.com/jwindle/BayesLogit/issues

URL https://github.com/jwindle/BayesLogit

NeedsCompilation yes

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Repository CRAN

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rpg *Polya-Gamma Random Variates*

Description

Generate random variates from the Polya-Gamma distribution.

Usage

```
rpg(num=1, h=1, z=0.0)

rpg.gamma(num=1, h=1, z=0.0, trunc=200)

rpg.devroye(num=1, h=1, z=0.0)

rpg.sp(num=1, h=1, z=0.0)

rpg.gamma.R(num=1, h=1, z=0.0, trunc=200)

rpg.devroye.R(num=1, h=1, z=0.0)
```

Arguments

num	The number of random variates to simulate.
h	Shape parameter. h must be >= 1 if not using sum of gammas method.
z	Parameter associated with tilting.
trunc	The number of elements used in sum of gammas approximation.

Details

A random variable X with distribution PG(h,z) is distributed like

$$X \sim \sum_{k=1}^{\infty} G(h,1)/(2\pi^2(k-1/2)^2 + z^2/2).$$

The density for X may be derived by exponentially tilting the PG(h,0) density:

$$p(x|h,z) \propto \exp(-xz^2/2)p(x|h,0).$$

Different methods for generating this random variable are implemented, each of which is useful for certain parameters. The parameters supplied by the user automatically determine which method is used. One may manually call each routine using `rpg.METHOD`. Functions ending in ".R" are pure R implementations.

You may call rpg when n and z are vectors.

Value

This function returns num Polya-Gamma samples.

References

Nicholas G. Polson, James G. Scott, and Jesse Windle. Bayesian inference for logistic models using Polya-Gamma latent variables. https://arxiv.org/abs/1205.0310

Examples

```
h = c(1, 2, 3);
z = c(4, 5, 6);

## Devroye-like method -- only use if h contains integers, preferably small integers.
X = rpg.devroye(100, h, z);

h = c(1.2, 2.3, 3.2);
z = c(4, 5, 6);

## Sum of gammas method -- this is slow.
X = rpg.gamma(100, h, z);

h = c(1, 4, 2.3);
z = c(4, 5, 6);

## Hybrid method -- automatically chooses best procedure.
X = rpg(100, h, z);
```

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