Package ‘bridgedist’

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Title An Implementation of the Bridge Distribution with Logit-Link as in Wang and Louis (2003)

Version 0.1.0

Description An implementation of the bridge distribution with logit-link in R. In Wang and Louis (2003) <DOI:10.1093/biomet/90.4.765>, such a univariate bridge distribution was derived as the distribution of the random intercept that 'bridged' a marginal logistic regression and a conditional logistic regression. The conditional and marginal regression coefficients are a scalar multiple of each other. Such is not the case if the random intercept distribution was Gaussian.

Depends R (>= 3.0.0)

License GPL-2

LazyData true

RoxygenNote 5.0.1

Suggests knitr, rmarkdown, reshape2, ggplot2, testthat

Imports stats

VignetteBuilder knitr

URL http://github.com/swihart/bridgedist

BugReports http://github.com/swihart/bridgedist/issues

NeedsCompilation no

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R topics documented:

`Bridge` *The Bridge Distribution*

Description

Density, distribution function, quantile function and random generation for the bridge distribution with parameter `scale`. See Wang and Louis (2003).

Usage

```
dbridge(x, scale = 1/2, log = FALSE)

pbridge(q, scale = 1/2, lower.tail = TRUE, log.p = FALSE)

qbridge(p, scale = 1/2, lower.tail = TRUE, log.p = FALSE)

rbridge(n, scale = 1/2)
```

Arguments

`x, q`	vector of quantiles.
`scale`	scale parameter. The scale must be between 0 and 1. A scale of 1/sqrt(1+3/pi^2) gives unit variance.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P[X \le x]$, otherwise, $P[X > x]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

If `scale` is omitted, the default value `1/2` is assumed.

The Bridge distribution parameterized by `scale` has distribution function

and density

The mean is μ and the variance is $\pi^2(\phi^{-2} - 1)/3$.

Value

`dbridge` gives the density, `pbridge` gives the distribution function, `qbridge` gives the quantile function, and `rbridge` generates random deviates.

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

The numerical arguments other than `n` are recycled to the length of the result. Only the first elements of the logical arguments are used.

Note

Consult the vignette for some figures comparing the normal, logistic, and bridge distributions.

Source

`[dpq]bridge` are calculated directly from the definitions.

`rbridge` uses inversion.

References

Wang, Z. and Louis, T.A. (2003) Matching conditional and marginal shapes in binary random intercept models using a bridge distribution function. *Biometrika*, 90(4), 765-775. <DOI:10.1093/biomet/90.4.765>

See also:

Swihart, B.J., Caffo, B.S., and Crainiceanu, C.M. (2013). A Unifying Framework for Marginalized Random-Intercept Models of Correlated Binary Outcomes. *International Statistical Review*, 82 (2), 275-295 1-22. <DOI: 10.1111/insr.12035>

Griswold, M.E., Swihart, B.J., Caffo, B.S and Zeger, S.L. (2013). Practical marginalized multilevel models. Stat, 2(1), 129-142. <DOI: 10.1002/sta4.22>

Heagerty, P.J. (1999). Marginally specified logistic-normal models for longitudinal binary data. Biometrics, 55(3), 688-698. <DOI: 10.1111/j.0006-341X.1999.00688.x>

Heagerty, P.J. and Zeger, S.L. (2000). Marginalized multilevel models and likelihood inference (with comments and a rejoinder by the authors). Stat. Sci., 15(1), 1-26. <DOI: 10.1214/ss/1009212671>

See Also

Distributions for other standard distributions.

Examples

```
## Confirm unit variance for scale = 1/sqrt(1+3/pi^2)
var(rbridge(1e5, scale = 1/sqrt(1+3/pi^2)))  # approximately 1
```

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