Package 'BetaModels'

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Title Bayesian Analysis of Different Rates in Different Groups

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Depends R (>= 3.0)

Imports methods, oompaBase, ClassComparison, grDevices, graphics, stats

Suggests vioplot

Description Test for different proportions (rates) in different groups using a Bayesian model in which all rate parameters follow a beta distribution and are selected from a common hyperdistribution.

License Apache License (== 2.0)

URL http://oompa.r-forge.r-project.org/

NeedsCompilation no

R topics documented:

BetaRates-class   *Class "BetaRates"*

Description

Test for different proportions (rates) in different groups using a Bayesian model in which all rate parameters follow a beta distribution and are selected from a common hyperdistribution.

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Usage

```
BetaRates(k, n, x=seq(-3,3, length=100), y=x)
## S4 method for signature 'BetaRates'
summary(object, ...)
## S4 method for signature 'BetaRates'
image(x, col=greyscale(128), ...)
samplePosteriorRates(br, nsamp=2000)
guessCenter(v)
```

Arguments

object	object of class `BetaRates`
br	object of class `BetaRates`
x	In the `image` method, an object of class `BetaRates`. In the `BetaRates` constructor, a vector of the x-axis grid points at which to compute the posterior probability; see Details.
y	vector of the y-axis grid points at which to compute the posterior probability; see Details.
k	vector of "success" counts
n	vector of all counts
col	vector containing the color map to use for the image
nsamp	Number of posterior samples to take
v	Vector of observed rates
...	extra arguments for generic or plotting routines

Details

TBD

Value

The `BetaRates` constructor returns an object of the indicated class.

The graphical method `image`) invisibly returns the object on which it was invoked.

The `summary` method returns a vector with the maximum a posteriori parameters of the beta distribution.

The `samplePosteriorRates` function returns a list with two components. The first component, `xy`, is an `nsamp`-by-2 matrix with x-y values samples from the posterior distribution. The second component, `theta`, is an `nsamp`-by-length(k) matrix with posterior samples of the rates associated with each experiment supplied to the constructor.

The `guessCenter` function returns a list with both x-y and alpha-beta coordinates of the naive (frequentist) estimate fo mthe overall Beta distribution parameters.

Creating Objects

Although objects can be created directly using `new`, the most common usage will be to pass a vector of p-values to the `BetaRates` function.

Slots

k: vector of "success" counts.

n: vector of all counts.

x: vector of the x-axis grid points at which to compute the posterior probability; see Details.

y: vector of the y-axis grid points at which to compute the posterior probability; see Details.

results: Matrix of posterior probabilities.

logresults: Matrix of log-transformed posterior probabilities.

Methods

summary(object, . . .) Prints a summary of the betaRates object. This includes (1) the maximum a posterior coordinates on x-y-space, (2) the usual alpha-beta parameters for the Beta distribution, and (3) the mean and variance.

image(x, col, . . .) Plots an ikmage of the posterior probabilities using te specified color map. The point with the maximum posterior probability is marked in red.

Author(s)

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References

Gelman A, Carlin JB, Stern HS, Rubin DB. Bayesian Data Analysis, second edition. Chapman and Hall/CRC, Boca Raton, 2004. Section 5.3, pages 15-131.

Examples

```
showClass("BetaRates")
event <- c( 37,  4,  6,  1,  2, 10,  1, 13,   7,  1,  10)
total <- c(137, 18, 18, 26, 24, 45, 12, 43, 162, 78, 280)
guessCenter(event/total)
br <- BetaRates(event, total, x=seq(-3, 0, length=100), y=seq(0, 3, length=100))
image(br)
summary(br)
```

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