Package 'BetaModels'

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Title Bayesian Analysis of Different Rates in Different Groups

Author Kevin R. Coombes

Maintainer Kevin R. Coombes <krc@silicovore.com>

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.

1

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)

Kevin R. Coombes <krc@silicovore.com>

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)
```

Index