Package 'basad'

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Type Package

Title Bayesian Variable Selction With Shrinking and Diffussing Priors

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Description The software is a implementation of a Bayesian approach to variable selection based on a hierarchical model that places spike and slab prior distributions on the regression coefficients. The algorithm has a strong slection consistency in high dimensions.

License GPL-3

Imports Rcpp, RcppEigen, rmutil

LinkingTo Rcpp, RcppEigen

NeedsCompilation yes

R topics documented:

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basad | *bayesian variable selection with shrinking and diffusing priors*

Description

This function performs the bayesian variable selection procedure with shrinking and diffusing priors via Gibbs sampling. Three different prior options placed on the coefficients are provided: guassian, student's t, Laplace. Through "BIC" criteria or median probability model the function returns the variable selection results.

Usage

```
basad( x = NULL, y = NULL, K = -1, df = 5, nburn = 500, niter = 3000,
    Fast = TRUE, verbose = FALSE, prior.dist = "Gauss", select.cri = "median" )
```

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Arguments

x	The matrix or dataframe of covariates.
y	The response variables.
K	The initial guess of the active covariates that is related to the prior probability of whether a covariate is not zero. If K is not specified as a positive value, this prior probability will be estimated by a beta prior using Gibbs sampling.
df	The degree of freedom of t prior when `prior.dist == "t"`.
nburn	The iteration times of burning period (i.e., discarded values).
niter	The iteration times after burning period.
Fast	Option whether a faster sampling scheme from Bhattacharyya will be used to accelerate the algorithm, the default value is TRUE.
verbose	If TRUE, verbose output is sent to the terminal.
prior.dist	Different prior choices, if `prior.dist == "t"`, the algorithm will place t prior for coefficients, if `prior.dist == "Lap"`, the algorithm will palce Laplace prior for coefficients. Otherwise it will place the default Gaussian priors.
select.cri	Model selection criteria,if `select.cri == "median"`, the algorithm will use the median probability model to select the coefficients that are not zero, if `select.cri == "BIC"`, the algorithm will use the BIC criteria to select the coefficients that are not zero.

Value

An object of class basad with the following components:

basad.summary	Summary object for the choosed variables.
catList	Verbose details (used for printing).
n	The number of observations
p + 1	The dimensions of the predictors
posteriorZ	Vector of posterior probability of Z.
modelIdx	A vector of index that which coeffcients are not zero thus selected.
modelZ	Binary vector Z that idicating whether the coffecient is true in the model.
B	Coefficients results from Gibbs Sampling.
x	Original x-matrix.
y	Original y vector.

Author(s)

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References

Narisetty, N. N., & He, X. (2014). Bayesian variable selection with shrinking and diffusing priors. *The Annals of Statistics*, 42(2), 789-817.

Barbieri, M. M., & Berger, J. O. (2004). Optimal predictive model selection. *The annals of statistics*, 32(3), 870-897.

Bhattacharya, A., Chakraborty, A., & Mallick, B. K. (2016). Fast sampling with Gaussian scale mixture priors in high-dimensional regression. *Biometrika*, asw042.

Examples

```
## Not run:
#----------------------------------------------------
Example 1:
#----------------------------------------------------

obj <- basad( x = X, y = Y)
obj

## End(Not run)

## Not run:
#----------------------------------------------------
Example 2: using different priors and slection criteria
#----------------------------------------------------

obj <- basad( x = X, y = Y, prior.dist = "t", select.cri = "BIC")
obj


## End(Not run)
```

predict.basad	*basad prediction*

Description

Print summary output from spike and slab analysis. Note that this is the default print method for the package.

Usage

```
## S3 method for class 'basad'
predict(object, testx, ...)
```

Arguments

object	An object of class basad.
testx	Data frame or x-matrix containing test data.
...	Further arguments passed to or from other methods.

Details

Computes the predicted value using a test data set.

Value

A vector of fitted values for basad estimated beta values.

Author(s)

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References

Narisetty, N. N., & He, X. (2014). Bayesian variable selection with shrinking and diffusing priors. *The Annals of Statistics*, 42(2), 789-817.

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print.basad   *Print Summary Output of Analysis*

Description

Print summary output from basad analysis. Note that this is the default print method for the package.

Usage

```
## S3 method for class 'basad'
print(x, ...)
```

Arguments

x	An object of class basad.
...	Further arguments passed to or from other methods.

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References

Narisetty, N. N., & He, X. (2014). Bayesian variable selection with shrinking and diffusing priors. *The Annals of Statistics*, 42(2), 789-817.

See Also

spikeslab

Examples

```
## Not run:

res <- spikeslab(x = X, y = Y)
print(res)


## End(Not run)
```

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