Package 'pacbpred'

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Type Package

Title PAC-Bayesian Estimation and Prediction in Sparse Additive Models.

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Author Benjamin Guedj

Maintainer Benjamin Guedj <benjamin.guedj@upmc.fr>

Description This package is intended to perform estimation and prediction in high-dimensional additive models, using a sparse PAC-Bayesian point of view and a MCMC algorithm. The method is fully described in Guedj and Alquier (2013), 'PAC-Bayesian Estimation and Prediction in Sparse Additive Models', Electronic Journal of Statistics, 7, 264--291.

License GPL (>= 2)

URL http://www.lsta.upmc.fr/doct/guedj/index.html

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pacbpred-package *PAC-Bayesian Estimation and Prediction in Sparse Additive Models*

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Details

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Author(s)

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References

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Guedj and Alquier (2013), 'PAC-Bayesian Estimation and Prediction in Sparse Additive Models'. Electronic Journal of Statistics, 7, 264–291. DOI:10.1214/13-EJS771. Available on http://projecteuclid.org/DPubS?service=UI&version=1.0&verb=Display&handle=euclid.ejs/1359041592.

See Also

pacbpred

Examples

```
ndata <- 100
ntrain <- 80
ntest <- ndata - ntrain
p <- 10
Y <- numeric(ndata)
X <- matrix(nr = ndata, nc = p, data = 2*runif(n = ndata*p) - 1)
for(i in 1:ndata)
  {
    Y[i] <- X[i,1]^3+sin(pi*X[i,2])
  }
```

```
Xtrain <- X[1:ntrain,]
Xtest <- X[(ntrain+1):ndata,]
Ytrain <- Y[1:ntrain]
Ytest <- Y[(ntrain+1):ndata]

niter <- 100
cst <- Inf
alpha <- .1
sigma2 <- .1
delta <- ntrain/2

res <- pacbpred(niter = niter, Xtrain = Xtrain, Xtest = Xtest, Y =
Ytrain, cst = cst,
sigma2 = sigma2, delta = delta, alpha = alpha)

print(cbind(res$predict,Ytest))
```

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pacbpred *pacbpred*

Description

This package is intended to perform estimation and prediction in high-dimensional additive models, using a PAC-Bayesian point of view and a MCMC algorithm. The method is fully described in Guedj and Alquier (2013), 'PAC-Bayesian Estimation and Prediction in Sparse Additive Models', see http://projecteuclid.org/DPubS?service=UI&version=1.0&verb=Display&handle=euclid.ejs/1359041592.

Usage

```
pacbpred(niter, burnin = floor(niter * 2/3), Xtrain, Xtest, Y, K = 8,
cst,
sigma2, alpha = 0.1, delta)
```

Arguments

niter	Mandatory. The number of MCMC iterations.
burnin	Optional. How many iterations should be discarded in the beginning of the chain?
Xtrain	Mandatory. The design matrix of the training sample.
Xtest	Optional. The design matrix of the test sample.
Y	Mandatory. The vector of responses corresponding to Xtrain. Y is assumed to have the same number of rows as Xtrain.
K	Optional. The maximal order of the development on the trigonometric basis.

`cst`	Optional. A numerical constant bounding from above the sup norm of true regression function.
`sigma2`	Optional. The variance of the proposal density along the algorithm.
`alpha`	Optional. The penalization term over the complexity of a model.
`delta`	Optional. The inverse temperature parameter.

Details

See Guedj and Alquier (2013), 'PAC-Bayesian Estimation and Prediction in Sparse Additive Models' on http://projecteuclid.org/DPubS?service=UI&version=1.0&verb=Display&handle=euclid.ejs/1359041592.

Value

A list composed of the following items.

`predict`	If `Xtest` is provided, the predicted values of the corresponding responses.
`estimates`	The vector of estimates over the trigonometric basis.
`ratio.mcmc`	A vector of the MCMC ratio for each iteration.
`accept`	A logical vector whose length is the number of iterations. For each iteration, has the proposed move been accepted ?
`models.mcmc`	The current models all along the MCMC chain.

Note

This is still an early stage development. Use at your own risk !

Author(s)

Benjamin Guedj

References

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pacbpred-package

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```
ndata <- 100
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p <- 10
Y <- numeric(ndata)
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for(i in 1:ndata)
  {
    Y[i] <- X[i,1]^3+sin(pi*X[i,2])
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Xtrain <- X[1:ntrain,]
Xtest <- X[(ntrain+1):ndata,]
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niter <- 100
cst <- Inf
alpha <- .1
sigma2 <- .1
delta <- ntrain/2

res <- pacbpred(niter = niter, Xtrain = Xtrain, Xtest = Xtest, Y =
Ytrain, cst = cst,
sigma2 = sigma2, delta = delta, alpha = alpha)

print(cbind(res$predict,Ytest))
```

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