

Package: FastGP (via r-universe)

August 28, 2024

Type Package

Title Efficiently Using Gaussian Processes with Rcpp and RcppEigen

Version 1.2

Date 2016-02-01

Author Giri Gopalan, Luke Bornn

Maintainer Giri Gopalan <gopalan88@gmail.com>

Description Contains Rcpp and RcppEigen implementations of matrix operations useful for Gaussian process models, such as the inversion of a symmetric Toeplitz matrix, sampling from multivariate normal distributions, evaluation of the log-density of a multivariate normal vector, and Bayesian inference for latent variable Gaussian process models with elliptical slice sampling (Murray, Adams, and MacKay 2010).

License GPL-2

Imports Rcpp, MASS, mvtnorm, rbenchmark, stats

LinkingTo Rcpp, RcppEigen

NeedsCompilation yes

Date/Publication 2016-02-02 12:27:14

Repository <https://ggopalan.r-universe.dev>

RemoteUrl <https://github.com/cran/FastGP>

RemoteRef HEAD

RemoteSha 680becfd962298411cc6dfceb68943647db72cfb

Contents

ess	2
rcpp_matrix_ops	3
rcpp_rmvnorm	3

Index	5
--------------	----------

ess *Sampling from a Bayesian model with a multivariate normal prior distribution*

Description

This function uses elliptical slice sampling to sample from a Bayesian model in which the prior is multivariate normal (JMLR Murray, Adams, and MacKay 2010)

Usage

```
ess(log.lik,Y, Sig, N_mcmc,burn_in,N,flag)
```

Arguments

log.lik	Log-lik function in model which is assumed to take two arguments: the first contains the parameters/latent variables and the second the observed data Y
Y	Observed data.
Sig	Covariance matrix associated with the prior distribution on the parameters/latent variable vector.
N_mcmc	Number of desired mcmc samples.
burn_in	Number of burn-in iterations.
N	Dimensionality of parameter/latent variable vector.
flag	Set to TRUE for MASS implementation of mvrnorm (which may be more stable but slow), FALSE for FastGP implementation of rcpp_rmvnorm (which is faster but less stable)

Author(s)

Giri Gopalan gopalan88@gmail.com

Examples

```
# See demo/FastGPDemo.r.
```

Description

Performs useful matrix operations using Rcpp and RcppEigen.

Usage

```
rcppeigen_invert_matrix(A)
rcppeigen_get_det(A)
rcppeigen_get_chol(A)
rcppeigen_get_chol_stable(A)
rcppeigen_get_chol_diag(A)
tinv(A)
```

Arguments

A Matrix to perform operation on.

Details

Functions with "rcppeigen" directly call RcppEigen implementations of the associated functions; `rcppeigen_get_chol_stable` retrieves L and `rcppeigen_get_chol_diag(A)` retrieves D in $A = LDL^T$ form, whereas `rcppeigen_get_chol(A)` retrieves L in $A = LL^T$ form. Thanks to Jared Knowles who pointed out that the former variant is more stable (with a potential speed trade-off) and has found it useful for his package `merTools`. `tinv` inverts a symmetric Toeplitz matrix using methods from Trench and Durbin from "Matrix Computations" by Golub and Van Loan using Rcpp.

Author(s)

`gopalan88@gmail.com`

Examples

```
# See demo/FastGPDemo.R
```

Description

These functions allow for the sampling of and evaluation of the log-density of a multivariate normal vector.

Usage

```
rcpp_log_dmvnorm(S,mu,x, istoep)  
rcpp_rmvnorm(n,S,mu)  
rcpp_rmvnorm_stable(n,S,mu)
```

Arguments

S	Covariance matrix of associated multivariate normal.
n	Number of (independent) samples to generate.
mu	Mean vector.
x	Vector of observations to evaluate the log-density of.
istoep	set this to TRUE if S is Toeplitz.

Author(s)

Giri Gopalan gopalan88@gmail.com

Examples

```
#See demo/FastGPdemo.R
```

Index

`durbin(rcpp_matrix_ops)`, 3

`ess`, 2

`rcpp_distance(rcpp_matrix_ops)`, 3

`rcpp_log_dmvnorm(rcpp_rmvnorm)`, 3

`rcpp_matrix_ops`, 3

`rcpp_rmvnorm`, 3

`rcpp_rmvnorm_stable(rcpp_rmvnorm)`, 3

`rcppeigen_get_chol(rcpp_matrix_ops)`, 3

`rcppeigen_get_chol_diag`
 `(rcpp_matrix_ops)`, 3

`rcppeigen_get_chol_stable`
 `(rcpp_matrix_ops)`, 3

`rcppeigen_get_det(rcpp_matrix_ops)`, 3

`rcppeigen_get_diag(rcpp_matrix_ops)`, 3

`rcppeigen_invert_matrix`
 `(rcpp_matrix_ops)`, 3

`tinvc(rcpp_matrix_ops)`, 3

`trench(rcpp_matrix_ops)`, 3