Package 'ROCFTP.MMS'

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Type Package

Title Perfect Sampling

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Description Th algorithm provided in this package generates perfect sample for unimodal or multimodal posteriors.

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Encoding UTF-8

Language en-us

URL https://github.com/nabipoor/ROCFTP.MMS

Depends R (>= 3.6.0)

Imports stats

RoxygenNote 7.1.1

Suggests testthat (>= 3.0.0),
    knitr

Collate 'LR.R'
    'multishift.R'
    'M.MSH.sampler.R'
    'CFTP.R'
    'ROCFTP.MMS.R'

R topics documented:

ROCFTP.MMS   *Perfect Sampling*

Description

ROCFTP, Read Once Coupling From The Past, with Metropolis-Multishift is used to generate perfect sample for given posterior density based on the two extreme starting paths, minimum and maximum of the most interest range of the posterior. It uses the monotone random operation of multishift coupler which allows to sandwich all of the state space in one point. It means both Markov Chains starting form the maximum and minimum will be coalesced. The generated sample is independent from the starting points. It is useful for mixture posteriors too.

Usage

```
ROCFTP.MMS(LB, start, post, sigma, log = FALSE)
```

Arguments

LB	defines the length of each block. The algorithm starts new blocks to find a coalescence of the two Markov chains started from extreme points of the most interest range. So, if it is too small the algorithm after 50 blocks repetition will give error message, and if it is too large then it will increase generation time.
start	is the initial values of the two extreme points of the most interest range of posterior.
post	is the posterior which is defined in the form of an R function.
sigma	is a standard deviation for multishift coupler. Multishift coupler is constructed based on normal density. If the posterior is a mixture distribution or a multimodal distribution, then sigma should be chosen in such a way that Markov chains easily moves between modes, and if the sigma is chosen small; the Markov chains may trap in one mode and don't coalesce.
log	has the default value of FALSE for density function of posteriors. If TRUE; then posterior should be defined in log form.

References

Nabipoor M, Murdoch D. (2010) ROCFTP With Metropolis-Multishift Coupler, Summer Research, Department of Statistical and actuarial sciences, University of Western Ontario

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Examples

```
#Unimodal posterior
post<- function(x)
{
  dnorm(x, mean=30, sd=1)
}
start<- c(20,40)
LB=30
```

```
ROCFTP.MMS(LB,start, post,1)
#Generate n i.i.d. exact sample
RG <- function(i){ROCFTP.MMS(30, c(20,40), post, 1)}
n <- 5
mrtx <- matrix(1:n, ncol=1)
dat <- apply(mrtx,1,RG)
qqnorm(dat, pch = 16, frame = FALSE)
qqline(dat, col = "steelblue", lwd = 3)

# multimodal posterior
post <- function(x)
{
 0.2*dnorm(x, mean=-5, sd=1)+0.2*dnorm(x, mean=5, sd=1)+0.6*dnorm(x, mean=15, sd=1)
}
start <- c(-15,25)
LB <- 116
sigma <- 3.5
ROCFTP.MMS(LB,start, post,sigma) #generates one exact sample
#Generate n i.i.d. exact sample
RG <- function(i){ROCFTP.MMS(116, c(-15,25), post, 3.5)}
n <- 5
mrtx <- matrix(1:n, ncol=1)
apply(mrtx,1,RG)

#log form of posterior
post<- function(x) {dnorm(x, mean=30, sd=1, log=TRUE)}
start<- c(20,40)
LB=100
sigma=0.5
ROCFTP.MMS(LB,start, post, sigma, log=TRUE)
```

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