Package 'dsample'

February 9, 2023

Title Discretization-Based Direct Random Sample Generation

Version 0.91.3.4

Description
Discretization-based random sampling algorithm that is useful for a complex model in high dimension is implemented. The normalizing constant of a target distribution is not needed. Posterior summaries are compared with those by 'OpenBUGS'. The method is described: Wang and Lee (2014) <doi:10.1016/j.csda.2013.06.011> and exercised in Lee (2009) <http://hdl.handle.net/1993/21352>.

License GPL-3

Encoding UTF-8

RoxygenNote 7.1.2

Imports stats, graphics, MASS, mnormt

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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dsample *Generating Random Samples via Wang-Lee algorithm*

Description

dsample generates a sample of specified size n from the target density function (up to a normalizing constant) based on the Wang-Lee algorithm.

Usage

```
dsample(expr, rpmat, n = 1000, nk = 10000, wconst)
```

Arguments

expr	expression of a target density function
rpmat	matrix containing random points for discretization
n	non-negative integer, the desired sample size.
nk	positive integer, the number of contours. See 'Details'.
wconst	real number between 0 and 1. See 'Details'.

Details

X has the number of rows equals to the number of discrete base points. In each row, the first element contains the functional value of the target density and the rest elements are the coordinates at which the density is evaluated. wconst is a constant for adjusting the volume of the last contour.

Value

dsample gives the samples in data.frame with number of rows n and number of columns ncol(rpmat).

References

Wang, L. and Lee, C.H. (2014). Discretization-based direct random sample generation. Computational Statistics and Data Analysis, 71, 1001-1010. Lee, C.H. (2009). Efficient Monte Carlo Random Sample Generation through Discretization, MSc thesis, Department of Satistics, University of Manitoba, Canada

Examples

```
## Example on page 414 in West (1993)
expr <- expression((x1*(1-x2))^5 * (x2*(1-x1))^3 * (1-x1*(1-x2)-x2*(1-x1))^37)
sets <- list(x1=runif(1e3), x2=runif(1e3))
smp <- dsample(expr=expr, rpmat=sets, nk=1e2, n=1e3)
```

plot.dsample *Visualizing Wang-Lee Samples*

Description

The samples generated by the Wang-Lee algorithm are plotted for visual examination. The plot is useful when multiple modes exist.

Usage

```
## S3 method for class 'dsample'
plot(x, which, ...)
```

Arguments

x	an object produced by dsample.
which	plot type, 1: CDF, 2: Contours, and 3: Histogram.
...	arguments passing functions inside

Value

plot.dsample has no return value.

summary.dsample *Summary Statistics of Marginal Distributions*

Description

Producing basic summary statistics (mean, standard deviation and the first five modes) from the sample drawn for all marginal distributions.

Usage

```
## S3 method for class 'dsample'
summary(object, n = 5, k = 1, ...)
```

Arguments

object	data.frame containing the samples drawn
n	the first n samples
k	number of clusters
...	arguments passing to the functions used internally

Value

`summary.dsample` gives a list of summary statistics.

`means`	Means
`stdevs`	Standard deviations
`modes`	Modes
`hc`	object produced by `hclust`
`grp`	cluster members produced by `hclust`
`X`	samples generated by `dsample`
`cdf`	cumulative distributions

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