Package ‘ars’

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Title Adaptive Rejection Sampling
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Author Paulino Perez Rodriguez <perpdgo@colpos.mx> original C++ code
from Arnost Komarek based on ars.f written by P. Wild and W. R.
Gilks
Maintainer Paulino Perez Rodriguez <perpdgo@colpos.mx>
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Repository CRAN
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R topics documented:

ars ................................................................. 1

Index 4

ars Adaptive Rejection Sampling

Description

Adaptive Rejection Sampling from log-concave density functions

Usage

ars(n=1,f,fprima,x=c(-4,1,4),ns=100,m=3,emax=64,lb=FALSE,ub=FALSE,xlb=0,xub=0,...)
Arguments

\(n\) sample size

\(f\) function that computes \(\log(f(u,...))\), for given \(u\), where \(f(u)\) is proportional to the density we want to sample from

\(fprima\) \(d/du \log(f(u,...))\)

\(x\) some starting points in which \(\log(f(u,...))\) is defined

\(ns\) maximum number of points defining the hulls

\(m\) number of starting points

\(emax\) large value for which it is possible to compute an exponential

\(lb\) boolean indicating if there is a lower bound to the domain

\(xlb\) value of the lower bound

\(ub\) boolean indicating if there is a upper bound to the domain

\(xub\) value of the upper bound

... arguments to be passed to \(f\) and \(fprima\)

Details

**ifault codes, subroutine initial**

1. 0: successful initialisation
2. 1: not enough starting points
3. 2: \(ns\) is less than \(m\)
4. 3: no abscissae to left of mode (if \(lb = false\))
5. 4: no abscissae to right of mode (if \(ub = false\))
6. 5: non-log-concavity detect

**ifault codes, subroutine sample**

1. 0: successful sampling
2. 5: non-concavity detected
3. 6: random number generator generated zero
4. 7: numerical instability

Value

a sampled value from density

Author(s)

Paulino Perez Rodriguez, original C++ code from Arnost Komarek based on ars.f written by P. Wild and W. R. Gilks
References

Examples

```r
library(ars)

#Example 1: sample 20 values from the normal distribution N(2,3)
f<-function(x,mu=0,sigma=1){-1/(2*sigma^2)*(x-mu)^2}
fprimac<-function(x,mu=0,sigma=1){-1/sigma^2*(x-mu)}
mysample<-ars(20,f,fprimac,mu=2,sigma=3)
mysample
hist(mysample)

#Example 2: sample 20 values from a gamma(2,0.5)
f1<-function(x,shape,scale=1){(shape-1)*log(x)-x/scale}
f1primac<-function(x,shape,scale=1){(shape-1)/x-1/scale}
mysample1<-ars(20,f1,f1primac,m=1,l=TRUE,x=4.5,m=1,l=TRUE,lb=0,shape=2,scale=0.5)
mysample1
hist(mysample1)

#Example 3: sample 20 values from a beta(1.3,2.7) distribution
f2<-function(x,a,b){(a-1)*log(x)+(b-1)*log(1-x)}
f2primac<-function(x,a,b){(a-1)/x-(b-1)/(1-x)}
mysample2<-ars(20,f2,f2primac,lb=c(0.3,0.6),ub=TRUE,xlb=0,ub=TRUE,xub=1,a=1.3,b=2.7)
mysample2
hist(mysample2)
```
Index

* distribution
  ars, 1

ars, 1