Package ‘ars’
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Title Adaptive Rejection Sampling
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Depends R (>= 3.1.2)
Description Adaptive Rejection Sampling, Original version.
License GPL (>= 2)
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R topics documented:

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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**: $\frac{d}{du} \log(f(u,...))$
- **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 an 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
fprima <- function(x, mu = 0, sigma = 1) (-1/sigma^2)*(x-mu)
mysample <- ars(20, f, fprima, 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)
f1prima <- function(x, shape, scale = 1) (shape-1)/x-1/scale
mysample1 <- ars(20, f1, f1prima, x = 4.5, m = 1, lb = TRUE, xlb = 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))
f2prima <- function(x, a, b) ((a-1)/x-(b-1)/(1-x))
mysample2 <- ars(20, f2, f2prima, x = c(0.3,0.6), m = 2, lb = TRUE, xlb = 0, ub = TRUE, xub = 1, a = 1.3, b = 2.7)
mysample2
hist(mysample2)
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