ARS Manual

December 9, 2013

ARSpackage *ARSpackage: an Adaptive Rejection Sampler*

Description

Final project for Statistics 243, an R package that performs adaptive rejection sampling, first proposed by Gilks and Wild in 1992.

Details

Package:	ARSpackage
Type:	Package
Version:	1.0
Date:	2013-12-13
Depends:	methods, numDeriv
Collate:	'adapt_reject.r', 'ars_methods.r'

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References

Gilks, Wild, 1992. http://faculty.chicagobooth.edu/hedibert.lopes/teaching/ccis2010/1992GilksWild.pdf.

See Also

https://bitbucket.org/lfelberg/stat243_final_proj
https://github.com/paciorek/stat243-fall-2013/tree/master/project

Cadapt_reject_sample *The adapt_reject class*

Description

This class contains all the methods used to perform an AR sampling.

Slots

n: Variable of class "numeric", n, containing the number of points to sample, taken as user input.

f_x: Function of class "function", containing the f(x) to sample from, taken as user input.

bounds: Variable of class "numeric", n, containing the bounds of the function, taken as user input.

output: Variable of class "vector", containing sampled points to return to user.

h_at_x: Variable of class "vector", containing computed log(f(x)) values at all x values

hprime_at_x: Variable of class "vector", containing computed derivative of log(f(x)) values at all x values

z: Variable of class "vector", containing abscissae of upper bound function.

samples: Variable of class "vector", containing random numbers generated by s(x) and unif.

x: Variable of class "vector", containing x values used in ARS.

weights: Variable of class "vector", containing sampled points to return to user.

output: Variable of class "numeric", containing sampled points to return to user.

mat_sorted: Variable of class "matrix", containing x values, their corresponding h and h prime values, sorted by increasing x.

a_r_s *The adapt_reject function*

Description

This calls the class Cadapt_reject_sample and its methods. The vector of samples is accessible via *ans output*.

Usage

```
a_r_s(n_samples, fx, bounds = c(-Inf, Inf), ...)
```

Arguments

n_samples:	Number of samples desired from distribution
fx:	Function to sample from
bounds:	Bounds of function of interest. The default is an unbounded function

Value

S4 adapt_reject_sample object; a vector containing n points sampled from the f(x) distribution

ev_h — *Cadapt_reject_sample eval_h*

Description

Cadapt_reject_sample eval_h

Arguments

object	Cadapt_reject_sample object

gen_x — *Cadapt_reject_sample generating first two points*

Description

Cadapt_reject_sample generating first two points

Arguments

object	Cadapt_reject_sample object

initialize — *Cadapt_reject_sample initialization: method to intialize the ARS class for sampling*

Description

Cadapt_reject_sample initialization: method to intialize the ARS class for sampling

Arguments

object	Cadapt_reject_sample object
n	numeric determining the number of samples to obtain
f_x	function for distribution to sample from
bounds	vector of distribution bounds

lower — *Cadapt_reject_sample lower*

Description

Cadapt_reject_sample lower

Arguments

object	Cadapt_reject_sample object

s_x *Cadapt_reject_sample s(x)*

Description

Function to normalize the upper bounds of log(f(x))

Arguments

object	Cadapt_reject_sample object

sample *Cadapt_reject_sample sample*

Description

Cadapt_reject_sample sample

Arguments

object	Cadapt_reject_sample object

show *Cadapt_reject_sample show*

Description

Cadapt_reject_sample show

Arguments

object	Cadapt_reject_sample object

update *Cadapt_reject_sample update*

Description

Cadapt_reject_sample update

Arguments

object	Cadapt_reject_sample object

upper *Cadapt_reject_sample upper*

Description

Cadapt_reject_sample upper

Arguments

object	Cadapt_reject_sample object

validity_ars *Validity checks for S4* adapt_reject_sample *object*

Description

Validity checks for S4 adapt_reject_sample object

Usage

```
validity_ars(object)
```

Arguments

object	An adapt_reject_sample object

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