Package 'SimTools'

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Title Toolkit for Simulation output including Monte Carlo and MCMC

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Imports mcmcse, mvtnorm

Description Toolkit for Simulation output including Monte Carlo and MCMC

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Encoding UTF-8

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NeedsCompilation no

R topics documented:

`boxplot.Siid` *Boxplot for Siid*

Description

Boxplots with simultaenous error bars around all quantiles for iid data.

Usage

```
## S3 method for class 'Siid'
boxplot(x, ...,  alpha = 0.05, thresh = 0.001,  mean.col = 'plum4',
                 quan.col = 'lightsteelblue3', opaq = .6, range = 1.5, width = NULL, varwidth = FAL
                  outline = TRUE, plot = TRUE, border = par("fg"), col = 'white',
                      ann = !add, horizontal = FALSE, add = FALSE)
```

Arguments

x	: a 'Siid' class object
...	: arguments sent to boxplot
alpha	: confidence level of simultaneous confidence intervals
thresh	: numeric typically less than .005 for the accuracy of the simulteaneous procedure
mean.col	: color for the mean confidence interval
quan.col	: color for the quantile confidence intervals
opaq	: opacity of mean.col and quan.col. A value of 0 is transparent and 1 is completely opaque.
range	: as defined for base boxplot
width	: as defined for base boxplot
varwidth	: as defined for base boxplot
outline	: as defined for base boxplot
plot	: logical indicating whether the plot is to be constructed
border	: as defined for base boxplot
col	: as defined for base boxplot
ann	: as defined for base boxplot
horizontal	: as defined for base boxplot
add	: as defined for base boxplot

Value

returns the base boxplot with simultaneous confidence intervals around all quantiles

References

Robertson, N., Flegal, J. M., Vats, D., and Jones, G. L., "Assessing and Visualizing Simultaneous Simulation Error", Journal of Computational and Graphical Statistics, 2020.

Examples

```
# Generating iid data
chain <- matrix(rnorm(3*1e3), nrow = 1e3, ncol = 3)
siid.obj <- Siid(chain)
boxplot(siid.obj)
```

`plot.Siid` *Plot Siid*

Description

Density plots with simultaenous error bars around means and quantiles for iid data.

Usage

```
## S3 method for class 'Siid'
plot(x, Q = c(0.1, 0.9), alpha = 0.05, thresh = 0.001, plot = TRUE,
                      mean = TRUE, border = NA, mean.col = 'plum4', quan.col = 'lightsteelblue3',
                      opaq = 0.7, auto.layout = TRUE, ask = dev.interactive(),...)
```

Arguments

`x`	: a 'Siid' class object
`Q`	: vector of quantiles
`alpha`	: confidence level of simultaneous confidence intervals
`thresh`	: numeric typically less than .005 for the accuracy of the simulteaneous procedure
`plot`	: logical argument for is plots are to be returned
`mean`	: logical argument whether the mean is to be plotted
`border`	: whether a border is required for the simultaneous confidence intervals
`mean.col`	: color for the mean confidence interval
`quan.col`	: color for the quantile confidence intervals
`opaq`	: opacity of `mean.col` and `quan.col`. A value of 0 is transparent and 1 is completely opaque.
`auto.layout`	: logical argument for an automatic layout of plots
`ask`	: activating interactive plots
`...`	: arguments passed on to the `density` plot in base R

Value

returns a plot of the univariate density estimates with simultaneous confidence intervals wherever asked. If `plot == FALSE` a list of estimates and simultaneous confidence intervals.

References

Robertson, N., Flegal, J. M., Vats, D., and Jones, G. L., "Assessing and Visualizing Simultaneous Simulation Error", Journal of Computational and Graphical Statistics, 2020.

Examples

```
# Generating iid data
chain <- matrix(rnorm(3*1e3), nrow = 1e3, ncol = 3)
siid.obj <- Siid(chain)
plot(siid.obj)
```

`plot.Smcmc` *Plot Smcmc*

Description

Density plots with simultaenous error bars around means and quantiles for MCMC data. The error bars account for the correlated nature of the process.

Usage

```
## S3 method for class 'Smcmc'
plot(x, Q = c(0.1, 0.9), alpha = 0.05, thresh = 0.001, iid = FALSE, plot = TRUE,
                      mean = TRUE, border = NA, mean.col = 'plum4', quan.col = 'lightsteelblue3',
                      opaq = 0.7, auto.layout = TRUE, ask = dev.interactive(),...)
```

Arguments

`x`	: a 'Smcmc' class object
`Q`	: vector of quantiles
`alpha`	: confidence level of simultaneous confidence intervals
`thresh`	: numeric typically less than .005 for the accuracy of the simulteaneous procedure
`iid`	: logical argument for constructing density plot for iid samples. Defaults to `FALSE`
`plot`	: logical argument for is plots are to be returned
`mean`	: logical argument whether the mean is to be plotted
`border`	: whether a border is required for the simultaneous confidence intervals
`mean.col`	: color for the mean confidence interval
`quan.col`	: color for the quantile confidence intervals
`opaq`	: opacity of `mean.col` and `quan.col`. A value of 0 is transparent and 1 is completely opaque.
`auto.layout`	: logical argument for an automatic layout of plots
`ask`	: activating interactive plots
`...`	: arguments passed on to the `density` plot in base R

Value

returns a plot of the univariate density estimates with simultaneous confidence intervals wherever asked. If `plot == FALSE` a list of estimates and simultaneous confidence intervals.

References

Robertson, N., Flegal, J. M., Vats, D., and Jones, G. L., "Assessing and Visualizing Simultaneous Simulation Error", Journal of Computational and Graphical Statistics, 2020.

Examples

```
# Producing Markov chain
chain <- numeric(length = 1e3)
chain[1] <- 0
err <- rnorm(1e3)
for(i in 2:1e3)
{
  chain[i] <- .3*chain[i-1] + err[i]
}
chain <- Smcmc(chain)
plot(chain)
```

Siid *Siid class*

Description

Class for independent and identically distributed (iid) samples

Usage

```
Siid(data, varnames = colnames(data))
```

Arguments

data	: an iid output matrix with nsim rows and p columns
varnames	: a character string equal to the number of columns in data

Value

an Siid class object

Examples

```
# Generating iid data
chain <- matrix(rnorm(3*1e3), nrow = 1e3, ncol = 3)
siid.obj <- Siid(chain)
```

Smcmc *Smcmc class*

Description

Smcmc class for simulated data using Markov chain Monte Carlo

Usage

```
Smcmc(data, batch.size = FALSE, varnames = colnames(data))
```

Arguments

data	: an MCMC output matrix with nsim rows and p columns
batch.size	: logical vector, if true, calculates the batch size appropriate for this Markov chain. Setting to TRUE saves time in future steps.
varnames	: a character string equal to the number of columns in data

Value

an Smcmc class object

Examples

```
# Producing Markov chain
chain <- numeric(length = 1e3)
chain[1] <- 0
err <- rnorm(1e3)
for(i in 2:1e3)
{
  chain[i] <- .3*chain[i-1] + err[i]
}
smcmc.obj <- Smcmc(chain)
```

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