

# 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

**License** GPL (>= 2)

**Encoding** UTF-8

**RoxygenNote** 7.1.1

**NeedsCompilation** no

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boxplot.Siid	<i>Boxplot for Siid</i>
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## 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 = FALSE,
        outline = TRUE, plot = TRUE, border = par("fg"), col = 'white',
        ann = !add, horizontal = FALSE, add = FALSE)
```

**Arguments**

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

**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 densi ty 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 simultaneous 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 simultaneous 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)
```

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Siid	<i>Siid class</i>
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**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)
```

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Smcmc	<i>Smcmc class</i>
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**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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