

# Package ‘EvalEst’

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**Title** Dynamic Systems Estimation - Extensions

**Description** Provides functions for evaluating (time series) model estimation methods. These facilitate Monte Carlo experiments of repeated simulations and estimations. Also provides methods for looking at the distribution of the results from these experiments, including model roots (which are an equivalence class invariant).

**Depends** R (>= 2.5.0), tfplot, dse (>= 2007.10-1)

**Imports** setRNG, tframe (>= 2007.5-3)

**LazyLoad** yes

**License** GPL-2

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coef.TSmodelEstEval    *Specific Methods for coef*

---

### Description

See the generic function description.

### Usage

```
## S3 method for class 'TSmodelEstEval'
coef(object, criterion.args=NULL, ...)
## S3 method for class 'TSestModelEstEval'
coef(object, criterion.args=NULL, ...)
```

### Arguments

object            an object (model) from which to extract coefficients(parameters).  
criterion.args    arguments to be passed to this method when it is called by EstEval.  
...                (further arguments, currently disregarded).

### Details

The methods `***.ee` are intended mainly to be called from EstEval as criterion for evaluating an estimation method. See `coef`.

### See Also

[EstEval coef](#)

---

distribution                      *Generate distribution plots of Monte Carlo simulations*

---

### Description

Generate distribution plots of Monte Carlo simulations.

### Usage

```
distribution(obj, ...)
  ## S3 method for class 'TSdata'
distribution(obj, ..., bandwidth=0.2,
             select.inputs = seq(length= nseriesInput(obj)),
             select.outputs= seq(length=nseriesOutput(obj)))
  ## Default S3 method:
distribution(obj, ..., bandwidth=0.2, series=NULL)

  ## S3 method for class 'MonteCarloSimulations'
distribution(obj,
             series=seq(dim(obj$simulations)[2]),
             x.sections=TRUE, periods=1:3, graphs.per.page=5, ...)
```

### Arguments

obj	The result of MonteCarloSimulations.
bandwidth	passed to density or ksmooth.
series	The series which should be plotted. The default gives all series.
select.inputs	series to be plotted. (passed to selectSeries)
select.outputs	series to be plotted. (passed to selectSeries)
x.sections	If TRUE then kernel density estimates are plotted for periods indicated by periods. If FALSE then a time series plots of the mean and estimates 1 and 2 standard deviations from the mean. Periods is ignored if x.sections is FALSE.
periods	The periods at which the distribution should be calculated and plotted. The default gives the first three.
graphs.per.page	integer indicating number of graphs to place on a page.
...	(further arguments, currently disregarded).
select	integer vector indicating roots to be plotted. If select is not NULL then roots are sorted by magnitude and only the indicated roots are plotted. For example, select=c(1,2) will plot only the two largest roots.

### Details

Kernel estimates of the densities (series by series, not joint densities) are estimated using ksmooth (if available) or density (if available) to produces density plots. Output graphics can be paused between pages by setting par(ask=TRUE).

**Value**

None

**See Also**[tfplot.MonteCarloSimulations](#)**Examples**

```
data("eg1.DSE.data.diff", package="dse")
model <- estVARXls(eg1.DSE.data.diff)
z <- MonteCarloSimulations(model)
distribution(z)
```

---

distribution.coefEstEval

*Plot distribution of estimates*


---

**Description**

Plot distribution of estimates.

**Usage**

```
## S3 method for class 'coefEstEval'
distribution(obj, ..., Sort=FALSE, bandwidth=0.2,
  graphs.per.page=5)
## S3 method for class 'rootsEstEval'
distribution(obj, ..., mod=TRUE, invert=FALSE, Sort=FALSE,
  bandwidth=0.2, select=NULL)
```

**Arguments**

obj	an object as returned by EstEval.
Sort	if Sort is true then sort is applied. This helps (a bit) with estimation methods like black.box which may not return parameters of the same length or in the same order.
bandwidth	passed to density or ksmooth.
graphs.per.page	integer indicating number of graphs to place on a page.
...	other objects to be plotted (not working for some methods).
invert	logical indicating if the inverse of roots should be plotted
mod	logical indicating if the modulus of roots should be plotted
select	integer vector indicating roots to be plotted. If select is not NULL then roots are sorted by magnitude and only the indicated roots are plotted. For example, select=c(1,2) will plot only the two largest roots.

**Details**

ksmooth is applied if available to get a smoothed estimate of the distribution of the estimates. If ksmooth is not available then density is applied if it is available.

**Value**

None

**See Also**

[EstEval](#)

**Examples**

```
data("eg1.DSE.data.diff", package="dse")
model <- estVARXls(TSdata(output=outputData(eg1.DSE.data.diff)), max.lag=2)
# now use this as the true model
z <- EstEval(model,
  estimation="estVARXls", estimation.args=list(max.lag=2))
distribution(z)
tfplot(z)
```

---

 EstEval

*Evaluate an estimation method*


---

**Description**

Evaluate an estimation method.

**Usage**

```
EstEval(model, replications=100, rng=NULL, quiet=FALSE,
  simulation.args=NULL,
  estimation=NULL, estimation.args=NULL,
  criterion ="coef", criterion.args =NULL)
```

```
is.EstEval(obj)
```

**Arguments**

model	A TSmodel.
replications	The number of simulations.
rng	The RNG and starting seed.
quiet	If TRUE then no information is printed during estimation.
simulation.args	A list of any arguments to pass to simulate.
estimation	A character string indicating the estimation routine to use.

estimation.args	A list of any arguments to pass to the estimation routine.
criterion	A function to apply to the results of estimation to extract the information which is to be retained.
criterion.args	A list of any arguments to be passed to the criterion function.
obj	an object.

### Details

estimation.args and criterion.args should be NULL if no args are needed. If model is an object of class 'EstEval' or 'simulation' then the model and the seed!!! are extracted so the evaluation will be based on the same generated sample. criterion can be 'coef', 'roots', 'TSmodel', or 'TSestModel'. With the default (coef) or with TSmodel the other criteria can be reconstructed (when the estimation method finds a known form for the model - which is not always the case, for example with estBlackBox methods). If criterion = 'roots' then criterion.args= list(verbose=FALSE) is advised.

### Value

A list with element result of length replications, each element containing the results of criterion(estimation(simulate(model))). Other elements of the list contain information from the supplied arguments.

### See Also

[simulate](#) [MonteCarloSimulations](#) [distribution](#) [forecastCovWRTtrue](#)

### Examples

```
data("eg1.DSE.data.diff", package="dse")
model <- estVARXls(TSdata(output=outputData(eg1.DSE.data.diff)))
z <- EstEval(model,
  estimation="estVARXls", estimation.args=list(max.lag=2))
tfplot(z)
zz <- EstEval(model,
  estimation="estVARXls", estimation.args=list(max.lag=2),
  simulation.args=list(sampleT=50, sd=1.5))
is.EstEval(z)
```

---

generateSSmodel

*Randomly generate a state space model*

---

### Description

Randomly generate a state space model.

**Usage**

```
generateSSmodel(m,n,p, stable=FALSE)
```

**Arguments**

n,m,p	Input, state and output dimensions.
stable	TRUE or FALSE indicating if the model must be stable.

**Details**

Randomly generate a state space model. If stable is true then the largest root will have magnitude less than 1.0.

**Value**

An SS TSmodel.

**Examples**

```
z <- generateSSmodel(2,3,1)
```

---

genMineData

*Generate Data*

---

**Description**

Generate data for Monte Carlo experiments

**Usage**

```
genMineData(umodel, ymodel, uinput=NULL, sampleT=100,
  unoise=NULL, usd=1, ynoise=NULL, ysd=1, rng=NULL)
build.input.models(data, max.lag=NULL)
build.diagonal.model(multi.models)
```

**Arguments**

umodel	Model for input data.
ymodel	Model for output data.
sampleT	Number of periods of data to generate.
unoise	Input noise.
usd	Standard deviation of input noise.
ynoise	Output noise.
ysd	Standard deviation of output noise.
rng	RNG setting.

<code>multi.models</code>	A list of <code>TSestModels</code> .
<code>data</code>	data from which to build models.
<code>max.lag</code>	number of lags in the estimated models.
<code>uinput</code>	Input data to <code>umodel</code> .

### Details

This function generates test data using specified models. `umodel` is used to generate data corresponding to input data and `ymodel` is used to generate data corresponding to output data. The result of `umodel` is used as input to `ymodel` so the input dimension of `ymodel` should be the output dimension of `umodel`. Typically the `ymodel` would be degenerate in some of the input variables so the effective inputs are a subset. If `umodel` requires input data it should be specified in `uinput`. If noise is `NULL` then a normal noise will be generated by `simulate`. This will be iid  $N(0,I)$ . The RNG will be set first to `rng` if it is specified. If `unoise` or `ynoise` are specified they should be as expected by `simulate` for the specified `umodel` and `ymodel`.

`genMineData` uses `build.input.models`, which makes a list of univariate `TSestModels`, one for each series in `inputData(data)` estimated by `estVARXls` with `max.lag` lags. `genMineData` then uses `build.diagonal.model` which builds one diagonal model from a list of models returned by `build.input.models`. It uses the AR part only.

### Value

A `TSdata` object.

### See Also

[simulate](#)

### Examples

```
data("eg1.DSE.data.diff", package="dse")
umodel <- build.diagonal.model(
  build.input.models(eg1.DSE.data.diff, max.lag=2))
z <- TSdata(output=outputData(eg1.DSE.data.diff),
  input = inputData(eg1.DSE.data.diff))
ymodel <- TSmodel(estVARXls(z, max.lag=3))
sim.data <- genMineData(umodel, ymodel)
```

---

MonteCarloSimulations *Generate simulations*

---

### Description

Run multiple simulations



**Usage**

```

is.MonteCarloSimulations(obj)
MonteCarloSimulations(model, simulation.args=NULL,
  replications=100, rng=NULL, quiet =FALSE, ...)
## Default S3 method:
MonteCarloSimulations(model, simulation.args = NULL,
  replications = 100, rng = NULL, quiet =FALSE, ...)
## S3 method for class 'TSmodel'
MonteCarloSimulations(model, simulation.args=NULL,
  replications=100, rng=NULL, quiet=FALSE, ...)

## S3 method for class 'TSestModel'
MonteCarloSimulations(model, simulation.args=NULL,
  replications=100, rng=NULL, quiet=FALSE, ...)
## S3 method for class 'EstEval'
MonteCarloSimulations(model, simulation.args=NULL,
  replications=100, rng=getRNG(model), quiet=FALSE, ...)
## S3 method for class 'MonteCarloSimulations'
MonteCarloSimulations(model,
  simulation.args=NULL, replications=100, rng=getRNG(model), quiet=FALSE, ...)

```

**Arguments**

model	an object from which a model can be extracted. The model must have an associated simulation method (e.g. a TSmodel).
simulation.args,	A list of arguments in addition to model which are passed to simulate.
replications	The number of simulations.
rng	The RNG and starting seed.
quiet	logical indicating if printing and many warning messages should be suppressed.
obj	an object.
...	arguments passed to other methods.

**Details**

This function runs many simulations using `simulate`. Often it not be necessary to do this since the seed can be used to reproduce the sample and many functions for testing estimation methods, etc., will produce samples as they proceed. This function is useful for verification and for looking at the stochastic properties of the output of a model. If `model` is an object of class `EstEval` or `simulation` then the model and the seed!!! are extracted so the same sample will be generated. The default method expects the result of `simulate(model)` to be a matrix. There is a `tfplot` method (time series plots of the simulations) and a distribution method for the result. The latter plots kernel estimates of the distribution of the simulations at specified periods.

**Value**

A list of simulations.

**See Also**

[simulate](#) [EstEval](#) [distribution](#) [forecastCov](#) [WRTtrue](#)

**Examples**

```
data("eg1.DSE.data.diff", package="dse")
model <- estVARX1s(eg1.DSE.data.diff)
z <- MonteCarloSimulations(model, simulation.args=list(sampleT=100))
tfplot(z)
distribution(z)
```

---

```
nseries.MonteCarloSimulations
      Number of Series
```

---

**Description**

Return the number of series.

**Usage**

```
## S3 method for class 'MonteCarloSimulations'
nseriesInput(x)
## S3 method for class 'MonteCarloSimulations'
nseriesOutput(x)
```

**Arguments**

x                    A featherForecasts object.

**Details**

See the generic method.

**Value**

An integer.

---

print.estimatedModels *Print Specific Methods*

---

**Description**

See the generic function description.

**Usage**

```
## S3 method for class 'EstEval'
print(x, digits=options()$digits, ...)
## S3 method for class 'MonteCarloSimulations'
print(x, digits=options()$digits, ...)
```

**Arguments**

x	an object to be printed.
digits	a non-null value is used to indicate the number of significant digits. If digits is NULL then the value of digits specified by options is used.
...	(further arguments, currently disregarded).

**See Also**

[print summary](#)

---

roots.coefEstEval *Roots Specific Methods*

---

**Description**

See the generic function description.

**Usage**

```
## S3 method for class 'coefEstEval'
roots(obj, criterion.args=NULL, ...)
## S3 method for class 'rootsEstEval'
roots(obj, ...)
## S3 method for class 'TSestModelEstEval'
roots(obj, criterion.args=NULL, ...)
## S3 method for class 'TSmodelEstEval'
roots(obj, criterion.args=list(randomize = TRUE), ...)
```

**Arguments**

obj                    an object from which roots are to be extracted or calculated and printed.  
 criterion.args        arguments to be passed to this method when it is called by EstEval.  
 ...                    arguments to be passed to other methods.

**Details**

The methods `***.ee` are intended mainly to be called from EstEval as criterion for evaluating an estimation method.

**See Also**

[roots stability EstEval](#)

---

seriesNamesInput.MonteCarloSimulations  
*TS Input and Output Specific Methods*

---

**Description**

See the generic function description.

**Usage**

```
## S3 method for class 'MonteCarloSimulations'
seriesNamesInput(x)
## S3 method for class 'MonteCarloSimulations'
seriesNamesOutput(x)
```

**Arguments**

x                    an object from which to extract the names of the input or output series.

---

summary.EstEval        *Summary Specific Methods*

---

**Description**

See the generic function description.

**Usage**

```

    ## S3 method for class 'TSestModelEstEval'
summary(object, ...)
    ## S3 method for class 'TSmodelEstEval'
summary(object, ...)
    ## S3 method for class 'EstEval'
summary(object, ...)
    ## S3 method for class 'MonteCarloSimulations'
summary(object, series=NULL, periods=1:3, ...)
    ## S3 method for class 'coefEstEval'
summary(object, verbose=TRUE, ...)
    ## S3 method for class 'rootsEstEval'
summary(object, verbose=TRUE, ...)

    ## S3 method for class 'summary.TSestModelEstEval'
print(x, digits=options()$digits, ...)
    ## S3 method for class 'summary.TSmodelEstEval'
print(x, digits=options()$digits, ...)
    ## S3 method for class 'summary.EstEval'
print(x, digits=options()$digits, ...)
    ## S3 method for class 'summary.MonteCarloSimulations'
print(x, digits=options()$digits, ...)
    ## S3 method for class 'summary.coefEstEval'
print(x, digits=options()$digits, ...)
    ## S3 method for class 'summary.rootsEstEval'
print(x, digits=options()$digits, ...)

```

**Arguments**

object	an object for which a summary is to be printed.
x	an object for which a summary is to be printed.
digits	a non-null value is used to indicate the number of significant digits. If digits is NULL then the value of digits specified by options is used.
series	The series which should be plotted. The default NULL gives all series.
periods	optional integer vector indicating periods at which the summary should be calculated.
verbose	logical indicating if a longer summary should be produced.
...	arguments passed to other methods.

**See Also**

[summary print](#)

---

testEqual.EstEval      *Specific Methods for Testing Equality*

---

### Description

See the generic function description.

### Usage

```
## S3 method for class 'EstEval'  
testEqual(obj1, obj2, fuzz=0)  
## S3 method for class 'MonteCarloSimulations'  
testEqual(obj1, obj2, fuzz=1e-16)
```

### Arguments

obj1            an object which is to be compared with the second object.  
obj2            an object which is to be compared with the first object.  
fuzz            tolerance for numerical comparisons. Values within fuzz will be considered equal.

### See Also

[testEqual](#)

---

tfplot.coefEstEval      *Specific tfplot methods for coefEstEval (EstEval) objects*

---

### Description

See the generic function description.

### Usage

```
## S3 method for class 'coefEstEval'  
tfplot(x, cumulate=TRUE, norm=FALSE, bounds=TRUE,  
      invert=FALSE, Sort=FALSE, graphs.per.page = 5, ...)
```

**Arguments**

x	an object for which a tfplot is to be produced.
cumulate	logical indicating if the cumulative average of roots should be plotted
invert	logical indicating if the inverse of roots should be plotted
Sort	logical indicating if the roots should be sorted.
graphs.per.page	integer indicating number of graphs to place on a page.
norm	logical indicating if the euclidean norm of roots should be plotted (square root of the sum of squared roots).
bounds	logical indicating if estimated one standard error bounds should be plotted around the lines for the true roots.
...	arguments passed to other methods.

**Details**

If cumulate is true the cumulative average is plotted. If norm is true the norm is used, each parameter is plotted. If invert is true the reciprical is used (before cumulating). If Sort is true then sort is applied (before ave). This is not usually recommended but of interest with estimation methods like black.box which may not return parameters of the same length or in the same order. Plotting the true lines only makes sense if truth is the same length as result (and sometimes not even then).

**See Also**

[tfplot EstEval](#)

---

tfplot.MonteCarloSimulations

*Generate plots of Monte Carlo simulations*

---

**Description**

Generate plots of Monte Carlo simulations.

**Usage**

```
## S3 method for class 'MonteCarloSimulations'
tfplot(x,
  tf=tf.frame(x$simulations), start=tfstart(tf), end=tfend(tf),
  series=seq((dim(x$simulations)[2])),
  select.simulations=seq(dim(x$simulations)[3]),
  graphs.per.page=5, mar=par()$mar, ...)
```

**Arguments**

x	The result of MonteCarloSimulations.
tf	The time frame for plots. see tfplot.
start	The starting period for plots, taken from tf by default.
end	The ending period for plots, taken from tf by default.
series	The series which should be plotted. The default NULL gives all series.
select.simulations	Vector of integers indicating the simulations which should be plotted. The default plots all simulations.
graphs.per.page	The number of graphs to put on a page.
mar	Plot margins (see par).
...	arguments passed to other methods.

**Details**

This function produces plots of the simulated series. Output graphics can be paused between pages by setting `par(ask=TRUE)`.

**Value**

None

**See Also**

[distribution.MonteCarloSimulations](#)

**Examples**

```
data("eg1.DSE.data.diff", package="dse")
model <- estVARXls(eg1.DSE.data.diff)
z <- MonteCarloSimulations(model)
tfplot(z)
```

---

tfplot.rootsEstEval    *Specific tfplot methods for rootsEstEval (EstEval) objects*

---

**Description**

See the generic function description.



**Usage**

```

    ## S3 method for class 'rootsEstEval'
    tfplot(x, ...)
    ## S3 method for class 'rootsEstEval'
    plot(x, complex.plane=TRUE, cumulate=TRUE, norm=FALSE,
         bounds=TRUE, transform=NULL, invert=FALSE, Sort=TRUE, ...)

```

**Arguments**

x	an object for which a tfplot is to be produced.
complex.plane	logical indicating if the plot should be on the complex plane.
cumulate	logical indicating if the cumulative average of roots should be plotted
invert	logical indicating if the inverse of roots should be plotted
Sort	logical indicating if the roots should be sorted.
...	arguments passed to other methods.
norm	logical indicating if the euclidean norm of roots should be plotted (square root of the sum of squared roots).
bounds	logical indicating if estimated one standard error bounds should be plotted around the lines for the true roots.
transform	an optional string indicating the name of a function which should be applied to the roots before plotting.

**Details**

If `complex.plane` is `TRUE` then all results are plotted on a complex plane and the arguments `cumulate` and `Sort` do not apply. If `complex.plane` is `FALSE` then a sequential plot of the real and imaginary parts is produced. If `cumulate` is true the cumulative average is plotted. If `mod` is true the modulus is used, otherwise real and imaginary are separated. if `invert` is true the reciprocal is used (before cumulating). if `Sort` is true then sort is applied (before cumulate but after mod) by the Re part of the root. Some grouping is usually necessary since roots are not in an obvious order but sorting by the real part of the roots could be improved upon.

**See Also**

[tfplot EstEval](#)

---

tfplot.TSdata.ee

*Specific Methods for tfplot*

---

**Description**

See the generic function description.

**Usage**

```

## S3 method for class 'TSmodelEstEval'
tfplot(x, graph.args=NULL,
       criterion = "coef", criterion.args=NULL, ...)
## S3 method for class 'TSestModelEstEval'
tfplot(x, graph.args=NULL,
       criterion = "coef", criterion.args=NULL, ...)
## S3 method for class 'EstEval'
tfplot(x, tf=NULL, start=tfstart(tf), end=tfend(tf),
       truth= if(is.TSdata(x$truth)) outputData(x$truth) else x$truth,
       series = seq(length=nseries(truth)),
       Title="Estimated (and true) results",
       ylab = seriesNames(truth), remove.mean = FALSE,
       graphs.per.page=5, mar=par()$mar, reset.screen=TRUE, ...)

```

**Arguments**

x	an object for which a tfplot is to be produced.
tf	see tfplot.
start	see tfplot.
end	see tfplot.
truth	true value which will be plotted along with estimates.
Title	string of characters to use for title.
remove.mean	logical indicating if means should be removed before plotting results.
ylab	vector of strings for y axis labelling.
graphs.per.page	integer indicating number of graphs to place on a page.
reset.screen	logical indicating if the plot window should be cleared before starting.
series	integer or string indicating the series which should be plotted.
mar	plot margins. See par.
graph.args	list of graphics arguments eventually passed to plot. See par.
criterion	criterion which should be used to extract something from the object which will then be plotted. See EstEval.
criterion.args	arguments to be passed to criterion.
...	arguments passed to other methods.

**See Also**

[tfplot EstEval](#)

---

TobsMonteCarloSimulations  
*Tframe or Number of Observations*

---

**Description**

Return the number of Observations or the tframe.

**Usage**

```
## S3 method for class 'MonteCarloSimulations'
Tobs(x)
## S3 method for class 'MonteCarloSimulations'
tframe(x)
```

**Arguments**

x                    A MonteCarloSimulations object.

**Details**

See the generic method.

**Value**

An integer or a tframe object.

---

TSdata.coefEstEval    *TS Extractor Specific Methods*

---

**Description**

See the generic function description.

**Usage**

```
## S3 method for class 'coefEstEval'
TSestModel(obj)
## S3 method for class 'coefEstEval'
TSmodel(obj, ...)
```

**Arguments**

obj                    an object from which to extract the TSmodel or TSestModel.  
...                    arguments to be passed to other methods.

**See Also**[TSdata](#) [TSestModel](#) [TSmodel](#)

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