

Package ‘RobAStBase’

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Title Robust Asymptotic Statistics

Description Base S4-classes and functions for robust asymptotic statistics.

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distrMod(>= 2.8.0), RandVar(>= 1.2.0)

Suggests ROptEst(>= 1.2.0), RUnit(>= 0.4.26)

Imports startupmsg, graphics, grDevices, stats

ByteCompile yes

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| RobAStBase-package | <i>Robust Asymptotic Statistics</i> |
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Description

Base S4-classes and functions for robust asymptotic statistics.

Details

| | |
|------------------|--|
| Package: | RobAStBase |
| Version: | 1.2.0 |
| Date: | 2019-04-05 |
| Depends: | R(>= 3.4), methods, rrcov, distr(>= 2.8.0), distrEx(>= 2.8.0), distrMod(>= 2.8.0), RandVar(>= 1.2.0) |
| Suggests: | ROptEst(>= 1.2.0), RUnit(>= 0.4.26) |
| Imports: | startupmsg, graphics, grDevices, stats |
| ByteCompile: | yes |
| Encoding: | latin1 |
| License: | LGPL-3 |
| URL: | http://robast.r-forge.r-project.org/ |
| VCS/SVNRevision: | 1205 |

Package versions

Note: The first two numbers of package versions do not necessarily reflect package-individual development, but rather are chosen for the RobAStXXX family as a whole in order to ease updating "depends" information.

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References

M. Kohl (2005). Numerical Contributions to the Asymptotic Theory of Robustness. Dissertation. University of Bayreuth.

See Also

[distr-package](#), [distrEx-package](#), [distrMod-package](#)

Examples

```
library(RobAStBase)

## some L2 differentiable parametric family from package distrMod, e.g.
B <- BinomFamily(size = 25, prob = 0.25)

## classical optimal IC
IC0 <- optIC(model = B, risk = asCov())
plot(IC0) # plot IC
checkIC(IC0, B)
```

ALEstimate-class *ALEstimate-class*.

Description

Class of asymptotically linear estimates.

Details

The (return value) class of an estimator is of class `ALEstimate` if it is asymptotically linear; then it has an influence function (implemented in slot `pIC`) and so all the diagnostics for influence functions are available; in addition it is asymptotically normal, so we can (easily) deduce asymptotic covariances, hence may use these in confidence intervals; in particular, the return values of `kStepEstimator` `oneStepEstimator` (and `roptest`, `robtest`, `RMXEstimator`, `MBREstimator`, `OBREstimator`, `OMSEstimator` in package `'ROptEst'`) are objects of (subclasses of) this class.

As the return value of `CvMMDEstimator` (or `MDEstimator` with `CvMDist` or `CvMDist2` as distance) is asymptotically linear, there is class `MCALEstimate` extending `MCEstimate` by extra slots `pIC` and `asbias` (only filled optionally with non-NULL values). Again all the diagnostics for influence functions are then available. Classes `ML.ALEstimate` and class `CvMMD.ALEstimate` are nominal subclasses of class `MCALEstimate`, nominal in the sense that they have no extra slots, but they might have particular methods later on.

Helper method `getPIC` by means of the estimator class, and, in case of estimators of class `CvMMDEstimate`, also the name (in slot `name`) produces the (partial) influence function: calling `.CvMMDCovariance` – either directly or through wrapper `.CvMMDCovarianceWithMux`. This is used in the corresponding `.checkEstClassForParamFamily` method, which coerces object from class `"MCEstimate"` to `"MCALEstimate"`.

Objects from the Class

Objects can be created by calls of the form `new("ALEstimate", ...)`.

Slots

`name` Object of class `"character"`: name of the estimator.

`estimate` Object of class `"ANY"`: estimate.

`estimate.call` Object of class `"call"`: call by which estimate was produced.

`samplesize` object of class `"numeric"` — the samplesize (only complete cases are counted) at which the estimate was evaluated.

`completeness` object of class `"logical"` — complete cases at which the estimate was evaluated.

`asvar` object of class `"OptionalNumericOrMatrix"` which may contain the asymptotic (co)variance of the estimator.

`asbias` Optional object of class `"numeric"`: asymptotic bias.

`pIC` Optional object of class `InfluenceCurve`: influence curve.

`nuis.idx` object of class `"OptionalNumeric"`: indices of estimate belonging to the nuisance part.

`fixed` object of class `"OptionalNumeric"`: the fixed and known part of the parameter

`Infos` object of class `"matrix"` with two columns named `method` and `message`: additional informations.

`trafo` object of class `"list"`: a list with components `fct` and `mat` (see below).

`untransformed.estimate` Object of class `"ANY"`: untransformed estimate.

`untransformed.asvar` object of class `"OptionalNumericOrMatrix"` which may contain the asymptotic (co)variance of the untransformed estimator.

Extends

Class `ALEstimate` extends class `"Estimate"`, directly. Class `MCALEstimate` extends classes `"ALEstimate"`, and `"MCEstimate"` directly. Class `ML.ALEstimate` extends classes `"ALEstimate"`, and `"MLEstimate"` directly. Class `CvM.ALEstimate` extends classes `"ALEstimate"`, and `"CvMMDEstimate"` directly. The last two classes are to be used for method dispatch, later; they have an identical slot structure to class `MCALEstimate`.

Methods

pIC signature(object = "ALEstimate"): accessor function for slot pIC.
show signature(object = "ALEstimate")
confint signature(object = "ALEstimate", method = "missing"): compute asymptotic (LAN-based) confidence interval neglecting any bias.
confint signature(object = "ALEstimate", method = "symmetricBias"): compute asymptotic (LAN-based) confidence interval incorporating bias symmetrically.
confint signature(object = "ALEstimate", method = "onesidedBias"): compute asymptotic (LAN-based) confidence interval incorporating bias one-sided; i.e., positive or negative, respectively.
confint signature(object = "ALEstimate", method = "asymmetricBias"): compute asymptotic (LAN-based) confidence interval incorporating bias asymmetrically.

Author(s)

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See Also

[Estimate-class](#)

Examples

```
## prototype
new("ALEstimate")

## data example
set.seed(123)
x <- rgamma(50, scale = 0.5, shape = 3)

## parametric family of probability measures
G <- GammaFamily(scale = 1, shape = 2)

mle <- MLEstimator(x,G)
(picM <- pIC(mle))

## Kolmogorov(-Smirnov) minimum distance estimator
ke <- KolmogorovMDEstimator(x = x, ParamFamily = G)
pIC(ke) ## gives NULL

## von Mises minimum distance estimator with default mu

## to save time for CRAN
system.time(me <- CvMMEstimator(x = x, ParamFamily = G))
str(me@pIC) ## a call
system.time(pIC0 <- pIC(me))
str(me@pIC) ## now filled
```

BdStWeight-class *Robust Weight classes for bounded, standardized weights*

Description

Classes for bounded, robust, standardized weights.

Objects from the Class

Objects can be created by calls of the form `new("BdStWeight", ...)`; to fill slot `weight`, you will use the generating functions `getweight` and `minbiasweight`.

Slots

`name` Object of class "character"; inherited from class `RobWeight`.

`weight` Object of class "function" — the weight function; inherited from class `RobWeight`.

`clip` Object of class "numeric" — clipping bound(s); inherited from class `BoundedWeight`.

`stand` Object of class "matrix" — standardization.

Extends

Class "RobWeight", via class "BoundedWeight". Class "BoundedWeight", directly.

Methods

stand signature(object = "BdStWeight"): accessor function for slot `stand`.

stand<- signature(object = "BdStWeight", value = "matrix"): replacement function for slot `stand`. This replacement method should be used with great care, as the slot `weight` is not simultaneously updated and hence, this may lead to inconsistent objects.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Hampel et al. (1986) *Robust Statistics*. The Approach Based on Influence Functions. New York: Wiley.

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[BoundedWeight-class](#), [RobWeight-class](#), [IC](#), [InfluenceCurve-class](#)

Examples

```
## prototype
new("BdStWeight")
```

biastype-methods *Methods for Function biastype in Package 'RobAStBase'*

Description

biastype-methods

Methods

biastype signature(object = "interpolrisk"): returns the slot biastype of an object of class "interpolrisk".

Examples

```
myrisk <- MBRRisk(samplesize=100)
biastype(myrisk)
```

BoundedWeight-class *Robust Weight classes for bounded weights*

Description

Classes for bounded, robust weights.

Objects from the Class

Objects can be created by calls of the form `new("BoundedWeight", ...)`.

Slots

name Object of class "character"; inherited from class RobWeight.

weight Object of class "function" — the weight function; inherited from class RobWeight.

clip Object of class "numeric" — clipping bound(s).

Extends

Class "RobWeight", directly.

Methods

clip signature(x1 = "BoundedWeight"): accessor function for slot clip.

clip<- signature(object = "BoundedWeight", value = "numeric"): replacement function for slot clip. This replacement method should be used with great care, as the slot weight is not simultaneously updated and hence, this may lead to inconsistent objects.

Author(s)

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References

Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[RobWeight-class](#), [IC](#), [InfluenceCurve-class](#)

Examples

```
## prototype
new("BoundedWeight")
```

checkIC

Generic Function for Checking ICs

Description

Generic function for checking centering and Fisher consistency of ICs.

Usage

```
checkIC(IC, L2Fam, ...)
## S4 method for signature 'IC,missing'
checkIC(IC, out = TRUE, ..., diagnostic = FALSE)
## S4 method for signature 'IC,L2ParamFamily'
checkIC(IC, L2Fam, out = TRUE, ..., diagnostic = FALSE)
```

Arguments

| | |
|------------|---|
| IC | object of class "IC" |
| L2Fam | L2-differentiable family of probability measures. |
| out | logical: Should the values of the checks be printed out? |
| ... | additional parameters |
| diagnostic | logical; if TRUE and out==TRUE, diagnostic information on the integration is printed; independent of out, if diagnostic==TRUE, this information is returned as attribute <code>diagnostic</code> of the return value. . |

Details

The precisions of the centering and the Fisher consistency are computed.

Diagnostics on the involved integrations are available if argument `diagnostic` is TRUE. Then there is attribute `diagnostic` attached to the return value, which may be inspected and accessed through [showDiagnostic](#) and [getDiagnostic](#).

Value

The maximum deviation from the IC properties is returned.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[L2ParamFamily-class](#), [IC-class](#)

Examples

```
IC1 <- new("IC")
checkIC(IC1)
```

 ComparePlot

Wrapper function for function comparePlot

Description

The wrapper ComparePlot (capital C!) takes most of arguments to function comparePlot (lower case c!) by default and gives a user possibility to run the function with low number of arguments.

Usage

```
ComparePlot(IC1, IC2, y, ..., IC3 = NULL, IC4 = NULL,
  alpha.trsp = 100, with.legend = TRUE, rescale = FALSE,
  withCall = TRUE)
```

Arguments

| | |
|-------------|--|
| IC1 | object of class IC |
| IC2 | object of class IC |
| IC3 | object of class IC |
| IC4 | object of class IC |
| y | optional data argument — for plotting observations into the plot |
| ... | additional parameters (in particular to be passed on to plot) |
| alpha.trsp | the transparency argument (0 to 100) for plotting the data |
| with.legend | the flag for showing the legend of the plot |
| rescale | the flag for rescaling the axes for better view of the plot |
| withCall | the flag for the call output |

Value

invisible(*retV*) where *retV* is the return value of the respective call to the full-fledged function comparePlot with the additional item *wrappedcall* with the call to the wrapper ComparePlot and *wrappedcall* the call to to the full-fledged function comparePlot.

Details

Calls comparePlot with suitably chosen defaults; if *withCall* == TRUE, the call to comparePlot, i.e., item *wrappedcall* of the (hidden) return value, is printed.

Examples

```
# Gamma
fam <- GammaFamily()
rfam <- InfRobModel(fam, ContNeighborhood(0.5))
IC1 <- optIC(model = fam, risk = asCov())
IC2 <- makeIC(list(function(x)sin(x),function(x)x^2), L2Fam = fam)
```

```

Y <- distribution(fam)
y <- r(Y)(100)
ComparePlot(IC1, IC2, y, withCall = TRUE)

```

comparePlot-methods *Compare - Plots*

Description

Plots 2-4 influence curves to the same model.

Usage

```

comparePlot(obj1, obj2, ... )
## S4 method for signature 'IC,IC'
comparePlot(obj1, obj2, obj3 = NULL, obj4 = NULL, data = NULL,
  ..., withSweave = getdistrOption("withSweave"),
  forceSameModel = FALSE, main = FALSE, inner = TRUE,
  sub = FALSE, col = par("col"), lwd = par("lwd"), lty,
  col.inner = par("col.main"), cex.inner = 0.8,
  bmar = par("mar")[1], tmar = par("mar")[3],
  with.automatic.grid = TRUE, with.legend = FALSE,
  legend = NULL, legend.bg = "white",
  legend.location = "bottomright", legend.cex = 0.8,
  withMBR = FALSE, MBRB = NA, MBR.fac = 2, col.MBR = par("col"),
  lty.MBR = "dashed", lwd.MBR = 0.8, x.vec = NULL,
  scaleX = FALSE, scaleX.fct, scaleX.inv, scaleY = FALSE,
  scaleY.fct = pnorm, scaleY.inv = qnorm, scaleN = 9,
  x.ticks = NULL, y.ticks = NULL, mfColRow = TRUE,
  to.draw.arg = NULL,
  cex.pts = 1, cex.pts.fun = NULL, col.pts = par("col"),
  pch.pts = 19, cex.npts = 1, cex.npts.fun = NULL,
  col.npts = par("col"), pch.npts = 20, jitter.fac = 1,
  with.lab = FALSE, cex.lbs = 1, adj.lbs = c(0, 0),
  col.lbs = col.pts, lab.pts = NULL, lab.font = NULL,
  alpha.trsp = NA, which.lbs = NULL, which.Order = NULL,
  which.nonlbs = NULL, attr.pre = FALSE, return.Order = FALSE,
  withSubst = TRUE)

```

Arguments

| | |
|------|---|
| obj1 | object of class "InfluenceCurve" |
| obj2 | object of class "InfluenceCurve" to be compared with obj1 |
| obj3 | optional: object of class "InfluenceCurve" to be compared with obj1 |
| obj4 | optional: object of class "InfluenceCurve" to be compared with obj1 |
| data | optional data argument — for plotting observations into the plot; |

| | |
|----------------------------------|--|
| <code>withSweave</code> | logical: if TRUE (for working with Sweave) no extra device is opened |
| <code>forceSameModel</code> | logical; shall we check / enforce that the model of the ICs <code>obj1</code> , <code>obj2</code> , <code>obj3</code> , and <code>obj4</code> be the same? |
| <code>main</code> | logical: is a main title to be used? or just as argument <code>main</code> in <code>plot.default</code> . |
| <code>col</code> | color[s] of ICs in arguments <code>obj1</code> [..., <code>obj4</code>]. |
| <code>lwd</code> | linewidth[s] of ICs in arguments <code>obj1</code> [..., <code>obj4</code>]. |
| <code>lty</code> | line-type[s] of ICs in arguments <code>obj1</code> [..., <code>obj4</code>]. |
| <code>inner</code> | logical: do panels have their own titles? or character vector of / cast to length 'number of plotted dimensions'; if argument <code>to.draw.arg</code> is used, this refers to a vector of length <code>length(to.draw.arg)</code> , the actually plotted dimensions. For further information, see also description of argument <code>main</code> in <code>plot.default</code> . |
| <code>sub</code> | logical: is a sub-title to be used? or just as argument <code>sub</code> in <code>plot.default</code> . |
| <code>tmar</code> | top margin – useful for non-standard main title sizes |
| <code>bmar</code> | bottom margin – useful for non-standard sub title sizes |
| <code>cex.inner</code> | magnification to be used for inner titles relative to the current setting of <code>cex</code> ; as in <code>par</code> |
| <code>col.inner</code> | character or integer code; color for the inner title |
| <code>with.automatic.grid</code> | logical; should a grid be plotted alongside with the ticks of the axes, automatically? If TRUE a respective call to <code>grid</code> in argument <code>panel.first</code> is ignored. |
| <code>with.legend</code> | logical; shall a legend be plotted? |
| <code>legend</code> | either NULL or a list of length (number of plotted panels) of items which can be used as argument <code>legend</code> in command <code>legend</code> . |
| <code>legend.location</code> | a valid argument <code>x</code> for <code>legend</code> — the place where to put the legend on the last issued plot |
| <code>legend.bg</code> | background color for the legend |
| <code>legend.cex</code> | magnification factor for the legend |
| <code>withMBR</code> | logical; shall horizontal lines with min and max of MBRE be plotted for comparison? |
| <code>MBRB</code> | matrix (or NA); coerced by usual recycling rules to a matrix with as many rows as plotted panels and with first column the lower bounds and the second column the upper bounds for the respective coordinates (ideally given by the MBR-IC). |
| <code>MBR.fac</code> | positive factor; scales the bounds given by argument <code>MBRB</code> |
| <code>col.MBR</code> | color for the MBR lines; as usual <code>col</code> -argument; |
| <code>lty.MBR</code> | line type for the MBR lines; as usual <code>lty</code> -argument; |
| <code>lwd.MBR</code> | line width for the MBR lines; as usual <code>lwd</code> -argument; |

| | |
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| <code>x.vec</code> | a numeric vector of grid points to evaluate the influence curve; by default, <code>x.vec</code> is NULL; then the grid is produced automatically according to the distribution of the IC. <code>x.vec</code> can be useful for usage with a rescaling of the x-axis to avoid that the evaluation points be selected too unevenly (i.e. on an equally spaced grid in the original scale, but then, after rescaling non-equally). The grid has to be specified in original scale; i.e.; when used with rescaling, it should be chosen non-equally spaced. |
| <code>scaleX</code> | logical; shall X-axis be rescaled (by default according to the cdf of the underlying distribution)? |
| <code>scaleY</code> | logical; shall Y-axis be rescaled (by default according to a probit scale)? |
| <code>scaleX.fct</code> | an isotone, vectorized function mapping the domain of the IC to [0,1]; if <code>scaleX</code> is TRUE and <code>scaleX.fct</code> is missing, the cdf of the underlying observation distribution. |
| <code>scaleX.inv</code> | the inverse function to <code>scale.fct</code> , i.e., an isotone, vectorized function mapping [0,1] to the domain of the IC such that for any <code>x</code> in the domain, <code>scaleX.inv(scaleX.fct(x))=x</code> ; if <code>scaleX</code> is TRUE and <code>scaleX.inv</code> is missing, the quantile function of the underlying observation distribution. |
| <code>scaleY.fct</code> | an isotone, vectorized function mapping for each coordinate the range of the respective coordinate of the IC to [0,1]; defaulting to the cdf of $\mathcal{N}(0, 1)$; can also be a list of functions with one list element for each of the panels to be plot. |
| <code>scaleY.inv</code> | an isotone, vectorized function mapping for each coordinate the range [0,1] into the range of the respective coordinate of the IC; defaulting to the quantile function of $\mathcal{N}(0, 1)$; can also be a list of functions with one list element for each of the panels to be plot. |
| <code>scaleN</code> | integer; defaults to 9; on rescaled axes, number of x and y ticks if drawn automatically; |
| <code>x.ticks</code> | numeric; defaults to NULL; (then ticks are chosen automatically); if non-NULL, user-given x-ticks (on original scale); |
| <code>y.ticks</code> | numeric; defaults to NULL; (then ticks are chosen automatically); if non-NULL, user-given y-ticks (on original scale); can be a list with one (numeric or NULL) item per panel |
| <code>mfColRow</code> | shall default partition in panels be used — defaults to TRUE |
| <code>to.draw.arg</code> | Either NULL (default; everything is plotted) or a vector of either integers (the indices of the subplots to be drawn) or characters — the names of the subplots to be drawn: these names are to be chosen either among the row names of the trafo matrix <code>rownames(trafo(eval(obj1@Call\$L2Fam)@param))</code> or if the last expression is NULL a vector " <code>dim<dimnr></code> ", <code>dimnr</code> running through the number of rows of the trafo matrix. |
| <code>withSubst</code> | logical; if TRUE (default) pattern substitution for titles and labels is used; otherwise no substitution is used. |
| <code>col.pts</code> | color of the points of the data argument plotted; can be a vector or a matrix. More specifically, if argument <code>attr.pre</code> is TRUE, it is recycled to fill a matrix of dimension <code>n</code> by <code>nIC</code> (<code>n</code> the number of observations prior to any selection and <code>nIC</code> the number of ICs plotted) where filling is done in order column first. The columns are used for possibly different colors for the different ICs from |

arguments `obj1`, `obj2`, and, possibly `obj3` and `obj4`. The selection done via `which.lbs` and `which.Order` is then done afterwards and on this matrix; in this case, argument `col.npts` is ignored. If `attr.pre` is `FALSE`, `col.pts` is recycled to fill a matrix of dimension `n.s` by `nIC` where `n.s` is the number of observations selected for labelling and refers to the index ordering after the selection. Then argument `col.npts` determines the colors of the shown but non-labelled observations as given in argument `which.nonlbs`.

| | |
|---------------------------|---|
| <code>pch.pts</code> | symbol of the points of the data argument plotted (may be a vector of length <code>nIC</code> or a matrix, see <code>col.pts</code>). |
| <code>cex.pts</code> | size of the points of the data argument plotted (may be a vector of length <code>nIC</code> or a matrix, see <code>col.pts</code>). |
| <code>cex.pts.fun</code> | rescaling function for the size of the points to be plotted; either <code>NULL</code> (default), then $\log(1+\text{abs}(x))$ is used for each of the rescalings, or a function which is then used for each of the rescalings, or a list of functions; if it is a function or a list of functions, if necessary it is recycled to length <code>nIC * dim</code> where <code>dim</code> is the number of dimensions of the <code>pICs</code> to be plotted; in the index of this list, <code>nIC</code> is incremented first; then <code>dim</code> . |
| <code>col.npts</code> | color of the non-labelled points of the data argument plotted; (may be a vector of length <code>nIC</code> the number of plotted <code>pICs</code> , i.e., one value for each <code>pIC</code> in arguments <code>obj1</code> , <code>obj2</code> , and, if available, <code>obj3</code> and <code>obj4</code> , or it can be a matrix <code>nnlb <- sum(which.nonlbs)</code> by <code>nIC</code> , <code>nnlb</code> the number of non-labelled observations). |
| <code>pch.npts</code> | symbol of the non-labelled points of the data argument plotted (may be a vector of length <code>nIC</code> or a matrix, see <code>col.npts</code>). |
| <code>cex.npts</code> | size of the non-labelled points of the data argument plotted (may be a vector of length <code>nIC</code> or a matrix, see <code>col.npts</code>). |
| <code>cex.npts.fun</code> | rescaling function for the size of the non-labelled points to be plotted; either <code>NULL</code> (default), then $\log(1+\text{abs}(x))$ is used for each of the rescalings, or a function which is then used for each of the rescalings, or a list of functions; if it is a function or a list of functions, if necessary it is recycled to length <code>nIC * dim</code> where <code>dim</code> is the number of dimensions of the <code>pICs</code> to be plotted; in the index of this list, <code>nIC</code> is incremented first; then <code>dim</code> . |
| <code>lab.pts</code> | character or <code>NULL</code> ; labels to be plotted to the observations; can be a vector of length <code>n</code> , <code>n</code> the number of all observations prior to any selection with <code>which.lbs</code> , <code>which.Order</code> ; if <code>lab.pts</code> is <code>NULL</code> , observation indices are used. |
| <code>with.lab</code> | logical; shall labels be plotted to the observations? (May be a vector of length <code>nIC</code> , see <code>col.pts</code> – but not a matrix). |
| <code>cex.lbs</code> | size of the labels; can be vectorized to an array of <code>dim nlbs x nIC x npnl</code> where <code>npnl</code> is the number of plotted panels and <code>nlbs</code> the number of plotted labels; if it is a vector, it is recycled in order labels then plotted <code>ICs</code> then panels. |
| <code>col.lbs</code> | color of the labels; can be vectorized to a matrix of <code>dim nlbs x nIC</code> as <code>col.pts</code> . |
| <code>adj.lbs</code> | adjustment of the labels; can be vectorized to an array of <code>dim 2 x nIC x npnl</code> , <code>npnl</code> the number of plotted panels; if it is a vector, it is recycled in order <code>(x,y)</code> -coords then <code>ICs</code> then panels. |
| <code>lab.font</code> | font to be used for labels (may be a vector of length <code>nIC</code> , see <code>with.lab</code>). |

| | |
|---------------------------|---|
| <code>alpha.trsp</code> | alpha transparency to be added ex post to colors <code>col.pch</code> and <code>col.lbl</code> ; if one-dim and NA all colors are left unchanged. Otherwise, with usual recycling rules <code>alpha.trsp</code> gets shorted/prolongated to length the data-symbols to be plotted. Coordinates of this vector <code>alpha.trsp</code> with NA are left unchanged, while for the remaining ones, the alpha channel in rgb space is set to the respective coordinate value of <code>alpha.trsp</code> . The non-NA entries must be integers in [0,255] (0 invisible, 255 opaque). |
| <code>jitter.fac</code> | jittering factor used in case of a <code>DiscreteDistribution</code> for plotting points of the data argument in a jittered fashion (may be a vector of length 2, see <code>with.lab</code>). |
| <code>attr.pre</code> | logical; do graphical attributes for plotted data refer to indices prior (TRUE) or posterior to selection via arguments <code>which.lbs</code> , <code>which.Order</code> , <code>which.nonlbs</code> (FALSE)? |
| <code>which.lbs</code> | either an integer vector with the indices of the observations to be plotted into graph or NULL — then no observation is excluded. |
| <code>which.Order</code> | for each of the given ICs, we order the observations (descending) according to the norm given by the corresponding <code>normtype(object)</code> ; then <code>which.Order</code> either is an integer vector with the indices of the <i>ordered</i> observations (remaining after a possible reduction by argument <code>which.lbs</code>) to be plotted into graph or NULL — then no (further) observation is excluded. |
| <code>which.nonlbs</code> | indices of the observations which should be plotted but not labelled; either an integer vector with the indices of the observations to be plotted into graph or NULL — then all non-labelled observations are plotted. |
| <code>return.Order</code> | logical; if TRUE, a list of length maximally four with order vectors is returned — one for the ordering w.r.t. each of the given ICs; more specifically, the order of the (remaining) observations given by their original index is returned (remaining means: after a possible reduction by argument <code>which.lbs</code> , and ordering is according to the norm given by <code>normtype(object)</code>); otherwise we return <code>invisible()</code> as usual. |
| <code>...</code> | further arguments to be passed to <code>plot</code> |

Details

Any parameters of `plot.default` may be passed on to this particular plot method.

For main-, inner, and subtitles given as arguments `main`, `inner`, and `sub`, top and bottom margins are enlarged to 5 resp. 6 by default but may also be specified by `tmar` / `bmar` arguments. If `main` / `inner` / `sub` are logical then if the respective argument is FALSE nothing is done/plotted, but if it is TRUE, we use a default main title taking up the calling arguments in case of `main`, default inner titles taking up the class and (named) parameter slots of arguments in case of `inner`, and a "generated on <data>"-tag in case of `sub`. Of course, if `main` / `inner` / `sub` are character, this is used for the title; in case of `inner` it is then checked whether it has correct length. If argument `withSubst` is TRUE, in all title and axis label arguments, the following patterns are substituted:

"%C1", "%C2", ["%C3", ["%C4"]] class of argument `obj<i>`, `i=1,..4`

"%A1", "%A2", ["%A3", ["%A4"]] deparsed argument `obj<i>`, `i=1,..4`

"%D" time/date-string when the plot was generated

If argument `...` contains argument `ylim`, this may either be as in `plot.default` (i.e. a vector of length 2) or a vector of length $2 \times (\text{number of plotted dimensions})$; in the case of longer length, these are the values for `ylim` for the plotted dimensions of the IC, one pair for each dimension.

In addition, argument `...` may contain arguments `panel.first`, `panel.last`, i.e., hook expressions to be evaluated at the very beginning and at the very end of each panel (within the then valid coordinates). To be able to use these hooks for each panel individually, they may also be lists of expressions (of the same length as the number of panels and run through in the same order as the panels).

Value

An S3 object of class `c("plotInfo", "DiagnInfo")`, i.e., a list containing the information needed to produce the respective plot, which at a later stage could be used by different graphic engines (like, e.g. `ggplot`) to produce the plot in a different framework. A more detailed description will follow in a subsequent version.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[L2ParamFamily-class](#), [IC-class](#), [plot](#)

Examples

```
if(require(ROptEst)){
  N0 <- NormLocationScaleFamily(mean=0, sd=1)
  N0.Rob1 <- InfRobModel(center = N0, neighbor = ContNeighborhood(radius = 0.5))

  IC1 <- optIC(model = N0, risk = asCov())
  IC2 <- optIC(model = N0.Rob1, risk = asMSE())

  comparePlot(IC1, IC2)

  set.seed(12); data <- r(N0)(20)
  comparePlot(IC1, IC2, data=data, with.lab = TRUE,
             which.lbs = c(1:4, 15:20),
             which.Order = 1:6,
             return.Order = TRUE)

  ## don't test to reduce check time on CRAN

  ## selection of subpanels for plotting
```

```

par(mfrow=c(1,1))
comparePlot(IC1, IC2, mfColRow = FALSE, to.draw.arg=c("mean"),
            panel.first=grid(), ylim=c(-4,4), xlim=c(-6,6))
## matrix-valued ylim
comparePlot(IC1, IC2, panel.first=grid(), ylim=c(-4,4,0,4), xlim=c(-6,6))

x <- c(data,-12,10)
comparePlot(IC1, IC2, data=x, which.Order=10,
            panel.first=grid(), ylim=c(-4,4,0,4), xlim=c(-6,6))

Y <- Chisq(df=1) * DiscreteDistribution(c(-1,1))
comparePlot(IC1, IC2, data=x, which.Order=10,
            scaleX = TRUE, scaleX.fct=pnorm, scaleX.inv=qnorm,
            scaleY = TRUE, scaleY.fct=p(Y), scaleY.inv=q.l(Y),
            panel.first=grid(), ylim=c(-4,4,0,4), xlim=c(-6,6))
comparePlot(IC1, IC2, data=x, which.Order=10,
            scaleX = TRUE, scaleX.fct=pnorm, scaleX.inv=qnorm,
            scaleY = TRUE, scaleY.fct=p(Y), scaleY.inv=q.l(Y),
            x.ticks = c(-Inf, -10, -1,0,1,10,Inf),
            y.ticks = c(-Inf, -5, -1,0,1,5,Inf),
            panel.first=grid(), ylim=c(-4,4,0,4), xlim=c(-6,6))

## with use of trafo-matrix:
G <- GammaFamily(scale = 1, shape = 2)
## explicitly transforming to
## MASS parametrization:
mtrafo <- function(x){
  nms0 <- names(c(main(param(G)), nuisance(param(G))))
  nms <- c("shape","rate")
  fval0 <- c(x[2], 1/x[1])
  names(fval0) <- nms
  mat0 <- matrix( c(0, -1/x[1]^2, 1, 0), nrow = 2, ncol = 2,
                  dimnames = list(nms,nms0))
  list(fval = fval0, mat = mat0)}
G2 <- G
trafo(G2) <- mtrafo
G2
G2.Rob1 <- InfRobModel(center = G2, neighbor = ContNeighborhood(radius = 0.5))
system.time(IC1 <- optIC(model = G2, risk = asCov()))
system.time(IC2 <- optIC(model = G2.Rob1, risk = asMSE()))
system.time(IC2.i <- optIC(model = G2.Rob1, risk = asMSE(normtype=InfoNorm())))
system.time(IC2.s <- optIC(model = G2.Rob1, risk = asMSE(normtype=SelfNorm())))

comparePlot(IC1, IC2, IC2.i, IC2.s)

}

```

Description

Generates an object of class "ContIC"; i.e., an influence curves η of the form

$$\eta = (A\Lambda - a) \min(1, b/|A\Lambda - a|)$$

with clipping bound b , centering constant a and standardizing matrix A . Λ stands for the L2 derivative of the corresponding L2 differentiable parametric family which can be created via `CallL2Fam`.

Usage

```
ContIC(name, CallL2Fam = call("L2ParamFamily"),
       Curve = EuclRandVarList(RealRandVariable(Map = c(function(x){x}),
                                                Domain = Reals())),
       Risks, Infos, clip = Inf, cent = 0, stand = as.matrix(1),
       lowerCase = NULL, neighborRadius = 0, w = new("HampelWeight"),
       normtype = NormType(), biastype = symmetricBias(),
       modifyIC = NULL)
```

Arguments

| | |
|----------------|---|
| name | object of class "character". |
| CallL2Fam | object of class "call": creates an object of the underlying L2-differentiable parametric family. |
| Curve | object of class "EuclRandVarList" |
| Risks | object of class "list": list of risks; cf. RiskType-class . |
| Infos | matrix of characters with two columns named method and message: additional informations. |
| clip | positive real: clipping bound. |
| cent | real: centering constant |
| stand | matrix: standardizing matrix |
| w | HampelWeight: weight object |
| lowerCase | optional constant for lower case solution. |
| neighborRadius | radius of the corresponding (unconditional) contamination neighborhood. |
| biastype | BiasType: type of the bias |
| normtype | NormType: type of the norm |
| modifyIC | object of class "OptionalFunction": function of four arguments: (1) L2Fam an L2 parametric family (2) IC an optional influence curve, (3) withMakeIC a logical argument whether to enforce the IC side conditions by makeIC, and (4) ... for arguments to be passed to calls to E in makeIC. Returns an object of class "IC". This function is mainly used for internal computations! |

Value

Object of class "ContIC"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#), [ContIC](#), [HampIC-class](#)

Examples

```
IC1 <- ContIC()
plot(IC1)
```

ContIC-class

Influence curve of contamination type

Description

Class of (partial) influence curves of contamination type; i.e., influence curves η of the form

$$\eta = (A\Lambda - a) \min(1, b/|A\Lambda - a|)$$

with clipping bound b , centering constant a and standardizing matrix A . Λ stands for the L2 derivative of the corresponding L2 differentiable parametric family created via the call in the slot `CallL2Fam`.

Objects from the Class

Objects can be created by calls of the form `new("ContIC", ...)`. More frequently they are created via the generating function `ContIC`, respectively via the method `generateIC`.

Slots

`CallL2Fam`: object of class "call": creates an object of the underlying L2-differentiable parametric family.

`name`: object of class "character"

`Curve`: object of class "EuclRandVarList"

`modifyIC` object of class "OptionalFunction": function of four arguments: (1) `L2Fam` an L2 parametric family (2) `IC` an optional influence curve, (3) `withMakeIC` a logical argument whether to enforce the IC side conditions by `makeIC`, and (4) ... for arguments to be passed to calls to `E` in `makeIC`. Returns an object of class "IC". This function is mainly used for internal computations!

Risks: object of class "list": list of risks; cf. [RiskType-class](#).
Infos: object of class "matrix" with two columns named method and message: additional informations.
clip: object of class "numeric": clipping bound.
cent: object of class "numeric": centering constant.
stand: object of class "matrix": standardizing matrix.
weight: object of class "HampelWeight": weight function
biastype: object of class "BiasType": bias type (symmetric/onsided/asymmetric)
normtype: object of class "NormType": norm type (Euclidean, information/self-standardized)
lowerCase: object of class "OptionalNumeric": optional constant for lower case solution.
neighborRadius: object of class "numeric": radius of the corresponding (unconditional) contamination neighborhood.

Extends

Class "HampIC", directly.
 Class "IC", by class "HampIC".
 Class "InfluenceCurve", by class "IC".

Methods

CallL2Fam<- signature(object = "ContIC"): replacement function for slot CallL2Fam.
cent signature(object = "ContIC"): accessor function for slot cent.
cent<- signature(object = "ContIC"): replacement function for slot cent.
clip signature(x1 = "ContIC"): accessor function for slot clip.
clip<- signature(object = "ContIC"): replacement function for slot clip.
stand<- signature(object = "ContIC"): replacement function for slot stand.
lowerCase<- signature(object = "ContIC"): replacement function for slot lowerCase.
neighbor signature(object = "ContIC"): generates an object of class "ContNeighborhood" with radius given in slot neighborRadius.
generateIC signature(neighbor = "ContNeighborhood", L2Fam = "L2ParamFamily"): generate an object of class "ContIC". Rarely called directly.
show signature(object = "ContIC")

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#), [ContIC](#) [HampIC-class](#)

Examples

```
IC1 <- new("ContIC")
plot(IC1)
```

ContNeighborhood

Generating function for ContNeighborhood-class

Description

Generates an object of class "ContNeighborhood".

Usage

```
ContNeighborhood(radius = 0)
```

Arguments

radius non-negative real: neighborhood radius.

Value

Object of class "ContNeighborhood"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[ContNeighborhood-class](#)

Examples

```
ContNeighborhood()

## The function is currently defined as
function(radius = 0){
  new("ContNeighborhood", radius = radius)
}
```

ContNeighborhood-class

Contamination Neighborhood

Description

Class of (unconditional) contamination neighborhoods.

Objects from the Class

Objects can be created by calls of the form `new("ContNeighborhood", ...)`. More frequently they are created via the generating function `ContNeighborhood`.

Slots

type Object of class "character": "(uncond.) convex contamination neighborhood".

radius Object of class "numeric": neighborhood radius.

Extends

Class "UncondNeighborhood", directly.

Class "Neighborhood", by class "UncondNeighborhood".

Methods

No methods defined with class "ContNeighborhood" in the signature.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[ContNeighborhood](#), [UncondNeighborhood-class](#)

Examples

```
new("ContNeighborhood")
```

cutoff *Generating function(s) for class 'cutoff'*

Description

Generating function(s) for class cutoff.

Usage

```
cutoff(name = "empirical", body.fct0,
       cutoff.quantile = 0.95,
       norm = NormType(), QF, nsim = 100000)
cutoff.sememp(cutoff.quantile = 0.95)
cutoff.chisq(cutoff.quantile = 0.95)
cutoff.quant(qfct)
```

Arguments

| | |
|-----------------|--|
| name | argument for name slot of cutoff object |
| body.fct0 | a call generated by code wrapped to substitute resp. quote; the body of the fct slot of the cutoff object |
| cutoff.quantile | numeric (in [0,1]); the corresponding slot value for the cutoff object |
| norm | an object of class NormType – the norm/distance by which to produce the cutoff - value. |
| nsim | integer: the sample size used for determining the quantiles of $(x^T Q x)^{1/2}$ for x multivariate standard normal and Q a corresponding quadratic form |
| QF | a quadratic (positive semidefinite, symmetric) matrix used as quadratic form |
| qfct | a (nominal) quantile function |

Details

cutoff generates a valid object of class "cutoff". As function slot fct may only have a formal argument data, the other arguments to determine the cutoff value, i.e. norm, QF, nsim, cutoff.quantile, nsim have to enter the scope of this function by lexical scoping; now cutoff.quantile, norm, QF are to be taken from the calling environment (not from the defining one), so we have delay evaluation of the function body, which is why we assume it to be given wrapped into substitute resp. quote. body.fct0 is by default (i.e. if argument body.fct0 is missing) set to quote(quantile(slot(norm, "fct")(data), cutoff.quantile)), internally, i.e.; to an empirical quantile of the corresponding norms.

cutoff.sememp() is a helper function generating the theoretical (asymptotic) quantile of (the square root of) a corresponding quadratic form, assuming multivariate normality; to determine this quantile nsim simulations are used.

`cutoff.chisq()` is a helper function generating the theoretical (asymptotic) quantile of (the square root of) a (self-standardized) quadratic form, assuming multivariate normality; i.e.; a corresponding quantile of a Chi-Square distribution.

`cutoff.quant()` is a helper function generating the theoretical quantile corresponding to the quantile function `qfct`; if `qfct` is missing, it searches the caller environment for an object `..ICloc`, and if this exists it uses the respective model quantile function; the fallback is `qnorm`. At any rate, if there is an object `..trf` in the scope of the function it is used to transfer the quantile (after its evaluation).

Value

Object of class "cutoff".

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

See Also

[cutoff-class](#), [ddPlot](#)

Examples

```
cutoff()
cutoff.sememp()
cutoff.chisq()
```

cutoff-class

Cutoff class for distance-distance plots

Description

Class of methods to determine cutoff point for distance-distance plots; used to derive other cutoff methods later by method dispatch.

Objects from the Class

Objects could in principle be created by calls of the form `new("cutoff", ...)`. More frequently they are created via the generating function `cutoff`, respectively via the helper functions `cutoff.sememp` and `cutoff.chisq`.

Slots

name: object of class "character"; defaults to "empirical" in prototype;

fct: an object of of class "function"; for this class layer, this function must only have one argument `data` (which may but need not be used to determine the cutoff point empirically); in derived classes this restriction could be dropped, if corresponding special methods for `ddPlot` are derived. Defaults to `function(data) quantile(data)`.

cutoff.quantile: Object of class "numeric": a probability (in [0,1]) to determine the respective quantile (empirical or theoretical) to plot the cutoff line; defaults to 0.95 in prototype;

Methods

cutoff.quantile signature(object = "cutoff"): accessor function for slot cutoff.quantile.

cutoff.quantile<- signature(object = "cutoff"): replacement function for slot cutoff.quantile.

fct signature(object = "cutoff"): accessor function for slot fct.

name signature(object = "cutoff"): accessor function for slot name.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

See Also

[ddPlot](#), [outlyingPlotIC](#) [cutoff](#)

Examples

```
cutoff()
```

ddPlot-methods

Methods for Function ddPlot in Package 'RobAStBase'

Description

ddPlot-methods

Usage

```
ddPlot(data, dist.x, dist.y, cutoff.x, cutoff.y, ...)
## S4 method for signature 'matrix'
ddPlot(data, dist.x = NormType(), dist.y = NormType(),
       cutoff.x, cutoff.y, ...,
       cutoff.quantile.x = 0.95, cutoff.quantile.y = cutoff.quantile.x,
       transform.x, transform.y = transform.x,
       id.n, cex.pts = 1, lab.pts, jitter.pts = 0, alpha.trsp = NA, adj = 0, cex.idn,
       col.idn, lty.cutoff, lwd.cutoff, col.cutoff, text.abline = TRUE,
       text.abline.x = NULL, text.abline.y = NULL,
       cex.abline = par("cex"), col.abline = col.cutoff,
       font.abline = par("font"), adj.abline = c(0,0),
       text.abline.x.x = NULL, text.abline.x.y = NULL,
       text.abline.y.x = NULL, text.abline.y.y = NULL,
       text.abline.x.fmt.cx = "%7.2f", text.abline.x.fmt.qx = "%4.2f%",
       text.abline.y.fmt.cy = "%7.2f", text.abline.y.fmt.qy = "%4.2f%",
       jitter.fac, jitter.tol = .Machine$double.eps, doplot = TRUE)
```

```

## S4 method for signature 'numeric'
ddPlot(data, dist.x = NormType(), dist.y = NormType(),
        cutoff.x, cutoff.y, ...,
        cutoff.quantile.x = 0.95, cutoff.quantile.y = cutoff.quantile.x,
        transform.x, transform.y = transform.x,
        id.n, cex.pts = 1, lab.pts, jitter.pts = 0, alpha.trsp = NA, adj = 0, cex.idn,
        col.idn, lty.cutoff, lwd.cutoff, col.cutoff, text.abline = TRUE,
        text.abline.x = NULL, text.abline.y = NULL,
        cex.abline = par("cex"), col.abline = col.cutoff,
        font.abline = par("font"), adj.abline = c(0,0),
        text.abline.x.x = NULL, text.abline.x.y = NULL,
        text.abline.y.x = NULL, text.abline.y.y = NULL,
        text.abline.x.fmt.cx = "%7.2f", text.abline.x.fmt.qx = "%4.2f%",
        text.abline.y.fmt.cy = "%7.2f", text.abline.y.fmt.qy = "%4.2f%",
        jitter.fac, jitter.tol=.Machine$double.eps, doplot = TRUE)
## S4 method for signature 'data.frame'
ddPlot(data, dist.x = NormType(), dist.y = NormType(),
        cutoff.x, cutoff.y, ...,
        cutoff.quantile.x = 0.95, cutoff.quantile.y = cutoff.quantile.x,
        transform.x, transform.y = transform.x,
        id.n, cex.pts = 1, lab.pts, jitter.pts = 0, alpha.trsp = NA, adj = 0, cex.idn,
        col.idn, lty.cutoff, lwd.cutoff, col.cutoff, text.abline = TRUE,
        text.abline.x = NULL, text.abline.y = NULL,
        cex.abline = par("cex"), col.abline = col.cutoff,
        font.abline = par("font"), adj.abline = c(0,0),
        text.abline.x.x = NULL, text.abline.x.y = NULL,
        text.abline.y.x = NULL, text.abline.y.y = NULL,
        text.abline.x.fmt.cx = "%7.2f", text.abline.x.fmt.qx = "%4.2f%",
        text.abline.y.fmt.cy = "%7.2f", text.abline.y.fmt.qy = "%4.2f%",
        jitter.fac, jitter.tol=.Machine$double.eps, doplot = TRUE)

```

Arguments

| | |
|--------------------------------|---|
| <code>data</code> | data coercable to matrix; the data at which to produce the <code>ddPlot</code> . |
| <code>...</code> | further arguments to be passed to <code>plot.default</code> , <code>text</code> , and <code>abline</code> |
| <code>dist.x</code> | object of class <code>NormType</code> ; the distance for the x axis. |
| <code>dist.y</code> | object of class <code>NormType</code> ; the distance for the y axis. |
| <code>cutoff.x</code> | object of class <code>cutoff</code> ; the cutoff information for the x axis (the vertical line discriminating 'good' and 'bad' points). |
| <code>cutoff.y</code> | object of class <code>cutoff</code> ; the cutoff information for the y axis (the horizontal line discriminating 'good' and 'bad' points). |
| <code>cutoff.quantile.x</code> | numeric; the cutoff quantile for the x axis. |
| <code>cutoff.quantile.y</code> | numeric; the cutoff quantile for the y axis. |
| <code>transform.x</code> | function; a transformation to be performed before determining the distances of the x axis. |

| | |
|------------------------------|---|
| <code>transform.y</code> | function; a transformation to be performed before determining the distances of the y axis. |
| <code>id.n</code> | a set of indices (or a corresponding logical vector); to select a subset of the data in argument data. |
| <code>cex.pts</code> | the corresponding <code>cex</code> argument for plotted points. |
| <code>lab.pts</code> | a vector of labels for the (unsubsetting) data. |
| <code>jitter.pts</code> | the corresponding <code>jitter</code> argument for plotted points; may be a vector of length 2 – for separate factors for x- and y-coordinate. |
| <code>alpha.trsp</code> | alpha transparency to be added ex post to colors <code>col.pch</code> and <code>col.lbl</code> ; if one-dim and NA all colors are left unchanged. Otherwise, with usual recycling rules <code>alpha.trsp</code> gets shorted/prolongated to length the data-symbols to be plotted. Coordinates of this vector <code>alpha.trsp</code> with NA are left unchanged, while for the remaining ones, the alpha channel in rgb space is set to the respective coordinate value of <code>alpha.trsp</code> . The non-NA entries must be integers in [0,255] (0 invisible, 255 opaque). |
| <code>adj</code> | the corresponding argument for <code>text</code> for labelling the outliers. |
| <code>cex.idn</code> | the corresponding <code>cex</code> argument for <code>text</code> for labelling the outliers. |
| <code>col.idn</code> | the corresponding <code>col</code> argument for <code>text</code> for labelling the outliers. |
| <code>lty.cutoff</code> | the corresponding <code>lty</code> argument for <code>abline</code> for drawing the cutoff lines; either one <code>lty</code> -value (one value or vector) or a list of length 2 of <code>lty</code> -values. |
| <code>lwd.cutoff</code> | (vector cast to length 2): the corresponding <code>lwd</code> argument for <code>abline</code> for drawing the cutoff lines. |
| <code>col.cutoff</code> | (vector cast to length 2): the corresponding <code>col</code> argument for <code>abline</code> for drawing the cutoff lines. |
| <code>text.abline</code> | vector of logicals (cast to length 2): shall text be added to cutoff lines. |
| <code>text.abline.x</code> | text to be added to cutoff lines in x direction; if NULL (default) we use “[pp] %-cutoff = [ff]” where [pp] is the percentage up to 2 digits and [ff] is the cutoff value up to 2 digits. |
| <code>text.abline.y</code> | text to be added to cutoff lines in y direction; if NULL (default) we use “[pp] %-cutoff = [ff]” where [pp] is the percentage up to 2 digits and [ff] is the cutoff value up to 2 digits. |
| <code>cex.abline</code> | vector of numerics (cast to length 2): <code>cex</code> -value for added cutoff text. |
| <code>col.abline</code> | vector of length 2: color for added cutoff text. |
| <code>font.abline</code> | vector of length 2: font for added cutoff text. |
| <code>adj.abline</code> | cast to 2 x 2 matrix (by recycling rules): adjustment values for added cutoff text. |
| <code>text.abline.x.y</code> | y-coordinate of text to be added to cutoff lines in x direction; if NULL (default) set to mid of <code>mean(par("usr")[c(3, 4)])</code> . |
| <code>text.abline.y.x</code> | x-coordinate of text to be added to cutoff lines in y direction; if NULL (default) set to mid of <code>mean(par("usr")[c(1, 2)])</code> . |

| | |
|-----------------------------------|---|
| <code>text.abline.x.x</code> | x-coordinate of text to be added to cutoff lines in x direction; if NULL (default) set to 1.05 times the cutoff value. |
| <code>text.abline.y.y</code> | y-coordinate of text to be added to cutoff lines in y direction; if NULL (default) set to 1.05 times the cutoff value. |
| <code>text.abline.x.fmt.cx</code> | format string (see gettextf) to format the cutoff value in label in x direction. |
| <code>text.abline.x.fmt.qx</code> | format string to format cutoff probability in label in x direction. |
| <code>text.abline.y.fmt.cy</code> | format string to format the cutoff value in label in y direction. |
| <code>text.abline.y.fmt.qy</code> | format string to format cutoff probability in label in y direction. |
| <code>jitter.fac</code> | factor for jittering, see jitter ; |
| <code>jitter.tol</code> | threshold for jittering: if distance between points is smaller than <code>jitter.tol</code> , points are considered replicates. |
| <code>doplot</code> | logical; shall a plot be produced? if FALSE only the return values are produced. |

Details

The `matrix`-method calls `.ddPlot.MatNtNtCoCo`, the `numeric`- and `data.frame`-methods coerce argument `data` to `matrix` — the `numeric`-method by a call to `matrix(data, nrow=1)`, in the `data.frame`-methods by a call to `t(as.matrix(data))`.

In arguments `text.abline.x` and `text.abline.y` the following patterns are substituted:

```
"%qx" cutoff-quantile in x-direction
"%qy" cutoff-quantile in y-direction
"%cx" cutoff-value in x-direction
"%cy" cutoff-value in y-direction
```

Value

If argument `doplot` is FALSE: A list (returned as `invisible()`) with items

| | |
|-------------------------|--|
| <code>id.x</code> | the indices of (possibly transformed) data (within subset <code>id.n</code>) beyond the x-cutoff |
| <code>id.y</code> | the indices of (possibly transformed) data (within subset <code>id.n</code>) beyond the y-cutoff |
| <code>id.xy</code> | the indices of (possibly transformed) data (within subset <code>id.n</code>) beyond the x-cutoff and the y-cutoff |
| <code>qtx</code> | the quantiles of the distances of the (possibly transformed) data in x direction |
| <code>qty</code> | the quantiles of the distances of the (possibly transformed) data in y direction |
| <code>cutoff.x.v</code> | the cutoff value in x direction |
| <code>cutoff.y.v</code> | the cutoff value in y direction |

If argument `doplot` is TRUE: An S3 object of class `c("plotInfo", "DiagnInfo")`, i.e., a list containing the information needed to produce the respective plot, which at a later stage could be used by different graphic engines (like, e.g. `ggplot`) to produce the plot in a different framework. A more detailed description will follow in a subsequent version. One item is `retV` which is the return value in case `doplot` is FALSE.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

Examples

```
MX <- matrix(rnorm(1500),nrow=6)
QM <- matrix(rnorm(36),nrow=6); QM <- QM %*% t(QM)
ddPlot(data=MX, dist.y=QFNorm(QuadF=PosSemDefSymmMatrix(QM)))
```

evalIC

Generic function for evaluating ICs

Description

Generic function for evaluating ICs.

Usage

```
evalIC(IC, x)
```

Arguments

| | |
|----|--------------------------|
| IC | object of class "IC" |
| x | numeric vector or matrix |

Details

The list of random variables contained in the slot `Curve` is evaluated at `x`.

Value

In case `x` is numeric a vector and in case `x` is matrix a matrix is returned.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also[IC-class](#)

`FixRobModel`*Generating function for FixRobModel-class*

Description

Generates an object of class "FixRobModel".

Usage

```
FixRobModel(center = ParamFamily(modifyParam =  
  function(theta) Norm(mean = theta)), neighbor = ContNeighborhood())
```

Arguments

| | |
|-----------------------|--------------------------------------|
| <code>center</code> | object of class "ProbFamily" |
| <code>neighbor</code> | object of class "UncondNeighborhood" |

Value

Object of class "FixRobModel"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also[FixRobModel-class](#)**Examples**

```
(M1 <- FixRobModel())  
  
## The function is currently defined as  
function(center = ParamFamily(), neighbor = ContNeighborhood()){  
  new("FixRobModel", center = center, neighbor = neighbor)  
}
```

FixRobModel-class *Robust model with fixed (unconditional) neighborhood*

Description

Class of robust models with fixed (unconditional) neighborhoods.

Objects from the Class

Objects can be created by calls of the form `new("FixRobModel", ...)`. More frequently they are created via the generating function `FixRobModel`.

Slots

`center` Object of class "ProbFamily".

`neighbor` Object of class "UncondNeighborhood".

Extends

Class "RobModel", directly.

Methods

neighbor<- signature(object = "FixRobModel"): replacement function for slot neighbor<-

show signature(object = "FixRobModel")

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[ProbFamily-class](#), [UncondNeighborhood-class](#), [FixRobModel](#)

Examples

```
new("FixRobModel")
```

| | |
|------------|--|
| generateIC | <i>Generic function for the generation of influence curves</i> |
|------------|--|

Description

This function is rarely called directly. It is used by other functions to create objects of class "IC".

Usage

```
generateIC(neighbor, L2Fam, ...)
```

Arguments

| | |
|----------|---|
| neighbor | Object of class "Neighborhood". |
| L2Fam | L2-differentiable family of probability measures. |
| ... | additional parameters |

Value

Object of class "IC"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#), [ContIC-class](#), [TotalVarIC-class](#)

generateIC.fct-methods

Generic Function for making ICs consistent at a possibly different model

Description

Generic function for providing centering and Fisher consistency of ICs.

Usage

```
generateIC.fct(neighbor, L2Fam, ...)
```

Arguments

| | |
|----------|---|
| neighbor | object of class "UncondNeighborhood" |
| L2Fam | L2-differentiable family of probability measures; may be missing. |
| ... | additional parameters |

Value

An IC at the model.

Methods

generateIC.fct signature(IC = "UncondNeighborhood", L2Fam = "L2ParamFamily": ...)

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[L2ParamFamily-class](#), [IC-class](#)

| | |
|-----------|--|
| getBiasIC | <i>Generic function for the computation of the asymptotic bias for an IC</i> |
|-----------|--|

Description

Generic function for the computation of the asymptotic bias for an IC.

Usage

```
getBiasIC(IC, neighbor, ...)

## S4 method for signature 'IC,UncondNeighborhood'
getBiasIC(IC, neighbor, L2Fam,
          biastype = symmetricBias(), normtype = NormType(),
          tol = .Machine$double.eps^0.25, numbeval = 1e5, withCheck = TRUE, ...)
```

Arguments

| | |
|-----------|---|
| IC | object of class "InfluenceCurve" |
| neighbor | object of class "Neighborhood". |
| L2Fam | object of class "L2ParamFamily". |
| biastype | object of class "BiasType" |
| normtype | object of class "NormType" |
| tol | the desired accuracy (convergence tolerance). |
| numbeval | number of evaluation points. |
| withCheck | logical: should a call to checkIC be done to check accuracy (defaults to TRUE). |
| ... | additional parameters to be passed to expectation E |

Value

The bias of the IC is computed.

Methods

IC = "IC", neighbor = "UncondNeighborhood" determines the as. bias by random evaluation of the IC; this random evaluation is done by the internal S4-method `.evalBiasIC`; this latter dispatches according to the signature `IC, neighbor, biastype`. For signature `IC="IC", neighbor = "ContNeighborhood", biastype = "BiasType"`, also an argument `normtype` is used to be able to use self- or information standardizing norms; besides this the signatures `IC="IC", neighbor = "TotalVarNeighborhood", biastype = "BiasType"`, `IC="IC", neighbor = "ContNeighborhood", biastype = "onesidedBias"`, and `IC="IC", neighbor = "ContNeighborhood", biastype = "asymmetricBias"` are implemented.

Note

This generic function is still under construction.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

- Huber, P.J. (1968) Robust Confidence Limits. *Z. Wahrscheinlichkeitstheor. Verw. Geb.* **10**:269–278.
- Rieder, H. (1980) Estimates derived from robust tests. *Ann. Stats.* **8**: 106–115.
- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.
- Ruckdeschel, P. and Kohl, M. (2005) Computation of the Finite Sample Bias of M-estimators on Neighborhoods.

See Also

[getRiskIC-methods](#), [InfRobModel-class](#)

getBoundedIC

getBoundedIC

Description

Generates a bounded influence curve.

Usage

```
getBoundedIC(L2Fam, D=trafo(L2Fam@param), ..., diagnostic = FALSE)
```

Arguments

| | |
|------------|--|
| L2Fam | object of class "L2ParamFamily" |
| D | matrix with as many columns as length(L2Fam@param) |
| ... | further arguments to be passed to E |
| diagnostic | logical; if TRUE, the return value obtains an attribute "diagnostic" with diagnostic information on the integration. |

Value

(a bounded) pIC (to matrix D) given as object of class "EuclRandVariable"

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

 getFiRisk

Generic Function for Computation of Finite-Sample Risks

Description

Generic function for the computation of finite-sample risks. This function is rarely called directly. It is used by other functions.

Usage

```
getFiRisk(risk, Distr, neighbor, ...)

## S4 method for signature 'fiUn0vShoot, Norm, ContNeighborhood'
getFiRisk(risk, Distr,
          neighbor, clip, stand, sampleSize, Algo, cont)

## S4 method for signature 'fiUn0vShoot, Norm, TotalVarNeighborhood'
getFiRisk(risk, Distr,
          neighbor, clip, stand, sampleSize, Algo, cont)
```

Arguments

| | |
|------------|---------------------------------|
| risk | object of class "RiskType". |
| Distr | object of class "Distribution". |
| neighbor | object of class "Neighborhood". |
| ... | additional parameters. |
| clip | positive real: clipping bound |
| stand | standardizing constant/matrix. |
| sampleSize | integer: sample size. |
| Algo | "A" or "B". |
| cont | "left" or "right". |

Details

The computation of the finite-sample under-/overshoot risk is based on FFT. For more details we refer to Section 11.3 of Kohl (2005).

Value

The finite-sample risk is computed.

Methods

risk = "fiUnOvShoot", Distr = "Norm", neighbor = "ContNeighborhood" computes finite-sample under-/overshoot risk in methods for function getFixRobIC.

risk = "fiUnOvShoot", Distr = "Norm", neighbor = "TotalVarNeighborhood" computes finite-sample under-/overshoot risk in methods for function getFixRobIC.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Huber, P.J. (1968) Robust Confidence Limits. *Z. Wahrscheinlichkeitstheor. Verw. Geb.* **10**:269–278.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

Ruckdeschel, P. and Kohl, M. (2005) Computation of the Finite Sample Risk of M-estimators on Neighborhoods.

See Also

[fiRisk-class](#)

getRiskFctBV-methods *Methods for Function getRiskFctBV in Package ‘RobAStBase’*

Description

getRiskFctBV for a given object of S4 class asGRisk returns a function in bias and variance to compute the asymptotic risk.

Methods

getRiskFctBV signature(risk = "asGRisk", biastype = "ANY"): returns an error that the respective method is not yet implemented.

getRiskFctBV signature(risk = "asMSE", biastype = "ANY"): returns a function with arguments bias and variance to compute the asymptotic MSE for a given ALE at a situation where it has bias bias (including the radius!) and variance variance.

getRiskFctBV signature(risk = "asSemivar", biastype = "onesidedBias"): returns a function with arguments bias and variance to compute the asymptotic semivariance error, i.e. $E[(S_n - \theta)_+^2]$ resp. $E[(S_n - \theta)_-^2]$, for a given ALE S_n at a situation where it has one-sided bias bias (including the radius!) and variance variance.

getRiskFctBV signature(risk = "asSemivar", biastype = "asymmetricBias"): returns a function with arguments bias and variance to compute the asymptotic semivariance error, i.e. $E[\nu_1(S_n - \theta)_+^2 + \nu_2(S_n - \theta)_-^2]$ for a given ALE S_n at a situation where it has one-sided bias bias (including the radius!) and variance variance.

Examples

```
myrisk <- asMSE()
getRiskFctBV(myrisk)
```

| | |
|-----------|---|
| getRiskIC | <i>Generic function for the computation of a risk for an IC</i> |
|-----------|---|

Description

Generic function for the computation of a risk for an IC.

Usage

```
getRiskIC(IC, risk, neighbor, L2Fam, ...)

## S4 method for signature 'IC,asCov,missing,missing'
getRiskIC(IC, risk,
  tol = .Machine$double.eps^0.25, withCheck = TRUE, ...)

## S4 method for signature 'IC,asCov,missing,L2ParamFamily'
getRiskIC(IC, risk, L2Fam,
  tol = .Machine$double.eps^0.25, withCheck = TRUE, ..., diagnostic = FALSE)

## S4 method for signature 'IC,trAsCov,missing,missing'
getRiskIC(IC, risk,
  tol = .Machine$double.eps^0.25, withCheck = TRUE, ...)

## S4 method for signature 'IC,trAsCov,missing,L2ParamFamily'
getRiskIC(IC, risk, L2Fam,
  tol = .Machine$double.eps^0.25, withCheck = TRUE, ...)

## S4 method for signature 'IC,asBias,UncondNeighborhood,missing'
getRiskIC(IC, risk, neighbor,
  tol = .Machine$double.eps^0.25, withCheck = TRUE, ...)

## S4 method for signature 'IC,asBias,UncondNeighborhood,L2ParamFamily'
getRiskIC(IC, risk, neighbor, L2Fam,
  tol = .Machine$double.eps^0.25, withCheck = TRUE, ...)

## S4 method for signature 'IC,asMSE,UncondNeighborhood,missing'
getRiskIC(IC, risk, neighbor,
```

```

    tol = .Machine$double.eps^0.25, withCheck = TRUE, ...)

## S4 method for signature 'IC,asMSE,UncondNeighborhood,L2ParamFamily'
getRiskIC(IC, risk, neighbor, L2Fam,
    tol = .Machine$double.eps^0.25, withCheck = TRUE, ...)

## S4 method for signature 'TotalVarIC,asUnOvShoot,UncondNeighborhood,missing'
getRiskIC(IC, risk, neighbor)

## S4 method for signature 'IC,fiUnOvShoot,ContNeighborhood,missing'
getRiskIC(IC, risk, neighbor, sampleSize, Algo = "A", cont = "left")

## S4 method for signature 'IC,fiUnOvShoot,TotalVarNeighborhood,missing'
getRiskIC(IC, risk, neighbor, sampleSize, Algo = "A", cont = "left")

```

Arguments

| | |
|------------|--|
| IC | object of class "InfluenceCurve" |
| risk | object of class "RiskType". |
| neighbor | object of class "Neighborhood". |
| L2Fam | object of class "L2ParamFamily". |
| ... | additional parameters (e.g. to be passed to E). |
| tol | the desired accuracy (convergence tolerance). |
| sampleSize | integer: sample size. |
| Algo | "A" or "B". |
| cont | "left" or "right". |
| withCheck | logical: should a call to checkIC be done to check accuracy (defaults to TRUE). |
| diagnostic | logical; if TRUE, the return value obtains an attribute "diagnostic" with diagnostic information on the integration. |

Details

To make sure that the results are valid, it is recommended to include an additional check of the IC properties of IC using checkIC.

Value

The risk of an IC is computed.

Methods

IC = "IC", risk = "asCov", neighbor = "missing", L2Fam = "missing" asymptotic covariance of IC.

IC = "IC", risk = "asCov", neighbor = "missing", L2Fam = "L2ParamFamily" asymptotic covariance of IC under L2Fam.

- IC = "IC", risk = "trAsCov", neighbor = "missing", L2Fam = "missing"** asymptotic covariance of IC.
- IC = "IC", risk = "trAsCov", neighbor = "missing", L2Fam = "L2ParamFamily"** asymptotic covariance of IC under L2Fam.
- IC = "IC", risk = "asBias", neighbor = "ContNeighborhood", L2Fam = "missing"** asymptotic bias of IC under convex contaminations; uses method [getBiasIC](#).
- IC = "IC", risk = "asBias", neighbor = "ContNeighborhood", L2Fam = "L2ParamFamily"** asymptotic bias of IC under convex contaminations and L2Fam; uses method [getBiasIC](#).
- IC = "IC", risk = "asBias", neighbor = "TotalVarNeighborhood", L2Fam = "missing"** asymptotic bias of IC in case of total variation neighborhoods; uses method [getBiasIC](#).
- IC = "IC", risk = "asBias", neighbor = "TotalVarNeighborhood", L2Fam = "L2ParamFamily"** asymptotic bias of IC under L2Fam in case of total variation neighborhoods; uses method [getBiasIC](#).
- IC = "IC", risk = "asMSE", neighbor = "UncondNeighborhood", L2Fam = "missing"** asymptotic mean square error of IC.
- IC = "IC", risk = "asMSE", neighbor = "UncondNeighborhood", L2Fam = "L2ParamFamily"** asymptotic mean square error of IC under L2Fam.
- IC = "TotalVarIC", risk = "asUnOvShoot", neighbor = "UncondNeighborhood", L2Fam = "missing"** asymptotic under-/overshoot risk of IC.
- IC = "IC", risk = "fiUnOvShoot", neighbor = "ContNeighborhood", L2Fam = "missing"** finite-sample under-/overshoot risk of IC.
- IC = "IC", risk = "fiUnOvShoot", neighbor = "TotalVarNeighborhood", L2Fam = "missing"** finite-sample under-/overshoot risk of IC.

Note

This generic function is still under construction.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>
 Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

- Huber, P.J. (1968) Robust Confidence Limits. *Z. Wahrscheinlichkeitstheor. Verw. Geb.* **10**:269–278.
- Rieder, H. (1980) Estimates derived from robust tests. *Ann. Stats.* **8**: 106–115.
- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.
- Ruckdeschel, P. and Kohl, M. (2005) Computation of the Finite Sample Risk of M-estimators on Neighborhoods.

See Also

[getRiskIC, InfRobModel-class](#)

getweight-methods *Generating weights*

Description

Generates weight functions of Hampel / BdSt type for different bias and norm types.

Usage

```
getweight(Weight, neighbor, biastype, ...)
minbiasweight(Weight, neighbor, biastype, ...)
## S4 method for signature 'HampelWeight,ContNeighborhood,BiasType'
getweight(Weight, neighbor, biastype, normW)
## S4 method for signature 'HampelWeight,ContNeighborhood,BiasType'
minbiasweight(Weight, neighbor, biastype, normW)
## S4 method for signature 'HampelWeight,ContNeighborhood,onesidedBias'
getweight(Weight, neighbor, biastype, ...)
## S4 method for signature 'HampelWeight,ContNeighborhood,onesidedBias'
minbiasweight(Weight, neighbor, biastype, ...)
## S4 method for signature 'HampelWeight,ContNeighborhood,asymmetricBias'
getweight(Weight, neighbor, biastype, ...)
## S4 method for signature 'HampelWeight,ContNeighborhood,asymmetricBias'
minbiasweight(Weight, neighbor, biastype, ...)
## S4 method for signature 'BdStWeight,TotalVarNeighborhood,BiasType'
getweight(Weight, neighbor, biastype, ...)
## S4 method for signature 'BdStWeight,TotalVarNeighborhood,BiasType'
minbiasweight(Weight, neighbor, biastype, ...)
```

Arguments

| | |
|----------|---|
| Weight | Object of class "RobWeight". |
| neighbor | Object of class "Neighborhood". |
| biastype | Object of class "BiasType". |
| normW | Object of class "NormType" — only for signature HampelWeight,ContNeighborhood,BiasType. |
| ... | possibly additional (unused) arguments — like in a call to the less specific methods. |

Details

These functions generate the weight function in slot `weight` in a corresp. object of class `RobWeight` and descendants.

Value

Object of class "HampelWeight" resp. "BdStWeight"

Methods

getweight signature(Weight = "HampelWeight", neighbor = "ContNeighborhood", biastype
with additional argument biastype of class "BiasType": produces weight slot...

minbiasweight signature(Weight = "HampelWeight", neighbor = "ContNeighborhood", bias
with additional argument biastype of class "BiasType": produces weight slot...

getweight signature(Weight = "HampelWeight", neighbor = "ContNeighborhood", biastype
produces weight slot...

minbiasweight signature(Weight = "HampelWeight", neighbor = "ContNeighborhood", bias
produces weight slot...

getweight signature(Weight = "HampelWeight", neighbor = "ContNeighborhood", biastype
produces weight slot...

minbiasweight signature(Weight = "HampelWeight", neighbor = "ContNeighborhood", bias
produces weight slot...

getweight signature(Weight = "BdStWeight", neighbor = "TotalVarNeighborhood", biasty
produces weight slot...

minbiasweight signature(Weight = "BdStWeight", neighbor = "TotalVarNeighborhood", b
produces weight slot...

Author(s)

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References

Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[BdStWeight-class](#), [HampelWeight-class](#), [IC-class](#)

HampelWeight-class *Robust Weight classes for weights of Hampel type*

Description

Classes for weights of Hampel type.

Objects from the Class

Objects can be created by calls of the form `new("HampelWeight", ...)`; to fill slot `weight`, you will use the generating functions `getweight` and `minbiasweight`.

Slots

`name` Object of class "character"; inherited from class `RobWeight`.
`weight` Object of class "function" — the weight function; inherited from class `RobWeight`.
`clip` Object of class "numeric" — clipping bound(s); inherited from class `BoundedWeight`.
`stand` Object of class "matrix" — standardization; inherited from class `BdStWeight`.
`cent` Object of class "numeric" — centering.

Extends

Class "RobWeight", via class "BoundedWeight". Class "BoundedWeight", via class "BdStWeight".
Class "BdStWeight", directly.

Methods

`cent` signature(object = "HampelWeight"): accessor function for slot `cent`.
`cent<-` signature(object = "HampelWeight", value = "matrix"): replacement function for slot `cent`. This replacement method should be used with great care, as the slot `weight` is not simultaneously updated and hence, this may lead to inconsistent objects.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.
Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[BdStWeight-class](#), [BoundedWeight-class](#), [RobWeight-class](#), [IC](#), [InfluenceCurve-class](#)

Examples

```
## prototype
new("HampelWeight")
```

HampIC-class

Influence curve of Hampel type

Description

Class of (partial) influence curves of Hampel (= total variation or contamination) type; used as common mother class for classes ContIC and TotalVarIC.

Objects from the Class

Objects can be created by calls of the form `new("HampIC", ...)`.

Slots

`callL2Fam` object of class "call": creates an object of the underlying L2-differentiable parametric family.

`name` object of class "character"

`Curve` object of class "EuclRandVarList"

`modifyIC` object of class "OptionalFunction": function of four arguments: (1) L2Fam an L2 parametric family (2) IC an optional influence curve, (3) withMakeIC a logical argument whether to enforce the IC side conditions by makeIC, and (4) ... for arguments to be passed to calls to E in makeIC. Returns an object of class "IC". This function is mainly used for internal computations!

`Risks` object of class "list": list of risks; cf. [RiskType-class](#).

`Infos` object of class "matrix" with two columns named method and message: additional informations.

`stand` object of class "matrix": standardizing matrix.

`weight` object of class "RobWeight": weight function

`biastype` object of class "BiasType": bias type (symmetric/onsided/asymmetric)

`normtype` object of class "NormType": norm type (Euclidean, information/self-standardized)

`lowerCase` object of class "OptionalNumeric": optional constant for lower case solution.

`neighborRadius` object of class "numeric": radius of the corresponding (unconditional) contamination neighborhood.

Extends

Class "IC", directly.
 Class "InfluenceCurve", by class "IC".

Methods

stand signature(object = "HampIC"): accessor function for slot stand.
weight signature(object = "HampIC"): accessor function for slot weight.
biastype signature(object = "HampIC"): accessor function for slot biastype.
normtype signature(object = "HampIC"): accessor function for slot normtype.
lowerCase signature(object = "HampIC"): accessor function for slot lowerCase.
neighborRadius signature(object = "HampIC"): accessor function for slot neighborRadius.
neighborRadius<- signature(object = "HampIC"): replacement function for slot neighborRadius.
neighborRadius signature(object = "ANY"): returns NULL.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Hampributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#)

Examples

```
IC1 <- new("HampIC")
plot(IC1)
```

 IC

Generating function for IC-class

Description

Generates an object of class "IC".

Usage

```
IC(name, Curve = EuclRandVarList(RealRandVariable(Map = list(function(x){x}),
                                                    Domain = Reals())),
    Risks, Infos, CallL2Fam = call("L2ParamFamily"), modifyIC = NULL)
```

Arguments

| | |
|-----------|---|
| name | Object of class "character"; the name of the IC. |
| CallL2Fam | object of class "call": creates an object of the underlying L2-differentiable parametric family. |
| Curve | object of class "EuclRandVarList". |
| Risks | object of class "list": list of risks; cf. RiskType-class . |
| Infos | matrix of characters with two columns named method and message: additional informations. |
| modifyIC | object of class "OptionalFunction": function of four arguments: (1) L2Fam an L2 parametric family (2) IC an optional influence curve, (3) withMakeIC a logical argument whether to enforce the IC side conditions by makeIC, and (4) . . . for arguments to be passed to calls to E in makeIC. Returns an object of class "IC". This function is mainly used for internal computations! |

Value

Object of class "IC"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.
- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#)

Examples

```
IC1 <- IC()
plot(IC1)
```

 IC-class

Influence curve

Description

Class of (partial) influence curves.

Objects from the Class

Objects can be created by calls of the form `new("IC", ...)`. More frequently they are created via the generating function `IC`.

Slots

`CallL2Fam` Object of class "call": creates an object of the underlying L2-differentiable parametric family.

`modifyIC` object of class "OptionalFunction": function of four arguments: (1) L2Fam an L2 parametric family (2) IC an optional influence curve, (3) `withMakeIC` a logical argument whether to enforce the IC side conditions by `makeIC`, and (4) ... for arguments to be passed to calls to `E` in `makeIC`. Returns an object of class "IC". This function is mainly used for internal computations!

`name` Object of class "character".

`Curve` Object of class "EuclRandVarList".

`Risks` Object of class "list": list of risks; cf. [RiskType-class](#).

`Infos` Object of class "matrix" with two columns named `method` and `message`: additional informations.

Extends

Class "InfluenceCurve", directly.

Methods

CallL2Fam signature(object = "IC"): accessor function for slot `CallL2Fam`.

CallL2Fam<- signature(object = "IC"): replacement function for slot `CallL2Fam`.

modifyIC signature(object = "IC"): accessor function for slot `modifyIC`.

checkIC signature(IC = "IC", L2Fam = "missing"): check centering and Fisher consistency of IC assuming the L2-differentiable parametric family which can be generated via the slot `CallL2Fam` of IC.

checkIC signature(IC = "IC", L2Fam = "L2ParamFamily"): check centering and Fisher consistency of IC assuming the L2-differentiable parametric family `L2Fam`.

evalIC signature(IC = "IC", x = "numeric"): evaluate IC at `x`.

evalIC signature(IC = "IC", x = "matrix"): evaluate IC at the rows of `x`.

infoPlot signature(object = "IC"): Plot absolute and relative information of IC.

plot signature(x = "IC", y = "missing")

show signature(object = "IC")

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve-class, IC](#)

Examples

```
IC1 <- new("IC")
plot(IC1)
```

InfluenceCurve *Generating function for InfluenceCurve-class*

Description

Generates an object of class "InfluenceCurve".

Usage

```
InfluenceCurve(name, Curve = EuclRandVarList(EuclRandVariable(Domain = Reals())),
               Risks, Infos)
```

Arguments

| | |
|-------|---|
| name | character string: name of the influence curve |
| Curve | object of class "EuclRandVarList" |
| Risks | list of risks |
| Infos | matrix of characters with two columns named method and message: additional informations |

Value

Object of class "InfluenceCurve"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.
- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve-class](#)

Examples

```
InfluenceCurve()

## The function is currently defined as
InfluenceCurve <- function(name, Curve = EuclRandVarList(EuclRandVariable(Domain = Reals())),
                          Risks, Infos){
  if(missing(name))
    name <- "influence curve"
  if(missing(Risks))
    Risks <- list()
  if(missing(Infos))
    Infos <- matrix(c(character(0),character(0)), ncol=2,
                    dimnames=list(character(0), c("method", "message")))

  return(new("InfluenceCurve", name = name, Curve = Curve,
            Risks = Risks, Infos = Infos))
}
```

InfluenceCurve-class *Influence curve*

Description

Class of influence curves (functions).

Objects from the Class

Objects can be created by calls of the form `new("InfluenceCurve", ...)`. More frequently they are created via the generating function `InfluenceCurve`.

Slots

`name` object of class "character"

`Curve` object of class "EuclRandVarList"

`Risks` object of class "list": list of risks; cf. [RiskType-class](#).

`Infos` object of class "matrix" with two columns named `method` and `message`: additional informations.

Methods

name signature(object = "InfluenceCurve"): accessor function for slot name.
name<- signature(object = "InfluenceCurve"): replacement function for slot name.
Curve signature(object = "InfluenceCurve"): accessor function for slot Curve.
Map signature(object = "InfluenceCurve"): accessor function for slot Map of slot Curve.
Domain signature(object = "InfluenceCurve"): accessor function for slot Domain of slot Curve.
Range signature(object = "InfluenceCurve"): accessor function for slot Range of slot Curve.
Infos signature(object = "InfluenceCurve"): accessor function for slot Infos.
Infos<- signature(object = "InfluenceCurve"): replacement function for slot Infos.
addInfo<- signature(object = "InfluenceCurve"): function to add an information to slot Infos.
Risks signature(object = "InfluenceCurve"): accessor function for slot Risks. By means of internal function `.evalListRec` recursively evaluates all non evaluated calls and writes back the evaluated calls to the calling environment.
Risks<- signature(object = "InfluenceCurve"): replacement function for slot Risks.
addRisk<- signature(object = "InfluenceCurve"): function to add a risk to slot Risks.
show signature(object = "InfluenceCurve")

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.
Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve](#), [RiskType-class](#)

Examples

```
new("InfluenceCurve")
```

InfoPlot

Wrapper function for information plot method

Description

The wrapper InfoPlot (capital I!) takes most of arguments to the plot method infoPlot (lower case i!) by default and gives a user possibility to run the function with low number of arguments.

Usage

```
InfoPlot(IC, data, ..., alpha.trsp = 100,
         with.legend = TRUE, rescale = FALSE, withCall = TRUE)
```

Arguments

| | |
|-------------|--|
| IC | object of class IC |
| data | optional data argument — for plotting observations into the plot |
| ... | additional parameters (in particular to be passed on to plot) |
| alpha.trsp | the transparency argument (0 to 100) for plotting the data |
| with.legend | the flag for showing the legend of the plot |
| rescale | the flag for rescaling the axes for better view of the plot |
| withCall | the flag for the call output |

Value

invisible(retV) where retV is the return value of the respective call to the full-fledged function infoPlot with the additional item wrapcall with the call to the wrapper InfoPlot and wrappedcall the call to to the full-fledged function infoPlot.

Details

Calls infoPlot with suitably chosen defaults. If withCall == TRUE, the call to infoPlot, i.e., item wrappedcall of the (hidden) return value, is returned

Examples

```
# Gamma
fam <- GammaFamily()
IC <- optIC(model = fam, risk = asCov())
Y <- distribution(fam)
data <- r(Y)(500)
InfoPlot(IC, data, withCall = FALSE)
```

 infoPlot

Plot absolute and relative information

Description

Plot absolute and relative information of influence curves.

Usage

```
infoPlot(object, ...)
## S4 method for signature 'IC'
infoPlot(object, data = NULL,
  ..., withSweave = getdistrOption("withSweave"),
  col = par("col"), lwd = par("lwd"), lty,
  colI = grey(0.5), lwdI = 0.7*par("lwd"), ltyI = "dotted",
  main = FALSE, inner = TRUE, sub = FALSE,
  col.inner = par("col.main"), cex.inner = 0.8,
  bmar = par("mar")[1], tmar = par("mar")[3],
  with.automatic.grid = TRUE,
  with.legend = TRUE, legend = NULL, legend.bg = "white",
  legend.location = "bottomright", legend.cex = 0.8,
  x.vec = NULL, scaleX = FALSE, scaleX.fct, scaleX.inv,
  scaleY = FALSE, scaleY.fct = pnorm, scaleY.inv=qnorm,
  scaleN = 9, x.ticks = NULL, y.ticks = NULL,
  mfColRow = TRUE, to.draw.arg = NULL,
  cex.pts = 1, cex.pts.fun = NULL, col.pts = par("col"),
  pch.pts = 19,
  cex.npts = 1, cex.npts.fun = NULL, col.npts = grey(.5),
  pch.npts = 20,
  jitter.fac = 1, with.lab = FALSE, cex.lbs = 1, adj.lbs = c(0, 0),
  col.lbs = col.pts, lab.pts = NULL, lab.font = NULL, alpha.trsp = NA,
  which.lbs = NULL, which.Order = NULL, which.nonlbs = NULL,
  attr.pre = FALSE, return.Order = FALSE,
  ylab.abs = "absolute information",
  ylab.rel= "relative information",
  withSubst = TRUE)
```

Arguments

| | |
|------------|---|
| object | object of class "InfluenceCurve" |
| data | optional data argument — for plotting observations into the plot; |
| withSweave | logical: if TRUE (for working with Sweave) no extra device is opened |
| main | logical: is a main title to be used? or just as argument main in plot.default . |

| | |
|----------------------------------|---|
| <code>inner</code> | logical: do panels have their own titles? or character vector of / cast to length 'number of compared dimensions'; if argument <code>to.draw.arg</code> is used, this refers to a vector of length 1 (absolute information) + <code>length(to.draw.arg)</code> , the actually plotted relative informations. For further information, see also main in <code>plot.default</code> . |
| <code>sub</code> | logical: is a sub-title to be used? or just as argument <code>sub</code> in <code>plot.default</code> . |
| <code>tmar</code> | top margin – useful for non-standard main title sizes; may be a vector with individual values for each of the panels to be plotted. |
| <code>bmar</code> | bottom margin – useful for non-standard sub title sizes; may be a vector with individual values for each of the panels to be plotted. |
| <code>col</code> | color of IC in argument object. |
| <code>lwd</code> | linewidth of IC in argument object. |
| <code>lty</code> | line-type of IC in argument object. |
| <code>colI</code> | color of the classically optimal IC. |
| <code>lwdI</code> | linewidth of the classically optimal IC. |
| <code>ltyI</code> | line-type of the classically optimal IC. |
| <code>cex.inner</code> | magnification to be used for inner titles relative to the current setting of <code>cex</code> ; as in <code>par</code> . |
| <code>col.inner</code> | character or integer code; color for the inner title |
| <code>with.automatic.grid</code> | logical; should a grid be plotted alongside with the ticks of the axes, automatically? If TRUE a respective call to <code>grid</code> in argument <code>panel.first</code> is ignored. |
| <code>with.legend</code> | logical; shall a legend be plotted? |
| <code>legend</code> | either NULL or a list of length (number of plotted panels) of items which can be used as argument <code>legend</code> in command <code>legend</code> . |
| <code>legend.location</code> | a valid argument <code>x</code> for <code>legend</code> — the place where to put the legend on the last issued plot — or a list of length (number of plotted panels) of such arguments, one for each plotted panel. |
| <code>legend.bg</code> | background color for the legend |
| <code>legend.cex</code> | magnification factor for the legend |
| <code>x.vec</code> | a numeric vector of grid points to evaluate the influence curve; by default, <code>x.vec</code> is NULL; then the grid is produced automatically according to the distribution of the IC. <code>x.vec</code> can be useful for usage with a rescaling of the x-axis to avoid that the evaluation points be selected too unevenly (i.e. on an equally spaced grid in the original scale, but then, after rescaling non-equally). The grid has to be specified in original scale; i.e.; when used with rescaling, it should be chosen non-equally spaced. |
| <code>scaleX</code> | logical; shall X-axis be rescaled (by default according to the cdf of the underlying distribution)? |
| <code>scaleY</code> | logical; shall Y-axis be rescaled for <code>abs.info-plot</code> (by default according to a probit scale)? |

| | |
|--------------------------|--|
| <code>scaleX.fct</code> | an isotone, vectorized function mapping the domain of the IC to [0,1]; if <code>scaleX</code> is TRUE and <code>scaleX.fct</code> is missing, the cdf of the underlying observation distribution. |
| <code>scaleX.inv</code> | the inverse function to <code>scale.fct</code> , i.e., an isotone, vectorized function mapping [0,1] to the domain of the IC such that for any x in the domain, <code>scaleX.inv(scaleX.fct(x))=x</code> ; if <code>scaleX</code> is TRUE and <code>scaleX.inv</code> is missing, the quantile function of the underlying observation distribution. |
| <code>scaleY.fct</code> | an isotone, vectorized function mapping the range of the norm of the IC to [0,1]; defaulting to the cdf of $\mathcal{N}(0, 1)$; can also be a list of functions with one list element for each of the panels to be plot. |
| <code>scaleY.inv</code> | an isotone, vectorized function mapping [0,1] into the range of the norm of the IC; defaulting to the quantile function of $\mathcal{N}(0, 1)$; can also be a list of functions with one list element for each of the panels to be plot. |
| <code>scaleN</code> | integer; defaults to 9; on rescaled axes, number of x and y ticks if drawn automatically; |
| <code>x.ticks</code> | numeric; defaults to NULL; (then ticks are chosen automatically); if non-NULL, user-given x-ticks (on original scale); |
| <code>y.ticks</code> | numeric; defaults to NULL; (then ticks are chosen automatically); if non-NULL, user-given y-ticks (on original scale); can be a list with one (numeric or NULL) item per panel |
| <code>mfColRow</code> | shall default partition in panels be used — defaults to TRUE |
| <code>to.draw.arg</code> | Either NULL (default; everything is plotted) or a vector making a selection among the relative information plots; the absolute information being plotted in any case. This vector is either a vector of integers (the indices of the subplots to be drawn) or characters — the names of the subplots to be drawn: these names are to be chosen either among the row names of the <code>trafo</code> matrix <code>rownames(trafo(eval(object@CallL2Fam))@par</code> or if the last expression is NULL a vector " <code>dim<dimnr></code> ", <code>dimnr</code> running through the number of rows of the <code>trafo</code> matrix. |
| <code>withSubst</code> | logical; if TRUE (default) pattern substitution for titles and lables is used; otherwise no substitution is used. |
| <code>col.pts</code> | color of the points of the data argument plotted; can be a vector or a matrix. More specifically, if argument <code>attr.pre</code> is TRUE, it is recycled to fill a matrix of dimension n by 2 (n the number of observations prior to any selection) where filling is done in order column first. The two columns are used for possibly different colors for the actual IC from the argument and the classical IC which is also shown. The selection done via <code>which.lbs</code> and <code>which.Order</code> is then done afterwards and on this matrix; argument <code>col.npts</code> is ignored in this case. If <code>attr.pre</code> is FALSE, <code>col.pts</code> is recycled to fill a matrix of dimension $n.s$ by 2 where $n.s$ is the number of observations selected for labelling and refers to the index ordering after the selection. Then argument <code>col.npts</code> determines the colors of the shown but non-labelled observations as given in argument <code>which.nonlbs</code> . |
| <code>pch.pts</code> | symbol of the points of the data argument plotted (may be a vector of length 2 or a matrix, see <code>col.pts</code> , with argument <code>pch.npts</code> as counterpart). |
| <code>cex.pts</code> | size of the points of the data argument plotted (may be a vector of length 2 or a matrix, see <code>col.pts</code> , with argument <code>cex.npts</code> as counterpart). |

| | |
|---------------------------|--|
| <code>cex.pts.fun</code> | rescaling function for the size of the points to be plotted; either NULL (default), then $\log(1+\text{abs}(x))$ is used for each of the rescalings, or a function which is then used for each of the rescalings, or a list of functions; if it is a function or a list of functions, if necessary it is recycled to length $2 * \text{dim}$ where 2 is for the classical IC and the IC in argument <code>object</code> and <code>dim</code> is the number of dimensions of the pICs to be plotted; in the index of this list, 2 is incremented first; then <code>dim</code> . |
| <code>col.npts</code> | color of the non-labelled points of the data argument plotted; (may be a vector of length 2, or it can be a matrix <code>nnlb <- sum(which.nonlbs)</code> by 2, <code>nnlb</code> the number of non-labelled shown observations). |
| <code>pch.npts</code> | symbol of the non-labelled points of the data argument plotted (may be a vector of length 2 or a matrix, see <code>col.npts</code>). |
| <code>cex.npts</code> | size of the non-labelled points of the data argument plotted (may be a vector of length 2 or a matrix, see <code>col.npts</code>). |
| <code>cex.npts.fun</code> | rescaling function for the size of the non-labelled points to be plotted; either NULL (default), then $\log(1+\text{abs}(x))$ is used for each of the rescalings, or a function which is then used for each of the rescalings, or a list of functions; if it is a function or a list of functions, if necessary it is recycled to length $2 * \text{dim}$ where <code>dim</code> is the number of dimensions of the pICs to be plotted; in the index of this list, 2 is incremented first; then <code>dim</code> . |
| <code>attr.pre</code> | logical; do graphical attributes for plotted data refer to indices prior (TRUE) or posterior to selection via arguments <code>which.lbs</code> , <code>which.Order</code> , <code>which.nonlbs</code> (FALSE)? |
| <code>with.lab</code> | logical; shall labels be plotted to the observations? (may be a vector of length 2, see <code>col.pts</code> – but not a matrix) |
| <code>cex.lbs</code> | size of the labels; can be vectorized to an array of <code>dim nlbs x 2 x npnl</code> where <code>npnl</code> is the number of plotted panels and <code>nlbs</code> the number of plotted labels; if it is a vector, it is recycled in order labels then ICs [<code>arg IC/classic</code>] then panels. |
| <code>col.lbs</code> | color of the labels; can be vectorized to a matrix of <code>dim nlbs x 2</code> as <code>col.pts</code> . |
| <code>adj.lbs</code> | adjustment of the labels; can be vectorized to an array of <code>dim 2 x 2 x npnl</code> matrix, <code>npnl</code> the number of plotted panels; if it is a vector, it is recycled in order (x,y)-coords then ICs [<code>arg IC/classic</code>] then panels. |
| <code>lab.pts</code> | character or NULL; labels to be plotted to the observations; can be a vector of length <code>n</code> , <code>n</code> the number of all observations prior to any selection with <code>which.lbs</code> , <code>which.Order</code> ; if <code>lab.pts</code> is NULL, observation indices are used. |
| <code>lab.font</code> | font to be used for labels; (may be a vector of length 2, see <code>with.lab</code>). |
| <code>alpha.trsp</code> | alpha transparency to be added ex post to colors <code>col.pch</code> and <code>col.nonlbl</code> ; if one-dim and NA all colors are left unchanged. Otherwise, with usual recycling rules <code>alpha.trsp</code> gets shorted/prolongated to length the number of panel data-symbols to be plotted. Coordinates of this vector <code>alpha.trsp</code> with NA are left unchanged, while for the remaining ones, the alpha channel in rgb space is set to the respective coordinate value of <code>alpha.trsp</code> . The non-NA entries must be integers in [0,255] (0 invisible, 255 opaque). |
| <code>jitter.fac</code> | jittering factor used in case of a <code>DiscreteDistribution</code> for plotting points of the data argument in a jittered fashion (may be a vector of length 2, see <code>with.lab</code>). |

| | |
|---------------------------|---|
| <code>which.lbs</code> | either an integer vector with the indices of the observations to be plotted into graph or NULL — then no observation is excluded |
| <code>which.Order</code> | we order the observations (descending) according to the norm given by <code>normtype(object)</code> ; then <code>which.Order</code> either is an integer vector with the indices of the <i>ordered</i> observations (remaining after a possible reduction by argument <code>which.lbs</code>) to be plotted into graph or NULL — then no (further) observation is excluded. |
| <code>which.nonlbs</code> | indices of the observations which should be plotted but not labelled; either an integer vector with the indices of the observations to be plotted into graph or NULL — then all non-labelled observations are plotted. |
| <code>return.Order</code> | logical; if TRUE, a list of length two with order vectors is returned — one for ordering w.r.t. the given IC, one for ordering w.r.t. the classically optimal IC; more specifically, the order of the (remaining) observations given by their original index is returned (remaining means: after a possible reduction by argument <code>which.lbs</code> , and ordering is according to the norm given by <code>normtype(object)</code>); otherwise we return <code>invisible()</code> as usual. |
| <code>ylab.abs</code> | character; label to be used for y-axis in absolute information panel |
| <code>ylab.rel</code> | character; label to be used for y-axis in relative information panel |
| <code>...</code> | further parameters for plot |

Details

Absolute information is defined as the square of the length of an IC. The relative information is defined as the absolute information of one component with respect to the absolute information of the whole IC; confer Section 8.1 of Kohl (2005).

Any parameters of `plot.default` may be passed on to this particular plot method.

For `main`-, `inner`-, and `sub`titles given as arguments `main`, `inner`, and `sub`, top and bottom margins are enlarged to 5 resp. 6 by default but may also be specified by `tmar` / `bmar` arguments. If `main` / `inner` / `sub` are logical then if the respective argument is FALSE nothing is done/plotted, but if it is TRUE, we use a default main title taking up the calling arguments in case of `main`, default inner titles taking up the class and (named) parameter slots of arguments in case of `inner`, and a "generated on <data>"-tag in case of `sub`. Of course, if `main` / `inner` / `sub` are character, this is used for the title; in case of `inner` it is then checked whether it has correct length. If argument `withSubst` is TRUE, in all title and axis label arguments, the following patterns are substituted:

```
"%C" class of argument object
"%A" deparsed argument object
"%D" time/date-string when the plot was generated
```

If argument `...` contains argument `ylim`, this may either be as in `plot.default` (i.e. a vector of length 2) or a vector of length $2 * (\text{number of plotted dimensions} + e)$, where e is 1 or 0 depending on whether absolute information is plotted or not; in the case of longer length, if e is 1, the first two elements are the values for `ylim` in panel "Abs", while the last $2 * (\text{number of plotted dimensions})$ are the values for `ylim` for the plotted dimensions of the IC, one pair for each dimension.

Similarly, if argument `...` contains arguments `xaxt` or `yaxt`, these may be vectorized, with one value for each of the panels to be plotted. This is useful for stacking panels over each other, using a common x-axis (see example below).

The ... argument may also contain an argument `withbox` which if TRUE warrants that even if `xaxt` and `yaxt` both are FALSE, a box is drawn around the respective panel.

In addition, argument ... may contain arguments `panel.first`, `panel.last`, i.e., hook expressions to be evaluated at the very beginning and at the very end of each panel (within the then valid coordinates). To be able to use these hooks for each panel individually, they may also be lists of expressions (of the same length as the number of panels and run through in the same order as the panels).

Value

An S3 object of class `c("plotInfo", "DiagnInfo")`, i.e., a list containing the information needed to produce the respective plot, which at a later stage could be used by different graphic engines (like, e.g. `ggplot`) to produce the plot in a different framework. A more detailed description will follow in a subsequent version.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[L2ParamFamily-class](#), [IC-class](#)

Examples

```
N <- NormLocationScaleFamily(mean=0, sd=1)
IC1 <- optIC(model = N, risk = asCov())
infoPlot(IC1)

## don't run to reduce check time on CRAN

## selection of subpanels for plotting
par(mfrow=c(1,2))
infoPlot(IC1, mfColRow = FALSE, to.draw.arg=c("Abs","sd"))
infoPlot(IC1, mfColRow = FALSE, to.draw.arg=c("Abs","sd"), log="y")

infoPlot(IC1, mfColRow = FALSE, to.draw.arg=c("Abs","mean"),
         panel.first= grid(), ylim = c(0,4), xlim = c(-6,6))
infoPlot(IC1, mfColRow = FALSE, to.draw.arg=c("Abs","mean"),
         panel.first= grid(), ylim = c(0,4,-3,3), xlim = c(-6,6))

par(mfrow=c(1,3))
infoPlot(IC1, mfColRow = FALSE, panel.first= grid(),
         ylim = c(0,4,0,.3,0,.8), xlim=c(-6,6))
par(mfrow=c(1,1))
```

```

data <- r(N)(20)
par(mfrow=c(1,3))
infoPlot(IC1, data=data, mfColRow = FALSE, panel.first= grid(),
         with.lab = TRUE, cex.pts=2,
         which.lbs = c(1:4,15:20), which.Order = 1:6,
         return.Order = TRUE)
infoPlot(IC1, data=data[1:10], mfColRow = FALSE, panel.first= grid(),
         with.lab = TRUE, cex.pts=0.7)
par(mfrow=c(1,1))

ICr <- makeIC(list(function(x)sign(x),function(x)sign(abs(x)-qnorm(.75))),N)
data <- r(N)(600)
data.c <- c(data, 1000*data[1:30])
par(mfrow=c(3,1))
infoPlot(ICr, data=data.c, tmar=c(4.1,0,0), bmar=c(0,0,4.1),
         xaxt=c("n","n","s"), mfColRow = FALSE, panel.first= grid(),
         cex.pts=c(.9,.9), alpha.trsp=20, lwd=2, lwdI=1.5, col=3,
         col.pts=c(3,2), colI=2, pch.pts=c(20,20), inner=FALSE,
         scaleX = TRUE, scaleX.fct=pnorm, scaleX.inv=qnorm,
         scaleY=TRUE, scaleY.fct=function(x) pchisq(x,df=1),
         scaleY.inv=function(x)qchisq(x,df=1),legend.cex = 1.0)

```

InfRobModel

Generating function for InfRobModel-class

Description

Generates an object of class "InfRobModel".

Usage

```
InfRobModel(center = L2ParamFamily(), neighbor = ContNeighborhood())
```

Arguments

center object of class "ProbFamily"
neighbor object of class "UncondNeighborhood"

Value

Object of class "FixRobModel"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[RobModel-class](#), [FixRobModel-class](#)

Examples

```
(M1 <- InfRobModel())

## The function is currently defined as
function(center = L2ParamFamily(), neighbor = ContNeighborhood()){
  new("InfRobModel", center = center, neighbor = neighbor)
}
```

| | |
|-------------------|---|
| InfRobModel-class | <i>Robust model with infinitesimal (unconditional) neighborhood</i> |
|-------------------|---|

Description

Class of robust models with infinitesimal (unconditional) neighborhoods; i.e., the neighborhood is shrinking at a rate of \sqrt{n} .

Objects from the Class

Objects can be created by calls of the form `new("InfRobModel", ...)`. More frequently they are created via the generating function `InfRobModel`.

Slots

`center` Object of class "ProbFamily".
`neighbor` Object of class "UncondNeighborhood".

Extends

Class "RobModel", directly.

Methods

neighbor<- signature(object = "InfRobModel"): replacement function for slot neighbor<-
show signature(object = "InfRobModel")

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[ProbFamily-class](#), [UncondNeighborhood-class](#), [InfRobModel](#)

Examples

```
new("InfRobModel")
```

interpolRisk-class *Interpolated Risks*

Description

Class of risks for which algorithms dispatch to speed-up algorithms

Usage

```
MBRRisk(samplesize=100)
OMSRRisk(samplesize=100)
RMXRRisk(samplesize=100)
```

Arguments

samplesize sample size at which to look at the risk.

Details

The main purpose of classes OMSRRisk, MBRRisk, and RMXRRisk is to help to dispatch into speed-up algorithms later in function ropetest. In all these risks, we assume convex contamination neighborhoods. OMSRRisk stands for optimal MSE-robust estimation (where we assume a radius r of 0.5), RMXRRisk stands for optimal optimally RMX-robust estimation and MBRRisk stands for optimal Bias-robust estimation. All these risks have an additional slot samplesize, defaulting to 100, and for which there is a replacement and an accessor method.

Objects from the Class

interpolRisk is a virtual class: No objects may be created from it. the other classes are generated via generating functions.

Slots

type Object of class "character": type of risk. (Inherited from RiskType).

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

Examples

```
new("OMSRRisk")
OMSRRisk()
RMXRRisk()
MBRRisk()
myrisk <- MBRRisk(samplesize=100)
samplesize(myrisk)
samplesize(myrisk) <- 20
```

kStepEstimate-class *kStepEstimate-class.*

Description

Class of asymptotically linear estimates.

Objects from the Class

Objects can be created by calls of the form `new("kStepEstimate", ...)`. More frequently they are created via the generating function `kStepEstimator`.

Slots

`name` Object of class "character": name of the estimator.

`estimate` Object of class "ANY": estimate.

`estimate.call` Object of class "call": call by which estimate was produced.

`samplesize` object of class "numeric" — the samplesize (only complete cases are counted) at which the estimate was evaluated.

`completecases`: object of class "logical" — complete cases at which the estimate was evaluated.

`asvar` object of class "OptionalNumericOrMatrix" which may contain the asymptotic (co)variance of the estimator.

`asbias` Optional object of class "numeric": asymptotic bias.

`pIC` Optional object of class `InfluenceCurve`: influence curve.

`nuis.idx` object of class "OptionalNumeric": indices of estimate belonging to the nuisance part.

`fixed` object of class "OptionalNumeric": the fixed and known part of the parameter.

`steps` Object of class "integer": number of steps.

`Infos` object of class "matrix" with two columns named `method` and `message`: additional informations.

`trafo` object of class "list": a list with components `fct` and `mat` (see below).

untransformed.estimate: Object of class "ANY": untransformed estimate.
untransformed.asvar: object of class "OptionalNumericOrMatrix" which may contain the asymptotic (co)variance of the untransformed estimator.
pICList Optional object of class "OptionalpICList": the list of (intermediate) (partial) influence curves used; only filled when called from kStepEstimator with argument withPICList==TRUE.
ICList Optional object of class "OptionalpICList": the list of (intermediate) (total) influence curves used; only filled when called from kStepEstimator with argument withICList==TRUE.
start The argument start — of class "StartClass" used in call to kStepEstimator.
startval Object of class matrix: the starting value with which the k-step Estimator was initialized (in p -space / transformed).
ustartval Object of class matrix: the starting value with which the k-step Estimator was initialized (in k -space / untransformed).
ksteps Object of class "OptionalMatrix": the intermediate estimates (in p -space) for the parameter; only filled when called from kStepEstimator.
uksteps Object of class "OptionalMatrix": the intermediate estimates (in k -space) for the parameter; only filled when called from kStepEstimator.
robtestcall Object of class "OptionalCall", i.e., a call or NULL: only filled when called from roptest in package **ROptEst**.

Extends

Class "ALEstimate", directly.
 Class "Estimate", by class "ALEstimate"

Methods

steps signature(object = "kStepEstimate"): accessor function for slot steps.
ksteps signature(object = "kStepEstimate"): accessor function for slot ksteps; has additional argument diff, defaulting to FALSE; if the latter is TRUE, the starting value from slot startval is prepended as first column; otherwise we return the corresponding increments in each step.
uksteps signature(object = "kStepEstimate"): accessor function for slot uksteps; has additional argument diff, defaulting to FALSE; if the latter is TRUE, the starting value from slot ustartval is prepended as first column; otherwise we return the corresponding increments in each step.
start signature(object = "kStepEstimate"): accessor function for slot start.
startval signature(object = "kStepEstimate"): accessor function for slot startval.
ustartval signature(object = "kStepEstimate"): accessor function for slot startval.
ICList signature(object = "kStepEstimate"): accessor function for slot ICList.
pICList signature(object = "kStepEstimate"): accessor function for slot pICList.
robtestCall signature(object = "kStepEstimate"): accessor function for slot robtestCall.
timings signature(object = "kStepEstimate"): accessor function for attribute "timings".
show signature(object = "kStepEstimate"): a show method;

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de> and Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

See Also

[ALEstimate-class](#)

kStepEstimator

Function for the computation of k-step estimates

Description

Function for the computation of k-step estimates.

Usage

```
kStepEstimator(x, IC, start = NULL, steps = 1L,
  useLast = getRobAStBaseOption("kStepUseLast"),
  withUpdateInKer = getRobAStBaseOption("withUpdateInKer"),
  IC.UpdateInKer = getRobAStBaseOption("IC.UpdateInKer"),
  withICList = getRobAStBaseOption("withICList"),
  withPICList = getRobAStBaseOption("withPICList"),
  na.rm = TRUE, startArgList = NULL, ...,
  withLogScale = TRUE, withEvalAsVar = TRUE,
  withMakeIC = FALSE, E.argList = NULL, diagnostic = FALSE)
```

Arguments

| | |
|-----------------|---|
| x | sample |
| IC | object of class "IC" |
| start | initial estimate (for full parameter, i.e. in dimension k respective joint length of main and nuisance part of the parameter): either a numerical value, or an object of class "Estimate" or a function producing either a numerical value, or an object of class "Estimate" when evaluated at x, \dots ; if missing or NULL, we use slot startPar of the L2family L2Fam from within IC |
| steps | integer: number of steps |
| useLast | which parameter estimate (initial estimate or k-step estimate) shall be used to fill the slots pIC, asvar and asbias of the return value. |
| withUpdateInKer | if there is a non-trivial trafo in the model with matrix D , shall the parameter be updated on $\ker(D)$? |
| IC.UpdateInKer | if there is a non-trivial trafo in the model with matrix D , the IC to be used for this; if NULL the result of getboundedIC(L2Fam, D) is taken; this IC will then be projected onto $\ker(D)$. |
| na.rm | logical: if TRUE, the estimator is evaluated at complete.cases(x). |

| | |
|---------------|--|
| startArgList | a list of arguments to be given to argument <code>start</code> if the latter is a function; this list by default already starts with two unnamed items, the sample <code>x</code> , and the model <code>eval(CallL2Fam(IC))</code> . |
| withPICList | logical: shall slot <code>pICList</code> of return value be filled? |
| withICList | logical: shall slot <code>ICList</code> of return value be filled? |
| ... | additional parameters |
| withLogScale | logical; if TRUE, a scale component (if existing and found with name <code>scalename</code>) is computed on log-scale and backtransformed afterwards (default). This avoids crossing 0. |
| withEvalAsVar | logical; if TRUE (default), tells R to evaluate the asymptotic variance or just to produces a call to do so. |
| withMakeIC | logical; if TRUE the <code>[p]IC</code> is passed through <code>makeIC</code> before return. |
| E.argList | NULL (default) or a named list of arguments to be passed to calls to <code>E</code> from <code>kStepEstimator</code> ; potential clashes with arguments of the same name in ... are resolved by inserting the items of argument list <code>E.argList</code> as named items to the argument lists, so in case of collisions the item of <code>E.argList</code> overwrites the existing one from ... |
| diagnostic | logical; if TRUE, diagnostic information on the performed integrations is gathered and shipped out as an attribute <code>diagnostic</code> of the return value of <code>kStepEstimator</code> . |

Details

Given an initial estimation `start`, a sample `x` and an influence curve `IC` the corresponding `k`-step estimator is computed.

The default value of argument `useLast` is set by the global option `kStepUseLast` which by default is set to FALSE. In case of general models `useLast` remains unchanged during the computations. However, if slot `CallL2Fam` of `IC` generates an object of class "L2GroupParamFamily" the value of `useLast` is changed to TRUE. Explicitly setting `useLast` to TRUE should be done with care as in this situation the influence curve is re-computed using the value of the one-step estimate which may take quite a long time depending on the model.

If `useLast` is set to TRUE and slot `modifyIC` of `IC` is filled with some function (which can be used to re-compute the `IC` for a different parameter), the computation of `asvar`, `asbias` and `IC` is based on the `k`-step estimate.

Timings for the several substeps are available as attribute `timings` of the return value.

Diagnostics on the involved integrations are available if argument `diagnostic` is TRUE. Then there is attribute `diagnostic` attached to the return value, which may be inspected and accessed through `showDiagnostic` and `getDiagnostic`.

Value

Object of class "kStepEstimate".

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>,
Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#), [kStepEstimate-class](#)

Examples

```
## don't run to reduce check time on CRAN

if(require(ROptEst)){
## 1. generate a contaminated sample
ind <- rbinom(100, size=1, prob=0.05)
x <- rnorm(100, mean=0, sd=(1-ind) + ind*9)

## 2. Kolmogorov(-Smirnov) minimum distance estimator
(est0 <- MDEstimator(x=x, NormLocationScaleFamily()))

## 3. k-step estimation: radius known
N1 <- NormLocationScaleFamily(mean=estimate(est0)["mean"], sd=estimate(est0)["sd"])
N1.Rob <- InfRobModel(center = N1, neighbor = ContNeighborhood(radius = 0.5))
IC1 <- optIC(model = N1.Rob, risk = asMSE())
(est1 <- kStepEstimator(x, IC1, est0, steps = 3, withPIC = TRUE))
estimate(est1)
ksteps(est1)
pICList(est1)
start(est1)
attr(est1,"timings")

## a transformed model
tfct <- function(x){
  nms0 <- c("mean","sd")
  nms <- "comb"
  fval0 <- x[1]+2*x[2]
  names(fval0) <- nms
  mat0 <- matrix(c(1,2), nrow = 1, dimnames = list(nms,nms0))
  return(list(fval = fval0, mat = mat0))
}

N1.traf <- N1; trafo(N1.traf) <- tfct
N1R.traf <- N1.Rob; trafo(N1R.traf) <- tfct
IC1.traf <- optIC(model = N1R.traf, risk = asMSE())
(est0.traf <- MDEstimator(x, N1.traf))
(est1.traf <- kStepEstimator(x, IC1.traf, est0, steps = 3,
  withIC = TRUE, withPIC = TRUE, withUpdateInKer = FALSE))
(est1a.traf <- kStepEstimator(x, IC1.traf, est0, steps = 3,
  withIC = TRUE, withPIC = TRUE, withUpdateInKer = TRUE))
estimate(est1.traf)
```

```

ksteps(est1.traf)
pICList(est1.traf)
startval(est1.traf)

untransformed.estimate(est1.traf)
uksteps(est1.traf)
ICList(est1.traf)
ustartval(est1.traf)

estimate(est1a.traf)
ksteps(est1a.traf)
pICList(est1a.traf)
startval(est1a.traf)

untransformed.estimate(est1a.traf)
uksteps(est1a.traf)
ICList(est1a.traf)
ustartval(est1a.traf)
}

```

kStepEstimator.start-methods

Methods for function kStepEstimator.start in Package 'RobAStBase'

Description

kStepEstimator.start-methods; these are called from within kStepEstimator to produce a numeric value of for the starting estimator in the end.

Usage

```

kStepEstimator.start(start, ...)
## S4 method for signature 'numeric'
kStepEstimator.start(start, nrvalues, ...)
## S4 method for signature 'Estimate'
kStepEstimator.start(start, nrvalues, ...)
## S4 method for signature 'function'
kStepEstimator.start(start, x, nrvalues, na.rm, L2Fam, startList)

```

Arguments

| | |
|-----------|--|
| start | the start slot of an object of class kStepEstimator |
| nrvalues | numeric; dimension k of the original model, i.e.; length of the untransformed parameter, or joint length of main and nuisance part of the parameter. |
| x | the data at which the starting estimator is to be evaluated. |
| na.rm | logical: if TRUE, the estimator is evaluated at complete.cases(x). |
| startList | a list of arguments to be given to the call to start if this is a function; |

L2Fam the parametric family;
 ... further arguments for kStepEstimator.start.

Value

a numeric vector with the corresponding value of the start estimator (in k space)

Methods

kStepEstimator.start signature(start = "numeric"): returns the unchanged argument start if it has the correct length; otherwise throws an error.

kStepEstimator.start signature(start = "Estimate"): returns slot untransformed.estimate of start if it is not NULL, and else slot estimate if the latter has dimension nrvalues.

kStepEstimator.start signature(start = "function"): returns kStepEstimator.start(do.call(start, args=c(li where, if na.rm == TRUE, beforehand x has been modified to x <- complete.cases(x).

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

See Also

[kStepEstimator](#), [ALEstimate-class](#)

locMEstimator

Generic function for the computation of location M estimates

Description

Generic function for the computation of location M estimates.

Usage

```
locMEstimator(x, IC, ...)
```

```
## S4 method for signature 'numeric,InfluenceCurve'
```

```
locMEstimator(x, IC, eps = .Machine$double.eps^0.5, na.rm = TRUE)
```

Arguments

| | |
|-------|--|
| x | sample |
| IC | object of class "InfluenceCurve" |
| ... | additional parameters |
| eps | the desired accuracy (convergence tolerance). |
| na.rm | logical: if TRUE, the estimator is evaluated at complete.cases(x). |

Details

Given some sample x and some influence curve IC an M estimate is computed by solving the corresponding M equation.

Value

Object of class "MEstimate"

Methods

$x = \text{"numeric"}$, $IC = \text{"InfluenceCurve"}$ univariate location.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Huber, P.J. (1964) Robust estimation of a location parameter. *Ann. Math. Stat.* **35**: 73–101.
- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve-class](#), [MEstimate-class](#)

| | |
|--------|---|
| makeIC | <i>Generic Function for making ICs consistent at a possibly different model</i> |
|--------|---|

Description

Generic function for providing centering and Fisher consistency of ICs.

Usage

```

makeIC(IC, L2Fam, ...)

## S4 method for signature 'IC,L2ParamFamily'
makeIC(IC, L2Fam, ..., diagnostic = FALSE)
## S4 method for signature 'list,L2ParamFamily'
makeIC(IC, L2Fam, forceIC = TRUE, name, Risks,
        Infos, modifyIC = NULL, ..., diagnostic = FALSE)
## S4 method for signature 'function,L2ParamFamily'
makeIC(IC, L2Fam, forceIC = TRUE, name,
        Risks, Infos, modifyIC = NULL, ..., diagnostic = FALSE)

```

Arguments

| | |
|------------|---|
| IC | object of class "IC" for signature IC="IC", respectively a list of functions in one argument for signature IC="list", respectively a function in one argument for signature IC="function". |
| L2Fam | L2-differentiable family of probability measures; may be missing, in which case it is replaced by the family in slot CallL2Fam of IC. |
| forceIC | logical; shall centeredness and Fisher consistency be enforced applying an affine linear transformation? |
| name | Object of class "character"; the name of the IC |
| Risks | object of class "list": list of risks; cf. RiskType-class . |
| Infos | matrix of characters with two columns named method and message: additional informations. |
| modifyIC | object of class "OptionalFunction": function of four arguments: (1) L2Fam an L2 parametric family (2) IC an optional influence curve, (3) withMakeIC a logical argument whether to enforce the IC side conditions by makeIC, and (4) ... for arguments to be passed to calls to E in makeIC. Returns an object of class "IC". This function is mainly used for internal computations! |
| ... | additional parameters to be passed to expectation E |
| diagnostic | logical; if TRUE, diagnostic information on the integration is printed and returned as attribute diagnostic of the return value. |

Details

Argument IC is transformed affinely such that the transformed IC satisfies the defining side conditions of an IC, i.e., centeredness and Fisher consistency:

$$E[IC] = 0$$

$$E[IC \Lambda^T] = D$$

where Λ is the L2 derivative of the model and D is the Jacobian of transformation trafo.

Diagnostics on the involved integrations are available if argument diagnostic is TRUE. Then there is attribute diagnostic attached to the return value, which may be inspected and accessed through [showDiagnostic](#) and [getDiagnostic](#).

Value

An IC of class "IC" at the model.

Methods

makeIC signature(IC = "IC", L2Fam = "missing"): creates an object of class "IC" at the parametric model of its own slot CallL2Fam; enforces IC conditions centeredness and Fisher consistency, applying an affine linear transformation.

makeIC signature(IC = "IC", L2Fam = "L2ParamFamily"): creates an object of class "IC" at the parametric model L2Fam; enforces IC conditions centeredness and Fisher consistency, applying an affine linear transformation.

makeIC signature(IC = "list", L2Fam = "L2ParamFamily"): creates an object of class "IC" out of a list of functions given by argument IC at the parametric model L2Fam; enforces IC conditions centeredness and Fisher consistency, applying an affine linear transformation.

makeIC signature(IC = "function", L2Fam = "L2ParamFamily"): creates an object of class "IC" out of a function given by argument IC at the parametric model L2Fam; enforces IC conditions centeredness and Fisher consistency, applying an affine linear transformation.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[L2ParamFamily-class](#), [IC-class](#)

Examples

```
## default IC
IC1 <- new("IC")

## L2-differentiable parametric family
B <- BinomFamily(13, 0.3)

## check IC properties
checkIC(IC1, B)

## make IC
IC2 <- makeIC(IC1, B)

## check IC properties
checkIC(IC2)
```

```

## slot modifyIC is filled in case of IC2
IC3 <- modifyIC(IC2)(BinomFamily(13, 0.2), IC2)
checkIC(IC3)
## identical to
checkIC(IC3, BinomFamily(13, 0.2))

IC4 <- makeIC(sin, B)
checkIC(IC4)

(IC5 <- makeIC(list(function(x)x^3), B, name="a try"))
plot(IC5)
checkIC(IC5)

## don't run to reduce check time on CRAN

N0 <- NormLocationScaleFamily()
IC6 <- makeIC(list(sin,cos),N0)
plot(IC6)
checkIC(IC6)

getRiskIC(IC6,risk=trAsCov())$trAsCov$value
getRiskIC(IC6,risk=asBias(),neighbor=ContNeighborhood())$asBias$value

```

masked-methods

Masked Methods from Packages 'stats' and 'graphics' in Package 'RobAStBase'

Description

masked methods from packages **stats** and **graphics**

Usage

```

clip(x1,...)
## S4 method for signature 'ANY'
clip(x1,x2,y1,y2)
start(x,...)
## S4 method for signature 'ANY'
start(x,...)

```

Arguments

x, ... see [start](#).
x1,x2,y1,y2 see [clip](#).

Details

In order to make accessible the otherwise masked functions `start`, `clip`, we generate corresponding S4-methods.

Value

see `start`, `clip`

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

| | |
|-----------------|--------------------------|
| MEstimate-class | <i>MEstimate-class</i> . |
|-----------------|--------------------------|

Description

Class of asymptotically linear estimates.

Objects from the Class

Objects can be created by calls of the form `new("MEstimate", ...)`. More frequently they are created via the generating function `locMEstimator`.

Slots

`name` Object of class "character": name of the estimator.

`estimate` Object of class "ANY": estimate.

`samplesize` Object of class "numeric": sample size.

`asvar` Optional object of class "matrix": asymptotic variance.

`asbias` Optional object of class "numeric": asymptotic bias.

`pIC` Optional object of class `InfluenceCurve`: influence curve.

`nuis.idx` object of class "OptionalNumeric": indices of estimate belonging to the nuisance part.

`Mroot` Object of class "numeric": value of the M equation at the estimate.

`Infos` object of class "matrix" with two columns named `method` and `message`: additional informations.

Extends

Class "ALEstimate", directly.

Class "Estimate", by class "ALEstimate".

Methods

Mroot signature(object = "MEstimate"): accessor function for slot Mroot.
show signature(object = "MEstimate")

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

See Also

[ALEstimate-class](#)

Examples

```
## prototype
new("MEstimate")
```

| | |
|------------------|--|
| movToRef-methods | <i>Methods for Functions moving from and to reference parameter in Package 'ROptEst'</i> |
|------------------|--|

Description

In optIC a gain in accuracy can be obtained when computing the optimally-robust ICs at a reference parameter of the model (instead of an arbitrary one). To this end, `moveL2Fam2RefParam` moved the model to the reference parameter and `moveICBackFromRefParam` moves the obtained optimal IC back to the original parameter.

Usage

```
moveL2Fam2RefParam(L2Fam, ...)
moveICBackFromRefParam(IC, L2Fam, ...)
```

Arguments

| | |
|-------|------------------------------------|
| L2Fam | object of class L2ParamFamily |
| IC | IC of class HampIC |
| ... | further arguments to be passed on. |

Details

`moveL2Fam2RefParam` and `moveICBackFromRefParam` are used internally in functions `robtest` and `roptest` to compute the optimally robust influence function according to the arguments given to them.

Value

`moveL2Fam2RefParam`
the L2 Family transformed to reference parameter.

`moveICBackFromRefParam`
the backtransformed IC.

Methods

moveL2Fam2RefParam signature(L2Fam = "L2ParamFamily"): returns L2Fam unchanged.

moveL2Fam2RefParam signature(L2Fam = "L2LocationFamily"): moves L2Fam to location 0.

moveL2Fam2RefParam signature(L2Fam = "L2ScaleFamily"): moves L2Fam to location 0 and scale 1.

moveL2Fam2RefParam signature(L2Fam = "L2LocationScaleFamily"): moves L2Fam to location 0 and scale 1.

moveL2Fam2RefParam signature(L2Fam = "L2LocationUnknownScaleFamily"): moves L2Fam to location 0 and scale 1.

moveL2Fam2RefParam signature(L2Fam = "L2ScaleUnknownLocationFamily"): moves L2Fam to location 0 and scale 1.

moveICBackFromRefParam signature(IC = "IC", L2Fam = "L2ParamFamily"): returns IC unchanged.

moveICBackFromRefParam signature(IC = "IC", L2Fam = "L2LocationFamily"): moves IC in IC back to original location in L2Fam.

moveICBackFromRefParam signature(IC = "IC", L2Fam = "L2ScaleFamily"): moves IC in IC back to original location and scale in L2Fam, rescaling risk where necessary.

moveICBackFromRefParam signature(IC = "IC", L2Fam = "L2LocationScaleFamily"): moves IC in IC back to original location and scale in L2Fam, rescaling risk where necessary.

moveICBackFromRefParam signature(IC = "IC", L2Fam = "L2LocationUnknownScaleFamily"): moves IC in IC back to original location and scale in L2Fam, rescaling risk where necessary.

moveICBackFromRefParam signature(IC = "IC", L2Fam = "L2ScaleUnknownLocationFamily"): moves IC in IC back to original location and scale in L2Fam, rescaling risk where necessary.

moveICBackFromRefParam signature(IC = "HampIC", L2Fam = "L2ParamFamily"): moves IC in IC back to original location and scale in L2Fam (and in addition changes Lagrange multipliers accordingly), rescaling risk where necessary.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

Neighborhood-class *Neighborhood*

Description

Class of neighborhoods of families of probability measures.

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

`type` Object of class "character": type of the neighborhood.

`radius` Object of class "numeric": neighborhood radius.

Methods

type signature(object = "Neighborhood"): accessor function for slot type.

radius signature(object = "Neighborhood"): accessor function for slot radius.

show signature(object = "Neighborhood")

radius<- signature(object = "Neighborhood"): replacement function for slot radius.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[ProbFamily-class](#)

| | |
|------------------|--|
| normtype-methods | <i>Methods for Function normtype in Package 'RobAStBase'</i> |
|------------------|--|

Description

normtype-methods

Methods

normtype signature(object = "interpolrisk"): returns the slot normtype of an object of class "interpolrisk".

Examples

```
myrisk <- MBRRisk(samplesize=100)
normtype(myrisk)
```

| | |
|------------------|---|
| oneStepEstimator | <i>Function for the computation of one-step estimates</i> |
|------------------|---|

Description

Function for the computation of one-step estimates.

Usage

```
oneStepEstimator(x, IC, start = NULL,
  useLast = getRobAStBaseOption("kStepUseLast"),
  withUpdateInKer = getRobAStBaseOption("withUpdateInKer"),
  IC.UpdateInKer = getRobAStBaseOption("IC.UpdateInKer"),
  na.rm = TRUE, startArgList = NULL, withMakeIC = FALSE, ...,
  E.argList = NULL)
```

Arguments

| | |
|---------|--|
| x | sample |
| IC | object of class "InfluenceCurve" |
| start | initial estimate (for full parameter, i.e. in dimension k respective joint length of main and nuisance part of the parameter): either a numerical value, or an object of class "Estimate" or a function producing either a numerical value, or an object of class "Estimate" when evaluated at x, \dots ; if missing or NULL, we use slot startPar of the L2family L2Fam from within IC. |
| useLast | which parameter estimate (initial estimate or one-step estimate) shall be used to fill the slots pIC, asvar and asbias of the return value. |

| | |
|------------------------------|---|
| <code>withUpdateInKer</code> | if there is a non-trivial trafo in the model with matrix D , shall the parameter be updated on $\ker(D)$? |
| <code>IC.UpdateInKer</code> | if there is a non-trivial trafo in the model with matrix D , the IC to be used for this; if NULL the result of <code>getboundedIC(L2Fam,D)</code> is taken; this IC will then be projected onto $\ker(D)$. |
| <code>na.rm</code> | logical: if TRUE, the estimator is evaluated at <code>complete.cases(x)</code> . |
| <code>startArgList</code> | a list of arguments to be given to argument <code>start</code> if the latter is a function; this list by default already starts with two unnamed items, the sample x , and the model <code>eval(CallL2Fam(IC))</code> ; in case IC is not of class IC, the model argument L2Fam will be set to NULL. |
| <code>withMakeIC</code> | logical; if TRUE the [p]IC is passed through <code>makeIC</code> before return. |
| <code>...</code> | additional arguments |
| <code>E.argList</code> | NULL (default) or a named list of arguments to be passed to calls to E from <code>kStepEstimator</code> ; potential clashes with arguments of the same name in <code>...</code> are resolved by inserting the items of argument list <code>E.argList</code> as named items to the argument lists, so in case of collisions the item of <code>E.argList</code> overwrites the existing one from <code>...</code> |

Details

Given an initial estimation `start`, a sample x and an influence curve IC the corresponding one-step estimator is computed.

In case IC is an object of class "IC" the slots `asvar` and `asbias` of the return value are filled (based on the initial estimate).

The default value of argument `useLast` is set by the global option `kStepUseLast` which by default is set to FALSE. In case of general models `useLast` remains unchanged during the computations. However, if slot `CallL2Fam` of IC generates an object of class "L2GroupParamFamily" the value of `useLast` is changed to TRUE. Explicitly setting `useLast` to TRUE should be done with care as in this situation the influence curve is re-computed using the value of the one-step estimate which may take quite a long time depending on the model.

If `useLast` is set to TRUE and slot `modifyIC` of IC is filled with some function (which can be used to re-compute the IC for a different parameter), the computation of `asvar`, `asbias` and IC is based on the one-step estimate.

Value

Object of class "kStepEstimate"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>,
Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve-class](#), [kStepEstimate-class](#)

 optIC

Generic function for the computation of optimally robust ICs

Description

Generic function for the computation of optimally robust ICs.

Usage

```
optIC(model, risk, ...)

## S4 method for signature 'L2ParamFamily,asCov'
optIC(model, risk, withMakeIC = FALSE, ...)
```

Arguments

| | |
|------------|--|
| model | probability model. |
| risk | object of class "RiskType". |
| ... | additional parameters (here used for makeIC, resp. for E). |
| withMakeIC | logical; if TRUE the [p]IC is passed through makeIC before return. |

Details

The classical optimal IC which ist optimal in sense of the Cramer-Rao bound is computed.

Value

Some optimally robust IC is computed.

Methods

model = "L2ParamFamily", risk = "asCov" computes classical optimal influence curve for L2 differentiable parametric families.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve-class](#), [RiskType-class](#)

Examples

```
B <- BinomFamily(size = 25, prob = 0.25)

## classical optimal IC
IC0 <- optIC(model = B, risk = asCov())
plot(IC0) # plot IC
checkIC(IC0, B)
```

OptionalInfluenceCurve-class

Some helper Classes in package 'RobAStBase'

Description

Some helper Classes in package 'RobAStBase': Classes OptionalInfluenceCurve, OptionalpICList, StartClass, pICList

Class Unions

OptionalInfluenceCurve is a class union of classes InfluenceCurve and NULL; OptionalInfluenceCurveOrCall is a class union of classes InfluenceCurve, call, and NULL — it is the slot class of slot pIC in ALEstimate; OptionalpICList is a class union of classes pICList and NULL — it is the slot class of slot pICList in kStepEstimate; StartClass is a class union of classes function, numeric and Estimate — it is the slot class of slot start in kStepEstimate.

List Classes

pICList is a descendant of class list which requires its members —if any— to be of class pIC.

Methods

show signature(object = "OptionalpICList"): particular show-method.

show signature(object = "pICList"): particular show-method.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

- Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.
- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
- Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve](#), [RiskType-class](#)

| | |
|----------------|--|
| outlyingPlotIC | <i>Function outlyingPlotIC in Package 'RobAStBase'</i> |
|----------------|--|

Description

outlyingPlotIC produces an outlyingness plot based on distances applied to ICs

Usage

```
outlyingPlotIC(data, IC.x, IC.y = IC.x, dist.x = NormType(), dist.y,
  cutoff.x = cutoff.sememp(0.95), cutoff.y = cutoff.chisq(0.95), ...,
  cutoff.quantile.x = 0.95, cutoff.quantile.y = cutoff.quantile.x,
  id.n, cex.pts = 1, lab.pts, jitter.pts = 0, alpha.trsp = NA, adj, cex.idn,
  col.idn, lty.cutoff, lwd.cutoff, col.cutoff, text.abline = TRUE,
  text.abline.x = NULL, text.abline.y = NULL, cex.abline = par("cex"),
  col.abline = col.cutoff, font.abline = par("font"), adj.abline = c(0,0),
  text.abline.x.x = NULL, text.abline.x.y = NULL, text.abline.y.x = NULL,
  text.abline.y.y = NULL, text.abline.x.fmt.cx = "%7.2f",
  text.abline.x.fmt.qx = "%4.2f%%", text.abline.y.fmt.cy = "%7.2f",
  text.abline.y.fmt.qy = "%4.2f%%", robCov.x = TRUE, robCov.y = TRUE,
  tf.x = NULL, tf.y = NULL, jitter.fac=10, jitter.tol=.Machine$double.eps,
  doplot = TRUE,
  main = gettext("Outlyingness \n by means of a distance-distance plot")
)
```

Arguments

| | |
|--------|---|
| data | data coercable to matrix; the data at which to produce the ddPlot. |
| IC.x | object of class IC the influence curve to produce the distances for the x axis. |
| IC.y | object of class IC the influence curve to produce the distances for the y axis. |
| ... | further arguments to be passed to plot.default, text, and abline |
| dist.x | object of class NormType; the distance for the x axis. |
| dist.y | object of class NormType; the distance for the y axis. |

| | |
|--------------------------------|---|
| <code>cutoff.x</code> | object of class <code>cutoff</code> ; the cutoff information for the x axis (the vertical line discriminating 'good' and 'bad' points). |
| <code>cutoff.y</code> | object of class <code>cutoff</code> ; the cutoff information for the y axis (the horizontal line discriminating 'good' and 'bad' points). |
| <code>cutoff.quantile.x</code> | numeric; the cutoff quantile for the x axis. |
| <code>cutoff.quantile.y</code> | numeric; the cutoff quantile for the y axis. |
| <code>id.n</code> | a set of indices (or a corresponding logical vector); to select a subset of the data in argument data. |
| <code>cex.pts</code> | the corresponding <code>cex</code> argument for plotted points. |
| <code>lab.pts</code> | a vector of labels for the (unsubsampled) data. |
| <code>jitter.pts</code> | the corresponding <code>jitter</code> argument for plotted points; may be a vector of length 2 – for separate factors for x- and y-coordinate. |
| <code>alpha.trsp</code> | alpha transparency to be added ex post to colors <code>col.pch</code> and <code>col.lbl</code> ; if one-dim and NA all colors are left unchanged. Otherwise, with usual recycling rules <code>alpha.trsp</code> gets shorted/prolongated to length the data-symbols to be plotted. Coordinates of this vector <code>alpha.trsp</code> with NA are left unchanged, while for the remaining ones, the alpha channel in rgb space is set to the respective coordinate value of <code>alpha.trsp</code> . The non-NA entries must be integers in [0,255] (0 invisible, 255 opaque). |
| <code>adj</code> | the corresponding argument for <code>text</code> for labelling the outliers. |
| <code>cex.idn</code> | the corresponding <code>cex</code> argument for <code>text</code> for labelling the outliers. |
| <code>col.idn</code> | the corresponding <code>col</code> argument for <code>text</code> for labelling the outliers. |
| <code>lty.cutoff</code> | the corresponding <code>lty</code> argument for <code>abline</code> for drawing the cutoff lines. |
| <code>lwd.cutoff</code> | the corresponding <code>lwd</code> argument for <code>abline</code> for drawing the cutoff lines. |
| <code>col.cutoff</code> | the corresponding <code>col</code> argument for <code>abline</code> for drawing the cutoff lines. |
| <code>text.abline</code> | vector of logicals (cast to length 2): shall text be added to cutoff lines. |
| <code>text.abline.x</code> | text to be added to cutoff lines in x direction; if NULL (default) we use “[pp] %-cutoff = [ff]” where [pp] is the percentage up to 2 digits and [ff] is the cutoff value up to 2 digits. |
| <code>text.abline.y</code> | text to be added to cutoff lines in y direction; if NULL (default) we use “[pp] %-cutoff = [ff]” where [pp] is the percentage up to 2 digits and [ff] is the cutoff value up to 2 digits. |
| <code>cex.abline</code> | vector of numerics (cast to length 2): <code>cex</code> -value for added cutoff text. |
| <code>col.abline</code> | vector of length 2: color for added cutoff text. |
| <code>font.abline</code> | vector of length 2: font for added cutoff text. |
| <code>adj.abline</code> | cast to 2 x 2 matrix (by recycling rules): adjustment values for added cutoff text. |
| <code>text.abline.x.y</code> | y-coordinate of text to be added to cutoff lines in x direction; if NULL (default) set to <code>mid of mean(par("usr")[c(3,4)])</code> . |

| | |
|-----------------------------------|--|
| <code>text.abline.y.x</code> | x-coordinate of text to be added to cutoff lines in y direction; if NULL (default) set to mid of <code>mean(par("usr")[c(1, 2)])</code> . |
| <code>text.abline.x.x</code> | x-coordinate of text to be added to cutoff lines in x direction; if NULL (default) set to 1.05 times the cutoff value. |
| <code>text.abline.y.y</code> | y-coordinate of text to be added to cutoff lines in y direction; if NULL (default) set to 1.05 times the cutoff value. |
| <code>text.abline.x.fmt.cx</code> | format string (see gettextf) to format the cutoff value in label in x direction. |
| <code>text.abline.x.fmt.qx</code> | format string to format cutoff probability in label in x direction. |
| <code>text.abline.y.fmt.cy</code> | format string to format the cutoff value in label in y direction. |
| <code>text.abline.y.fmt.qy</code> | format string to format cutoff probability in label in y direction. |
| <code>robCov.x</code> | shall x-distances be based on MCD, i.e., robust covariances (TRUE) or on classical covariance be used? |
| <code>robCov.y</code> | shall y-distances be based on MCD, i.e., robust covariances (TRUE) or on classical covariance be used? |
| <code>tf.x</code> | transformation for x axis: a function returning the transformed x-coordinates when applied to the data; if <code>tf.x</code> is NULL (default), internally this is set to the evaluation function of the IC.x. |
| <code>tf.y</code> | transformation for y axis: a function returning the transformed y-coordinates when applied to the data; if <code>tf.x</code> is NULL (default), internally this is set to the evaluation function of IC.y. |
| <code>jitter.fac</code> | factor for jittering, see jitter ; |
| <code>jitter.tol</code> | threshold for jittering: if distance between points is smaller than <code>jitter.tol</code> , points are considered replicates. |
| <code>doplot</code> | logical; shall a plot be produced? if FALSE only the return values are produced. |
| <code>main</code> | the main title. |

Details

calls a corresponding [ddPlot](#) method to produce the plot.

Value

If argument `doplot` is FALSE: A list (returned as `invisible()`) with items

| | |
|-------------------|---|
| <code>id.x</code> | the indices of (possibly transformed) data (within subset <code>id.n</code>) beyond the x-cutoff |
| <code>id.y</code> | the indices of (possibly transformed) data (within subset <code>id.n</code>) beyond the y-cutoff |

| | |
|-------------------------|--|
| <code>id.xy</code> | the indices of (possibly transformed) data (within subset <code>id.n</code>) beyond the x-cutoff and the y-cutoff |
| <code>qtx</code> | the quantiles of the distances of the (possibly transformed) data in x direction |
| <code>qty</code> | the quantiles of the distances of the (possibly transformed) data in y direction |
| <code>cutoff.x.v</code> | the cutoff value in x direction |
| <code>cutoff.y.v</code> | the cutoff value in y direction |

If argument `doplot` is TRUE: An S3 object of class `c("plotInfo", "DiagnInfo")`, i.e., a list containing the information needed to produce the respective plot, which at a later stage could be used by different graphic engines (like, e.g. `ggplot`) to produce the plot in a different framework. A more detailed description will follow in a subsequent version. a list (returned as `invisible()`) with items; one item is `retV` which is the return value in case `doplot` is FALSE.

Note

If you want to use the return value of `cutoff.quant()` for arguments `cutoff.x` or `cutoff.y`, remember to set the arguments `tf.x` resp. `tf.y` to the identity, i.e., `function(x)x`.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

Examples

```
if(require(ROptEst)){
  ## generates normal location and scale family with mean = -2 and sd = 3
  N0 <- NormLocationScaleFamily()
  N0.IC0 <- optIC(model = N0, risk = asCov())
  N0.Rob1 <- InfRobModel(center = N0, neighbor = ContNeighborhood(radius = 0.5))
  N0.IC1 <- optIC(model = N0.Rob1, risk = asMSE())
  set.seed(123)
  xn <- c(rnorm(100), rcauchy(20)+20)
  outlyingPlotIC(xn, IC.x=N0.IC0)
  outlyingPlotIC(xn, IC.x=N0.IC1)

  ## example for usage with cutoff.quant()
  classIC <- optIC(NormLocationScaleFamily(mean = 3.3, sd = 0.67),
                  risk = asCov())
  outlyingPlotIC(data = chem[-17], classIC, cex.pts = 3, jitter.fac = 1,
                 cutoff.x = cutoff.quant(), tf.x =function(x)(x))
}
```

Description

plot-methods

Usage

```

plot(x, y, ...)
## S4 method for signature 'IC,missing'
plot(x, ..., withSweave = getdistrOption("withSweave"),
      main = FALSE, inner = TRUE, sub = FALSE,
      col.inner = par("col.main"), cex.inner = 0.8,
      bmar = par("mar")[1], tmar = par("mar")[3],
      with.automatic.grid = TRUE,
      with.legend = FALSE, legend = NULL, legend.bg = "white",
      legend.location = "bottomright", legend.cex = 0.8,
      withMBR = FALSE, MBRB = NA, MBR.fac = 2, col.MBR = par("col"),
      lty.MBR = "dashed", lwd.MBR = 0.8,
      x.vec = NULL, scaleX = FALSE, scaleX.fct, scaleX.inv,
      scaleY = FALSE, scaleY.fct = pnorm, scaleY.inv=qnorm,
      scaleN = 9, x.ticks = NULL, y.ticks = NULL,
      mfColRow = TRUE, to.draw.arg = NULL,
      withSubst = TRUE)
## S4 method for signature 'IC,numeric'
plot(x, y, ...,
      cex.pts = 1, cex.pts.fun = NULL, col.pts = par("col"),
      pch.pts = 19,
      cex.npts = 1, cex.npts.fun = NULL, col.npts = par("col"),
      pch.npts = 20,
      jitter.fac = 1, with.lab = FALSE, cex.lbs = 1, adj.lbs = c(0,0),
      col.lbs = col.pts, lab.pts = NULL, lab.font = NULL,
      alpha.trsp = NA, which.lbs = NULL,
      which.Order = NULL, which.nonlbs = NULL, attr.pre = FALSE,
      return.Order = FALSE)

```

Arguments

| | |
|------------|---|
| x | object of class "IC": IC to be plotted |
| y | missing or numeric (a dataset, e.g.) |
| withSweave | logical: if TRUE (for working with Sweave) no extra device is opened |
| main | logical: is a main title to be used? or just as argument main in plot.default . |
| inner | logical: do panels have their own titles? or character vector of inner titles/ cast to length 'number of plotted dimensions'; if argument to.draw.arg is used, this refers to a vector of length length(to.draw.arg), the actually plotted dimensions. For further information, see also description of argument main in plot.default . |
| sub | logical: is a sub-title to be used? or just as argument sub in plot.default . |
| tmar | top margin – useful for non-standard main title sizes |
| bmar | bottom margin – useful for non-standard sub title sizes |

| | |
|----------------------------------|---|
| <code>cex.inner</code> | magnification to be used for inner titles relative to the current setting of <code>cex</code> ; as in <code>par</code> |
| <code>col.inner</code> | character or integer code; color for the inner title |
| <code>with.automatic.grid</code> | logical; should a grid be plotted alongside with the ticks of the axes, automatically? If TRUE a respective call to <code>grid</code> in argument <code>panel.first</code> is ignored. |
| <code>with.legend</code> | logical; shall a legend be plotted? |
| <code>legend</code> | either NULL or a list of length (number of plotted panels) of items which can be used as argument <code>legend</code> in command <code>legend</code> . |
| <code>legend.location</code> | a valid argument <code>x</code> for <code>legend</code> — the place where to put the legend on the last issued plot — or a list of length (number of plotted panels) of such arguments, one for each plotted panel. |
| <code>legend.bg</code> | background color for the legend |
| <code>legend.cex</code> | magnification factor for the legend |
| <code>withMBR</code> | logical; shall horizontal lines with min and max of <code>MBRE</code> be plotted for comparison? |
| <code>MBRB</code> | matrix (or NA); coerced by usual recycling rules to a matrix with as many rows as plotted panels and with first column the lower bounds and the second column the upper bounds for the respective coordinates (ideally given by the <code>MBR-IC</code>). |
| <code>MBR.fac</code> | positive factor; scales the bounds given by argument <code>MBRB</code> |
| <code>col.MBR</code> | color for the <code>MBR</code> lines; as usual <code>col</code> -argument; |
| <code>lty.MBR</code> | line type for the <code>MBR</code> lines; as usual <code>lty</code> -argument; |
| <code>lwd.MBR</code> | line width for the <code>MBR</code> lines; as usual <code>lwd</code> -argument; |
| <code>x.vec</code> | a numeric vector of grid points to evaluate the influence curve; by default, <code>x.vec</code> is NULL; then the <code>grid</code> is produced automatically according to the distribution of the <code>IC</code> . <code>x.vec</code> can be useful for usage with a rescaling of the <code>x</code> -axis to avoid that the evaluation points be selected too unevenly (i.e. on an equally spaced grid in the original scale, but then, after rescaling non-equally). The <code>grid</code> has to be specified in original scale; i.e.; when used with rescaling, it should be chosen non-equally spaced. |
| <code>scaleX</code> | logical; shall <code>X</code> -axis be rescaled (by default according to the <code>cdf</code> of the underlying distribution)? |
| <code>scaleY</code> | logical; shall <code>Y</code> -axis be rescaled (by default according to a <code>probit</code> scale)? |
| <code>scaleX.fct</code> | an isotone, vectorized function mapping the domain of the <code>IC</code> to <code>[0,1]</code> ; if <code>scaleX</code> is TRUE and <code>scaleX.fct</code> is missing, the <code>cdf</code> of the underlying observation distribution; can also be a list of functions with one list element for each of the panels to be plot. |
| <code>scaleX.inv</code> | the inverse function to <code>scale.fct</code> , i.e., an isotone, vectorized function mapping <code>[0,1]</code> to the domain of the <code>IC</code> such that for any <code>x</code> in the domain, $scaleX.inv(scaleX.fct(x))=x$; if <code>scaleX</code> is TRUE and <code>scaleX.inv</code> is missing, the <code>quantile</code> function of the underlying observation distribution; can also be a list of functions with one list element for each of the panels to be plot. |

| | |
|---------------------------|--|
| <code>scaleY.fct</code> | an isotone, vectorized function mapping for each coordinate the range of the respective coordinate of the IC to $[0,1]$; defaulting to the cdf of $\mathcal{N}(0, 1)$. |
| <code>scaleY.inv</code> | an isotone, vectorized function mapping for each coordinate the range $[0,1]$ into the range of the respective coordinate of the IC; defaulting to the quantile function of $\mathcal{N}(0, 1)$. |
| <code>scaleN</code> | integer; defaults to 9; on rescaled axes, number of x and y ticks if drawn automatically; |
| <code>x.ticks</code> | numeric; defaults to NULL; (then ticks are chosen automatically); if non-NULL, user-given x-ticks (on original scale); |
| <code>y.ticks</code> | numeric; defaults to NULL; (then ticks are chosen automatically); if non-NULL, user-given y-ticks (on original scale); can be a list with one (numeric or NULL) item per panel |
| <code>mfColRow</code> | shall default partition in panels be used — defaults to TRUE |
| <code>to.draw.arg</code> | Either NULL (default; everything is plotted) or a vector of either integers (the indices of the subplots to be drawn) or characters — the names of the subplots to be drawn: these names are to be chosen either among the row names of the trafo matrix <code>rownames(trafo(eval(x@CallL2Fam)@param))</code> or if the last expression is NULL a vector "dim<dimnr>", <code>dimnr</code> running through the number of rows of the trafo matrix. |
| <code>withSubst</code> | logical; if TRUE (default) pattern substitution for titles and labels is used; otherwise no substitution is used. |
| <code>cex.pts</code> | size of the points of the second argument plotted, can be a vector; if argument <code>attr.pre</code> is TRUE, it is recycled to the length of all observations and determines the sizes of all plotted symbols, i.e., the selection is done within this argument; in this case argument <code>col.npts</code> is ignored. If <code>attr.pre</code> is FALSE, <code>cex.pts</code> is recycled to the number of the observations selected for labelling and refers to the index ordering after the selection. Then argument <code>cex.npts</code> determines the sizes of the shown but non-labelled observations as given in argument <code>which.nonlbs</code> . |
| <code>cex.pts.fun</code> | rescaling function for the size of the points to be plotted; either NULL (default), then $\log(1+\text{abs}(x))$ is used for each of the rescalings, or a function which is then used for each of the rescalings, or a list of functions; if it is a function or a list of functions, if necessary it is recycled to length <code>dim</code> where <code>dim</code> is the number of dimensions of the pICs to be plotted. |
| <code>col.pts</code> | color of the points of the second argument plotted, can be a vector as in <code>cex.pts</code> (with <code>col.npts</code> as counterpart). |
| <code>pch.pts</code> | symbol of the points of the second argument plotted, can be a vector as in <code>cex.pts</code> (with <code>pch.npts</code> as counterpart). |
| <code>col.npts</code> | color of the non-labelled points of the data argument plotted; (may be a vector). |
| <code>pch.npts</code> | symbol of the non-labelled points of the data argument plotted (may be a vector). |
| <code>cex.npts</code> | size of the non-labelled points of the data argument plotted (may be a vector). |
| <code>cex.npts.fun</code> | rescaling function for the size of the non-labelled points to be plotted; either NULL (default), then $\log(1+\text{abs}(x))$ is used for each of the rescalings, or a |

| | |
|---------------------------|---|
| | function which is then used for each of the rescalings, or a list of functions; if it is a function or a list of functions, if necessary it is recycled to length <code>dim</code> where <code>dim</code> is the number of dimensions of the pICs to be plotted. |
| <code>with.lab</code> | logical; shall labels be plotted to the observations? |
| <code>cex.lbs</code> | size of the labels; can be vectorized to a matrix of <code>dim nlbs x npnl</code> where <code>npnl</code> is the number of plotted panels and <code>nlbs</code> the number of plotted labels; if it is a vector, it is recycled in order label then panel. |
| <code>col.lbs</code> | color of the labels; can be vectorized as <code>col.pts</code> . |
| <code>adj.lbs</code> | adjustment of the labels; can be vectorized to a <code>2 x npnl</code> matrix, <code>npnl</code> the number of plotted panels; if it is a vector, it is recycled in order (x,y)-coords then panel. |
| <code>lab.pts</code> | character or NULL; labels to be plotted to the observations; if NULL observation indices; |
| <code>lab.font</code> | font to be used for labels (of the observations). |
| <code>alpha.trsp</code> | alpha transparency to be added <i>ex post</i> to colors <code>col.pch</code> and <code>col.lbl</code> ; if one-dim and NA all colors are left unchanged. Otherwise, with usual recycling rules <code>alpha.trsp</code> gets shorted/prolongated to length the data-symbols to be plotted. Coordinates of this vector <code>alpha.trsp</code> with NA are left unchanged, while for the remaining ones, the alpha channel in rgb space is set to the respective coordinate value of <code>alpha.trsp</code> . The non-NA entries must be integers in <code>[0,255]</code> (0 invisible, 255 opaque). |
| <code>jitter.fac</code> | jittering factor used in case of a <code>DiscreteDistribution</code> for plotting points of the second argument in a jittered fashion. |
| <code>attr.pre</code> | logical; do graphical attributes for plotted data refer to indices prior (TRUE) or posterior to selection via arguments <code>which.lbs</code> , <code>which.Order</code> , <code>which.nonlbs</code> (FALSE)? |
| <code>which.lbs</code> | either an integer vector with the indices of the observations to be plotted into graph or NULL — then no observation is excluded |
| <code>which.Order</code> | we order the observations (descending) according to the norm given by <code>normtype(object)</code> ; then <code>which.Order</code> either is an integer vector with the indices of the <i>ordered</i> observations (remaining after a possible reduction by argument <code>which.lbs</code>) to be plotted (with labels) into graph or NULL — then no (further) observation is excluded. |
| <code>which.nonlbs</code> | indices of the observations which should be plotted but not labelled; either an integer vector with the indices of the observations to be plotted into graph or NULL — then all non-labelled observations are plotted |
| <code>return.Order</code> | logical; if TRUE, an order vector is returned; more specifically, the order of the (remaining) observations given by their original index is returned (remaining means: after a possible reduction by argument <code>which.lbs</code> , and ordering is according to the norm given by <code>normtype(object)</code>); otherwise we return <code>invisible()</code> as usual. |
| <code>...</code> | further parameters for <code>plot</code> |

Details

Any parameters of `plot.default` may be passed on to this particular plot method.

We start describing the `IC,missing-method`: For `main`-, `inner`-, and `subtitles` given as arguments `main`, `inner`, and `sub`, top and bottom margins are enlarged to 5 resp. 6 by default but may also be specified by `tmar` / `bmar` arguments. If `main` / `inner` / `sub` are logical then if the respective argument is `FALSE` nothing is done/plotted, but if it is `TRUE`, we use a default main title taking up the calling arguments in case of `main`, default inner titles taking up the class and (named) parameter slots of arguments in case of `inner`, and a "generated on <data>"-tag in case of `sub`. Of course, if `main` / `inner` / `sub` are character, this is used for the title; in case of `inner` it is then checked whether it has correct length. If argument `withSubst` is `TRUE`, in all title and axis label arguments, the following patterns are substituted:

```
"%C" class of argument object
"%A" deparsed argument object
"%D" time/date-string when the plot was generated
```

If argument `...` contains argument `ylim`, this may either be as in `plot.default` (i.e. a vector of length 2) or a vector of length $2 * (\text{number of plotted dimensions} + 2)$, where the first two elements are the values for `ylim` in panel "d", the first two are for `ylim` resp. `xlim` for panels "p" and "q", and the last $2 * (\text{number of plotted dimensions})$ are the values for `ylim` for the plotted dimensions of the L2derivative, one pair for each dimension.

The `IC,numeric-method` calls the `IC,missing-method` but in addition plots the values of a dataset into the `IC`.

In addition, argument `...` may contain arguments `panel.first`, `panel.last`, i.e., hook expressions to be evaluated at the very beginning and at the very end of each panel (within the then valid coordinates). To be able to use these hooks for each panel individually, they may also be lists of expressions (of the same length as the number of panels and run through in the same order as the panels).

Value

An S3 object of class `c("plotInfo", "DiagnInfo")`, i.e., a list containing the information needed to produce the respective plot, which at a later stage could be used by different graphic engines (like, e.g. `ggplot`) to produce the plot in a different framework. A more detailed description will follow in a subsequent version.

Examples

```
IC1 <- new("IC")
plot(IC1)
plot(IC1, main = TRUE, panel.first= grid(),
      col = "blue", cex.main = 2, cex.inner = 1)

### selection of subpanels for plotting
N <- NormLocationScaleFamily(mean=0, sd=1)
IC2 <- optIC(model = N, risk = asCov())
par(mfrow=c(1,1))
plot(IC2, main = TRUE, panel.first= grid(),
```

```

col = "blue", cex.main = 2, cex.inner = 0.6,
mfColRow = FALSE, to.draw.arg=c("sd"))

## xlim and ylim arguments
plot(IC2, main = TRUE, panel.first= grid(),
     ylim=c(-3,3), xlim=c(-2,3))
plot(IC2, main = TRUE, panel.first= grid(),
     ylim=c(-3,3,-1,3), xlim=c(-2,3),
     with.legend = TRUE)

data <- r(N)(30)
plot(IC2, data, panel.first= grid(),
     ylim = c(-3,3,-1,3), xlim=c(-2,3),
     cex.pts = 3, pch.pts = 1:2, col.pts="green",
     with.lab = TRUE, which.lbs = c(1:4,15:20),
     which.Order = 1:6, return.Order = TRUE)

```

PlotIC

Wrapper function for plot method for IC

Description

The wrapper PlotIC takes most of arguments to the plot method by default and gives a user possibility to run the function with low number of arguments.

Usage

```
PlotIC(IC, y, ..., alpha.trsp = 100, with.legend = TRUE,
       rescale = FALSE, withCall = TRUE)
```

Arguments

| | |
|-------------|--|
| IC | object of class IC |
| y | optional data argument — for plotting observations into the plot |
| ... | additional parameters (in particular to be passed on to plot) |
| alpha.trsp | the transparency argument (0 to 100) for plotting the data |
| with.legend | the flag for showing the legend of the plot |
| rescale | the flag for rescaling the axes for better view of the plot |
| withCall | the flag for the call output |

Value

invisible(retV) where retV is the return value of the respective call to the full-fledged plot method with the additional item wrapcall with the call to PlotIC and wrappedcall the call to the full-fledged plot method.

Details

Calls plot with suitably chosen defaults; if `withCall == TRUE`, the call to plot, i.e., item `wrappedcall` from the (hidden) return value, is printed.

Examples

```
# Gamma
fam <- GammaFamily()
rfam <- InfRobModel(fam, ContNeighborhood(0.5))
IC <- optIC(model = fam, risk = asCov())
Y <- distribution(fam)
y <- r(Y)(1000)
PlotIC(IC, y, withCall = FALSE)
```

qqplot

Methods for Function qqplot in Package 'RobAStBase'

Description

We generalize function `qqplot` from package `stats` to be applicable to distribution and probability model objects. In this context, `qqplot` produces a QQ plot of data (argument `x`) against a (model) distribution. For arguments `y` of class `RobModel`, points at a high “distance” to the model are plotted smaller. For arguments `y` of class `kStepEstimate`, points at with low weight in the [p]IC are plotted bigger and their color gets faded out slowly. Graphical parameters may be given as arguments to `qqplot`.

Usage

```
qqplot(x, y, ...)
## S4 method for signature 'ANY,RobModel'
qqplot(x, y,
  n = length(x), withIdLine = TRUE, withConf = TRUE,
  withConf.pw = withConf, withConf.sim = withConf,
  plot.it = TRUE, xlab = deparse(substitute(x)),
  ylab = deparse(substitute(y)), ..., distance = NormType(),
  n.adj = TRUE)
## S4 method for signature 'ANY,InfRobModel'
qqplot(x, y, n = length(x), withIdLine = TRUE,
withConf = TRUE, withConf.pw = withConf, withConf.sim = withConf,
  plot.it = TRUE, xlab = deparse(substitute(x)), ylab =
  deparse(substitute(y)), ..., cex.pts.fun = NULL, n.adj = TRUE)
## S4 method for signature 'ANY,kStepEstimate'
qqplot(x, y,
  n = length(x), withIdLine = TRUE, withConf = TRUE,
  withConf.pw = withConf, withConf.sim = withConf,
  plot.it = TRUE, xlab = deparse(substitute(x)),
  ylab = deparse(substitute(y)), ...,
```

```
exp.cex2.lbs = -.15,
exp.cex2.pts = -.35,
exp.fadcol.lbs = 1.85,
exp.fadcol.pts = 1.85,
bg = "white")
```

Arguments

| | |
|----------------|--|
| x | data to be checked for compatibility with distribution/model y. |
| y | object of class "RobModel", of class "InfRobModel" or of class "kStepEstimate". |
| n | numeric; number of quantiles at which to do the comparison. |
| withIdLine | logical; shall line $y = x$ be plotted in? |
| withConf | logical; shall confidence lines be plotted? |
| withConf.pw | logical; shall pointwise confidence lines be plotted? |
| withConf.sim | logical; shall simultaneous confidence lines be plotted? |
| plot.it | logical; shall be plotted at all (inherited from qqplot)? |
| xlab | x-label |
| ylab | y-label |
| ... | further parameters for method <code>qqplot</code> with signature <code>ANY, ProbFamily</code> (see qqplot) or with function <code>plot</code> |
| cex.pts.fun | rescaling function for the size of the points to be plotted; either NULL (default), then $\log(1+abs(x))$ is used, or a function which is then used. |
| n.adj | logical; shall sample size be adjusted for possible outliers according to radius of the corresponding neighborhood? |
| distance | a function mapping observations x to the positive reals; used to determine the size of the plotted points (the larger $distance(x)$, the smaller the points are plotted). |
| exp.cex2.lbs | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to magnify the labels. |
| exp.cex2.pts | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to magnify the symbols. |
| exp.fadcol.lbs | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to find out-fading colors. |
| exp.fadcol.pts | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to find out-fading colors. |
| bg | background color to fade against |

Details

qqplot signature(`x = "ANY"`, `y = "RobModel"`): produces a QQ plot of a dataset x against the theoretical quantiles of distribution of robust model y.

qqplot signature(`x = "ANY"`, `y = "InfRobModel"`): produces a QQ plot of a dataset x against the theoretical quantiles of distribution of infinitesimally robust model y.

qqplot signature($x = \text{"ANY"}$, $y = \text{"kStepEstimate"}$): produces a QQ plot of a dataset x against the theoretical quantiles of the model distribution of model at which the corresponding $kStepEstimate$ y had been calibrated at. By default, if the [p]IC of the $kStepEstimate$ is of class `HampIC`, i.e.; has a corresponding weight function, points (and, if with `.lab==TRUE`, labels) are scaled and faded according to this weight function. Corresponding arguments `exp.cex2.pts` and `exp.fadcol.pts` control this scaling and fading, respectively (and analogously `exp.cex2.lbs` and `exp.fadcol.lbs` for the labels). The choice of these arguments has to be done on a case-by-case basis. Positive exponents induce fading, magnification with increasing weight, for negative exponents the same is true for decreasing weight; higher (absolute) values increase the speed of fading / magnification.

Value

As for function `qqplot` from package **stats**: a list with components

| | |
|----------------|--|
| <code>x</code> | The x coordinates of the points that were/would be plotted |
| <code>y</code> | The corresponding quantiles of the second distribution, <i>including NAs</i> . |

Author(s)

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References

Becker, R. A., Chambers, J. M. and Wilks, A. R. (1988) *The New S Language*. Wadsworth & Brooks/Cole.

See Also

`qqplot` from package **stats** – the standard QQ plot function, `qqplot` from package **distr** for comparisons of distributions, and `qqplot` from package **distrMod** (which is called intermediately by this method), as well as `qqbounds`, used by `qqplot` to produce confidence intervals.

Examples

```
## \donttest to reduce check time

qqplot(rnorm(40, mean = 15, sd = sqrt(30)), Chisq(df=15))
RobM <- InfRobModel(center = NormLocationFamily(mean=13, sd=sqrt(28)),
  neighbor = ContNeighborhood(radius = 0.4))

x <- rnorm(20, mean = 15, sd = sqrt(30))
qqplot(x, RobM)
qqplot(x, RobM, alpha.CI=0.9, add.points.CI=FALSE)

## further examples for ANY,kStepEstimator-method
## in example to roptest() in package R0ptEst
```

returnlevelplot *Methods for Function returnlevelplot in Package 'RobAStBase'*

Description

We generalize function `returnlevelplot` from package `distrMod` to be applicable to distribution and probability model objects. In this context, `returnlevelplot` produces a rescaled QQ plot of data (argument `x`) against a (model) distribution. For arguments `y` of class `RobModel`, points at a high “distance” to the model are plotted smaller. For arguments `y` of class `kStepEstimate`, points at with low weight in the [p]IC are plotted bigger and their color gets faded out slowly. This parallels the behaviour of the respective `qqplot` methods. Graphical parameters may be given as arguments to `returnlevelplot`.

Usage

```
returnlevelplot(x, y, ...)
## S4 method for signature 'ANY,RobModel'
returnlevelplot(x, y,
  n = length(x), withIdLine = TRUE, withConf = TRUE,
  withConf.pw = withConf, withConf.sim = withConf,
  plot.it = TRUE, xlab = deparse(substitute(x)),
  ylab = deparse(substitute(y)), ..., distance = NormType(),
  n.adj = TRUE)
## S4 method for signature 'ANY,InfRobModel'
returnlevelplot(x, y, n = length(x), withIdLine = TRUE,
  withConf = TRUE, withConf.pw = withConf, withConf.sim = withConf,
  plot.it = TRUE, xlab = deparse(substitute(x)), ylab =
  deparse(substitute(y)), ..., cex.pts.fun = NULL, n.adj = TRUE)
## S4 method for signature 'ANY,kStepEstimate'
returnlevelplot(x, y,
  n = length(x), withIdLine = TRUE, withConf = TRUE,
  withConf.pw = withConf, withConf.sim = withConf,
  plot.it = TRUE, xlab = deparse(substitute(x)),
  ylab = deparse(substitute(y)), ...,
  exp.cex2.lbs = -.15,
  exp.cex2.pts = -.35,
  exp.fadcol.lbs = 1.85,
  exp.fadcol.pts = 1.85,
  bg = "white")
```

Arguments

| | |
|----------------|---|
| <code>x</code> | data to be checked for compatibility with distribution/model <code>y</code> . |
| <code>y</code> | object of class "RobModel", of class "InfRobModel" or of class "kStepEstimate". |
| <code>n</code> | numeric; number of quantiles at which to do the comparison. |

| | |
|----------------|---|
| withIdLine | logical; shall line $y = x$ be plotted in? |
| withConf | logical; shall confidence lines be plotted? |
| withConf.pw | logical; shall pointwise confidence lines be plotted? |
| withConf.sim | logical; shall simultaneous confidence lines be plotted? |
| plot.it | logical; shall be plotted at all (inherited from returnlevelplot)? |
| xlab | x-label |
| ylab | y-label |
| ... | further parameters for method <code>returnlevelplot</code> with signature <code>ANY, ProbFamily</code> (see returnlevelplot) or with function <code>plot</code> |
| cex.pts.fun | rescaling function for the size of the points to be plotted; either <code>NULL</code> (default), then <code>log(1+abs(x))</code> is used, or a function which is then used. |
| n.adj | logical; shall sample size be adjusted for possible outliers according to radius of the corresponding neighborhood? |
| distance | a function mapping observations x to the positive reals; used to determine the size of the plotted points (the larger <code>distance(x)</code> , the smaller the points are plotted). |
| exp.cex2.lbs | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to magnify the labels. |
| exp.cex2.pts | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to magnify the symbols. |
| exp.fadcol.lbs | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to find out-fading colors. |
| exp.fadcol.pts | for objects <code>kStepEstimate</code> based on a [p]IC of class <code>HampIC</code> : exponent for the weights of this [p]IC used to find out-fading colors. |
| bg | background color to fade against |

Details

returnlevelplot signature($x = \text{"ANY"}$, $y = \text{"RobModel"}$): produces a QQ plot of a dataset x against the theoretical quantiles of distribution of robust model y .

returnlevelplot signature($x = \text{"ANY"}$, $y = \text{"InfRobModel"}$): produces a QQ plot of a dataset x against the theoretical quantiles of distribution of infinitesimally robust model y .

returnlevelplot signature($x = \text{"ANY"}$, $y = \text{"kStepEstimate"}$): produces a QQ plot of a dataset x against the theoretical quantiles of the model distribution of model at which the corresponding `kStepEstimate` y had been calibrated at. By default, if the [p]IC of the `kStepEstimate` is of class `HampIC`, i.e.; has a corresponding weight function, points (and, if `withLab==TRUE`, labels) are scaled and faded according to this weight function. Corresponding arguments `exp.cex2.pts` and `exp.fadcol.pts` control this scaling and fading, respectively (and analogously `exp.cex2.lbs` and `exp.fadcol.lbs` for the labels). The choice of these arguments has to be done on a case-by-case basis. Positive exponents induce fading, magnification with increasing weight, for negative exponents the same is true for decreasing weight; higher (absolute) values increase the speed of fading / magnification.

Value

As for function [returnlevelplot](#) from package **stats**.

Note

The confidence bands given in our version of the return level plot differ from the ones given in package **ismev**. We use non-parametric bands, hence also allow for non-parametric deviances from the model, whereas in package **ismev** they are based on profiling, hence only check for variability within the parametric class.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

ismev: An Introduction to Statistical Modeling of Extreme Values. R package version 1.39. <https://CRAN.R-project.org/package=ismev>; original S functions written by Janet E. Heffernan with R port and R documentation provided by Alec G. Stephenson. (2012).

Coles, S. (2001). *An introduction to statistical modeling of extreme values*. London: Springer.

See Also

[qqplot](#) from package **stats** – the standard QQ plot function, [returnlevelplot](#) from package **distrMod** (which is called intermediately by this method), as well as [qqbounds](#), used by [returnlevelplot](#) to produce confidence intervals.

Examples

```
returnlevelplot(rnorm(40, mean = 15, sd = sqrt(30)), Chisq(df=15))
RobM <- InfRobModel(center = NormLocationFamily(mean=13, sd=sqrt(28)),
                    neighbor = ContNeighborhood(radius = 0.4))

## \donttest to reduce check time
x <- rnorm(20, mean = 15, sd = sqrt(30))
returnlevelplot(x, RobM)
returnlevelplot(x, RobM, alpha.CI=0.9, add.points.CI=FALSE)

## further examples for ANY,kStepEstimator-method
## in example to roptest() in package R0ptEst
```

RobAStBaseMASK

Masking of/by other functions in package "RobAStBase"

Description

Provides information on the (intended) masking of and (non-intended) masking by other other functions in package **RobAStBase**

Usage

```
RobAStBaseMASK(library = NULL)
```

Arguments

`library` a character vector with path names of R libraries, or NULL. The default value of NULL corresponds to all libraries currently known. If the default is used, the loaded packages are searched before the libraries

Value

no value is returned

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

Examples

```
RobAStBaseMASK()
```

RobAStBaseOptions *Function to change the global variables of the package 'RobAStBase'*

Description

With RobAStBaseOptions you can inspect and change the global variables of the package **RobAStBase**.

Usage

```
RobAStBaseOptions(...)  
getRobAStBaseOption(x)
```

Arguments

`...` any options can be defined, using name = value or by passing a list of such tagged values.

`x` a character string holding an option name.

Value

RobAStBaseOptions() returns a list of the global variables.
RobAStBaseOptions(x) returns the global variable `x`.
getRobAStBaseOption(x) returns the global variable `x`.
RobAStBaseOptions(x=y) sets the value of the global variable `x` to `y`.

Global Options

- kStepUseLast:** The default value of argument `kStepUseLast` is `FALSE`. Explicitly setting `kStepUseLast` to `TRUE` should be done with care as in this situation the influence curve in case of `oneStepEstimator` and `kStepEstimator` is re-computed using the value of the one- resp. k-step estimate which may take quite a long time depending on the model.
- withUpdateInKer:** if there is a non-trivial trafo in the model with matrix D , shall the parameter be updated on $\ker(D)$? Defaults to `FALSE`.
- IC.UpdateInKer:** if there is a non-trivial trafo in the model with matrix D , the IC to be used for this; if `NULL` the result of `getboundedIC(L2Fam,D)` is taken; this IC will then be projected onto $\ker(D)$; defaults to `NULL`.
- all.verbose:** argument `verbose` passed on by default to many calls of `optIC`, `radiusminimaxIC`, `getInfRobIC` etc.; well suited for testing purposes. Defaults to `FALSE`.
- withPICList:** logical: shall slot `pICList` of return value of `kStepEstimator` be filled? Defaults to `FALSE`.
- withICList:** logical: shall slot `ICList` of return value of `kStepEstimator` be filled? Defaults to `FALSE`.
- modifyICwarn:** logical: should a (warning) information be added if `modifyIC` is applied and hence some optimality information could no longer be valid? Defaults to `TRUE`.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

See Also

[options](#), [getOption](#)

Examples

```
RobASTBaseOptions()
RobASTBaseOptions("kStepUseLast")
RobASTBaseOptions("kStepUseLast" = TRUE)
# or
RobASTBaseOptions(kStepUseLast = 1e-6)
getRobASTBaseOption("kStepUseLast")
```

RobASTControl-class *Control classes in package RobASTBase*

Description

Control classes in package **RobASTBase**.

Objects from the Class

This class is virtual; that is no objects may be created.

Slots

name Object of class "character": name of the control object.

Methods

name signature(object = "RobAStControl"): accessor function for slot name.

name<- signature(object = "RobAStControl", value = "character"): replacement function for slot name.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

Hampel et al. (1986) *Robust Statistics. The Approach Based on Influence Functions*. New York: Wiley.

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

 RobModel-class

Robust model

Description

Class of robust models. A robust model consists of family of probability measures center and a neighborhood neighbor about this family.

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

center Object of class "ProbFamily"

neighbor Object of class "Neighborhood"

Methods

center signature(object = "RobModel"): accessor function for slot center.

center<- signature(object = "RobModel"): replacement function for slot center.

neighbor signature(object = "RobModel"): accessor function for slot neighbor.

neighbor<- signature(object = "RobModel"): replacement function for slot neighbor.

trafo signature(object = "RobModel", param = "missing"): accessor function for slot trafo of slot center.

trafo<- signature(object = "RobModel"): replacement function for slot trafo of slot center.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

- Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[ProbFamily-class](#), [Neighborhood-class](#)

| | |
|-----------------|------------------------------|
| RobWeight-class | <i>Robust Weight classes</i> |
|-----------------|------------------------------|

Description

Classes for robust weights.

Objects from the Class

Objects can be created by calls of the form `new("RobWeight", ...)`.

Slots

`name` Object of class "character".
`weight` Object of class "function" — the weight function.

Methods

name signature(object = "RobWeight"): accessor function for slot name.
name<- signature(object = "RobWeight"): replacement function for slot name.
weight signature(object = "RobWeight"): accessor function for slot weight.
weight<- signature(object = "RobWeight"): replacement function for slot weight.

Author(s)

Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

References

- Hampel et al. (1986) *Robust Statistics*. The Approach Based on Influence Functions. New York: Wiley.
 Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[InfluenceCurve-class, IC](#)

Examples

```
## prototype
new("RobWeight")
```

samplesize-methods *Methods for Function samplesize in Package 'RobAStBase'*

Description

samplesize-methods

Methods

samplesize signature(object = "interpolrisk"): returns the slot samplesize of an object of class "interpolrisk".

samplesize<- signature(object = "interpolrisk", value = "ANY"): modifies the slot samplesize of an object of class "interpolrisk".

Examples

```
myrisk <- MBRRisk(samplesize=100)
samplesize(myrisk)
samplesize(myrisk) <- 20
```

TotalVarIC *Generating function for TotalVarIC-class*

Description

Generates an object of class "TotalVarIC"; i.e., an influence curves η of the form

$$\eta = c \vee A\Lambda \wedge d$$

with lower clipping bound c , upper clipping bound d and standardizing matrix A . Λ stands for the L2 derivative of the corresponding L2 differentiable parametric family which can be created via CallL2Fam.

Usage

```
TotalVarIC(name, CallL2Fam = call("L2ParamFamily"),
            Curve = EuclRandVarList(RealRandVariable(Map = c(function(x) {x}),
                                                    Domain = Reals()))),
            Risks, Infos, clipLo = -Inf, clipUp = Inf, stand = as.matrix(1),
            lowerCase = NULL, neighborRadius = 0, w = new("BdStWeight"),
            normtype = NormType(), biastype = symmetricBias(),
            modifyIC = NULL)
```

Arguments

| | |
|----------------|---|
| name | object of class "character". |
| CallL2Fam | object of class "call": creates an object of the underlying L2-differentiable parametric family. |
| Curve | object of class "EuclRandVarList". |
| Risks | object of class "list": list of risks; cf. RiskType-class . |
| Infos | matrix of characters with two columns named method and message: additional informations. |
| clipLo | negative real: lower clipping bound. |
| clipUp | positive real: lower clipping bound. |
| stand | matrix: standardizing matrix |
| w | BdStWeight: weight object |
| lowerCase | optional constant for lower case solution. |
| neighborRadius | radius of the corresponding (unconditional) contamination neighborhood. |
| biastype | BiasType: type of the bias |
| normtype | NormType: type of the norm |
| modifyIC | object of class "OptionalFunction": function of four arguments: (1) L2Fam an L2 parametric family (2) IC an optional influence curve, (3) withMakeIC a logical argument whether to enforce the IC side conditions by makeIC, and (4) ... for arguments to be passed to calls to E in makeIC. Returns an object of class "IC". This function is mainly used for internal computations! |

Value

Object of class "TotalVarIC"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#), [ContIC](#)

Examples

```
IC1 <- TotalVarIC()
plot(IC1)
```

TotalVarIC-class

Influence curve of total variation type

Description

Class of (partial) influence curves of total variation type. i.e., an influence curves η of the form

$$\eta = c \vee A \Lambda \wedge d$$

with lower clipping bound c , upper clipping bound d and standardizing matrix A . Λ stands for the L2 derivative of the corresponding L2 differentiable parametric family which can be created via `CallL2Fam`.

Objects from the Class

Objects can be created by calls of the form `new("TotalVarIC", ...)`. More frequently they are created via the generating function `TotalVarIC`, respectively via the method `generateIC`.

Slots

`CallL2Fam` object of class "call": creates an object of the underlying L2-differentiable parametric family.

`name` object of class "character".

`Curve` object of class "EuclRandVarList".

`modifyIC` object of class "OptionalFunction": function of four arguments: (1) `L2Fam` an L2 parametric family (2) `IC` an optional influence curve, (3) `withMakeIC` a logical argument whether to enforce the IC side conditions by `makeIC`, and (4) ... for arguments to be passed to calls to `E` in `makeIC`. Returns an object of class "IC". This function is mainly used for internal computations!

`Risks` object of class "list": list of risks; cf. [RiskType-class](#).

`Infos` object of class "matrix" with two columns named `method` and `message`: additional informations.

`clipLo` object of class "numeric": lower clipping bound.

`clipUp` object of class "numeric": upper clipping bound.

`stand` object of class "matrix": standardizing matrix.

`weight` object of class "BdStWeight": weight function

biastype object of class "BiasType": bias type (symmetric/onsided/asymmetric)
normtype object of class "NormType": norm type (Euclidean, information/self-standardized)
neighborRadius object of class "numeric": radius of the corresponding (unconditional) contamination neighborhood.

Extends

Class "HampIC", directly.
 Class "IC", by class "HampIC".
 Class "InfluenceCurve", by class "IC".

Methods

CallL2Fam<- signature(object = "TotalVarIC"): replacement function for slot CallL2Fam.
clipLo signature(object = "TotalVarIC"): accessor function for slot clipLo.
clipLo<- signature(object = "TotalVarIC"): replacement function for slot clipLo.
clipUp signature(object = "TotalVarIC"): accessor function for slot clipUp.
clipUp<- signature(object = "TotalVarIC"): replacement function for slot clipUp.
clip signature(x1 = "TotalVarIC"): returns clipUp-clipLo.
stand<- signature(object = "TotalVarIC"): replacement function for slot stand.
lowerCase<- signature(object = "TotalVarIC"): replacement function for slot lowerCase.
neighbor signature(object = "TotalVarIC"): generates an object of class "TotalVarNeighborhood" with radius given in slot neighborRadius.
generateIC signature(neighbor = "TotalVarNeighborhood", L2Fam = "L2ParamFamily"): generate an object of class "TotalVarIC". Rarely called directly.
show signature(object = "TotalVarIC")

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.
 Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[IC-class](#), [ContIC](#), [HampIC-class](#)

Examples

```
IC1 <- new("TotalVarIC")
plot(IC1)
```

TotalVarNeighborhood *Generating function for TotalVarNeighborhood-class*

Description

Generates an object of class "TotalVarNeighborhood".

Usage

```
TotalVarNeighborhood(radius = 0)
```

Arguments

radius non-negative real: neighborhood radius.

Value

Object of class "ContNeighborhood"

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[TotalVarNeighborhood-class](#)

Examples

```
TotalVarNeighborhood()

## The function is currently defined as
function(radius = 0){
  new("TotalVarNeighborhood", radius = radius)
}
```

TotalVarNeighborhood-class

Total variation neighborhood

Description

Class of (unconditional) total variation neighborhoods.

Objects from the Class

Objects can be created by calls of the form `new("TotalVarNeighborhood", ...)`. More frequently they are created via the generating function `TotalVarNeighborhood`.

Slots

type Object of class "character": "(uncond.) total variation neighborhood".

radius Object of class "numeric": neighborhood radius.

Extends

Class "UncondNeighborhood", directly.

Class "Neighborhood", by class "UncondNeighborhood".

Methods

No methods defined with class "TotalVarNeighborhood" in the signature.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[TotalVarNeighborhood](#), [UncondNeighborhood-class](#)

Examples

```
new("TotalVarNeighborhood")
```

UncondNeighborhood-class

Unconditional neighborhood

Description

Class of unconditional (errors-in-variables) neighborhoods.

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

type Object of class "character": type of the neighborhood.

radius Object of class "numeric": neighborhood radius.

Extends

Class "Neighborhood", directly.

Author(s)

Matthias Kohl <Matthias.Kohl@stamats.de>

References

Rieder, H. (1994) *Robust Asymptotic Statistics*. New York: Springer.

Kohl, M. (2005) *Numerical Contributions to the Asymptotic Theory of Robustness*. Bayreuth: Dissertation.

See Also

[Neighborhood-class](#)

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