Package ‘pbo’

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R topics documented:

  pbo-package ................................................................. 2
dotplot.pbo ................................................................. 2
pbo-package

Probability of backtest overfitting.

Description

Computes the probability of backtest overfitting

Details

Implements algorithms for computing the probability of backtest overfitting, performance degradation and probability of loss, and first- and second-order stochastic dominance, based on the approach specified in Bailey et al., September 2013. Provides a collection of pre-configured plots based on lattice graphics.

Author(s)

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References


dotplot.pbo

PBO in-sample selection dot plot.

Description

Draws an annotated dot plot of study selection sorted by in-sample selection frequency.
Usage

```r
## S3 method for class 'pbo'
dotplot(
  x,
  data = NULL,
  main,
  xlab = "Sorted Study Number (N)",
  ylab = "IS Selection Frequency",
  show_config = TRUE,
  show_grid = TRUE,
  sel_threshold = 0,
  ...
)
```

Arguments

- **x**: a `pbo` object as returned by `pbo`.
- **data**: should not be used.
- **main**: plot title, default computed internally, passed to `dotplot`.
- **xlab**: x-axis label with default, passed to `dotplot`.
- **ylab**: y-axis label with default, passed to `dotplot`.
- **show_config**: whether to show the study dimension annotations, default TRUE.
- **show_grid**: whether to show the grid panel, default TRUE.
- **sel_threshold**: the minimum in-sample frequency subsetting threshold, default 0; selection frequencies at or below this value will be omitted.
- **...**: other parameters as passed to `dotplot`.

See Also

- `pbo`, `histogram.pbo`, `xyplot.pbo`

See Also

- `pbo`, `histogram.pbo`, `xyplot.pbo`

Description

- Draws an annotated histogram of PBO rank logits.
Usage

## S3 method for class 'pbo'

```r
histogram(
  x,
  data = NULL,
  show_pbo = TRUE,
  show_regions = TRUE,
  show_config = TRUE,
  col_bar = "#cc99cc",
  col_line = "#3366cc",
  ...
)
```

Arguments

- **x**: an object of class `pbo` as returned by `pbo`.
- **data**: should not be used
- **show_pbo**: whether to show the PBO value annotation, default TRUE
- **show_regions**: whether to show the overfit region annotations, default TRUE
- **show_config**: whether to show the study dimension annotations, default TRUE
- **col_bar**: histogram bar fill color passed to histogram panel
- **col_line**: density plot line color passed to density plot panel
- **...**: other parameters passed to `histogram`, `densityplot`, or `panel.abline`.

Details

Uses `lattice` function `histogram`, `densityplot`, and `panel.abline` panels together with class-specific annotations.

See Also

- `pbo`, `dotplot.pbo`, `xyplot.pbo`

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**pbo**

*Probability of backtest overfitting*

Description

Performs the probability of backtest overfitting computations.

Usage

```r
pbo(m, s = 4, f = NA, threshold = 0, inf_sub = 6, allow_parallel = FALSE)
```
Arguments

- **m**: A $T \times N$ data frame of returns, where $T$ is the samples per study and $N$ is the number of studies.
- **s**: The number of subsets of $m$ for CSCV combinations; must evenly divide $m$.
- **f**: The function to evaluate a study’s performance; required.
- **threshold**: The performance metric threshold (e.g. 0 for Sharpe, 1 for Omega).
- **inf_sub**: Infinity substitution value for reasonable plotting.
- **allow_parallel**: Whether to enable parallel processing, default FALSE.

Details

This function performs the probability of backtest overfitting calculation using a combinatorially-symmetric cross validation (CSCV) approach.

Value

Object of class `pbo` containing list of PBO calculation results and settings.

References


Examples

```r
## Not run:
require(pbo)
require(PerformanceAnalytics)
n <- 100
t <- 1000
s <- 8
m <- data.frame(matrix(rnorm(n*t,mean=0,sd=1),
nrow=t,ncol=n,byrow=TRUE,
dimnames=list(1:t,1:n)),
check.names=FALSE)
p <- pbo(m,s,f=Omega,threshold=1)
## End(Not run)
```

Description

Writes grid text to a default predetermined location.
Usage

pbo_show_config(p)

Arguments

p an object of class pbo as returned by pbo.

Note

Meant for internal use only.

Description

Draws an annotated plot of performance degradation and probability of loss.

Usage

```r
## S3 method for class 'pbo'
xyplot(
  x,
  data = NULL,
  plotType = "cscv",
  show_eqn = TRUE,
  show_threshold = TRUE,
  show_config = TRUE,
  show_rug = TRUE,
  show_prob = TRUE,
  show_grid = TRUE,
  increment = 0.01,
  osr_threshold = 0,
  sel_threshold = 0,
  xlab,
  ylab,
  main,
  lwd = 1,
  ylab_left,
  ylab_right,
  col_bar,
  col_line,
  col_sd1 = "#3366cc",
  col_sd2 = "#339999",
  lty_sd = c(1, 2, 4),
  ...
)
```
Arguments

- **x**: a pbo object as returned by `pbo`.
- **data**: should not be used.
- **plotType**: one of `cscv`, `degradation`, `dominance`, `pairs`, `ranks` or `selection`.
- **show_eqn**: whether to show the line equation annotation, default TRUE
- **show_threshold**: whether to show the probability of loss annotation, default TRUE
- **show_config**: whether to show the study dimension annotations, default TRUE
- **show_rug**: whether to show scatter rugs near the axes, default TRUE
- **show_prob**: whether to show the probability value in dominance plot, default TRUE
- **show_grid**: whether to show the panel grid, default TRUE
- **increment**: stochastic dominance distribution generator increment, e.g. 0.1 steps
- **osr_threshold**: out-of-sample rank threshold for filtering, default 0
- **sel_threshold**: selection frequency threshold for filtering, default 0
- **xlab**: x-axis label, default computed if not provided
- **ylab**: y-axis label, default computed if not provided
- **main**: plot title, default computed if not provided
- **lwd**: line width, default 1, passed to panels and legends
- **ylab_left**: dominance plot left-hand axis label
- **ylab_right**: dominance plot right-hand axis label
- **col_bar**: histogram bar fill color
- **col_line**: density plot line color
- **col_sd1**: color of two first-order stochastic dominance lines
- **col_sd2**: color of the single second-order stochastic dominance line
- **lty_sd**: line type array for stochastic dominance plot, e.g. c(2,3,5)
  ...
  other parameters passed to `xyplot` or its panels

Details

Provides several variations of xy-plots suitable for presentation of PBO analysis results. Use the `plotType` argument to indicate which variation or result to plot:

- The `cscv` type shows in-sample and out-of-sample results by CSCV iteration case (default).
- The `degradation` type shows the performance degradation regression fit results and the probability of loss.
- The `dominance` type shows the results of the first-order and second-order stochastic dominance analysis using two axes.
- The `pairs` type shows the in-sample and out-of-sample case selections.
- The `ranks` type shows the sorted performance ranks results.
- The `selection` type shows the case selection frequencies.

See Also

- `pbo`, `histogram.pbo`, `xyplot.pbo`
Index

* CSCV
  pbo, 4
  pbo-package, 2
  xyplot.pbo, 6

* PBO
  pbo, 4
  pbo-package, 2
  xyplot.pbo, 6

* backtest
  dotplot.pbo, 2
  pbo, 4
  pbo-package, 2

* overfitting
  dotplot.pbo, 2
  pbo, 4
  pbo-package, 2

* pbo
  dotplot.pbo, 2

* probability
  pbo, 4
  pbo-package, 2

  densityplot, 4
  dotplot, 3
  dotplot.pbo, 2

  histogram, 4
  histogram.pbo, 3

  panel.abline, 4
  pbo, 3, 4, 6, 7
  pbo-package, 2
  pbo_show_config, 5

  xyplot, 7
  xyplot.pbo, 6