Package ‘rrscale’

May 26, 2020

Title Robust Re-Scaling to Better Recover Latent Effects in Data

Version 1.0


Date 2020-5-22

Depends R (>= 3.5.0)

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.0.2

Imports DEoptim, nloptr, abind

Suggests knitr, rmarkdown, testthat, ggplot2, reshape2

VignetteBuilder knitr

NeedsCompilation no

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Repository CRAN

Date/Publication 2020-05-26 11:30:02 UTC

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asinh

Arc-hyperbolic-sine transformation

Description

• T the transformation with arguments Y, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.

• T_deriv the transformation with arguments Y, the data, lambda the parameter.

Usage

asinh

Format

An object of class list of length 2.

box_cox

Traditional box-cox power transformation. Accepts one real parameter.

Description

• T the transformation with arguments Y, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.

• T_deriv the transformation with arguments Y, the data, lambda the parameter.

Usage

box_cox
**box_cox_exp**

**Format**

An object of class `list` of length 2.

**Description**

- T the transformation with arguments Y, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.
- T_deriv the transformation with arguments Y, the data, lambda the parameter.

**box_cox_exp**

*Exponential of the traditional box-cox transformation*

**Usage**

`box_cox_exp`

**Format**

An object of class `list` of length 2.

**box_cox_negative**

*A generalized box-cox transformation that can handle negative data*

**Description**

- T the transformation with arguments Y, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.
- T_deriv the transformation with arguments Y, the data, lambda the parameter.

**Usage**

`box_cox_negative`

**Format**

An object of class `list` of length 2.
box_cox_plus1  
*Box-cox transformation with a shift of 1 added to the data*

**Description**

- $T$ the transformation with arguments $Y$, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.
- $T_{\text{deriv}}$ the transformation with arguments $Y$, the data, lambda the parameter.

**Usage**

`box_cox_plus1`

**Format**

An object of class `list` of length 2.

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box_cox_plusmin  
*Box-cox transformation with the data shifted so that it is positive*

**Description**

- $T$ the transformation with arguments $Y$, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.
- $T_{\text{deriv}}$ the transformation with arguments $Y$, the data, lambda the parameter.

**Usage**

`box_cox_plusmin`

**Format**

An object of class `list` of length 2.
**box_cox_shift**  

*Box-cox transformation of shifted variable*

**Description**

- $T$ the transformation with arguments $Y$, the data, lambda the parameter, and boolean inverse to calculate inverse transformation. The parameter lambda has two real elements (1) the power and (2) the additive shift to the data.

- $T_{\text{deriv}}$ the transformation with arguments $Y$, the data, lambda the parameter.

**Usage**

```r
box_cox_shift
```

**Format**

An object of class `list` of length 2.

---

**center**  

*Centers the data column-wise*

**Description**

Centers the data column-wise

**Usage**

```r
center(x)
```

**Arguments**

- `x`  
  the data.
gm_mean  

*Calculate the geometric mean*

**Description**
Calculate the geometric mean

**Usage**
gm_mean(x)

**Arguments**
x  
the data.

**Examples**
Y <- rlnorm(10)
gm <- gm_mean(Y)

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**log_box_cox**

*Log of the traditional box-cox transformation*

**Description**

- T the transformation with arguments Y, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.
- T_deriv the transformation with arguments Y, the data, lambda the parameter.

**Usage**

log_box_cox

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**list_transformations**  

*List possible transformations*

**Description**

Returns list of transformations. Each transformation is a transformation function (“T”) accepting a parameter and the derivative of this transformation function (“T_deriv”).

**Usage**

list_transformations()
power

Format
An object of class list of length 2.

---

power Simple power transformation

Description
- T the transformation with arguments Y, the data, lambda the parameter, and boolean inverse to calculate inverse transformation.
- T_deriv the transformation with arguments Y, the data, lambda the parameter.

Usage

power

Format
An object of class list of length 2.

---

rrscale Re-scale a data matrix

Description
This transformation is three steps (1) Gaussianize the data, (2) z-score Transform the data, and (3) remove extreme outliers from the data. The sequence of these transformations helps focus further analyses on consequential variance in the data rather than having it be focused on variation resulting from the feature’s measurement scale or outliers.

Usage

rrscale(
  Y,
  trans_list = list(box_cox_negative = box_cox_negative, asinh = asinh),
  lims_list = list(box_cox_negative = c(-100, 100), asinh = list(0, 100)),
  opt_control = NULL,
  opt_method = "DEoptim",
  z = 4,
  q = 0.001,
  verbose = FALSE,
  log_dir = ".rrscale/",
  zeros = FALSE,
  opts = FALSE,
  seed = NULL
)
  )
Arguments

Y  Data matrix, data.frame, or list of vectors, to be transformed.

trans_list  List of transformations to be considered. See function list_transformations.
Each element of the list should be a list containing the transformation function as the first
element and the derivative of the transformation function as the second argument. The first argument
of each function should be the data, the second the transformation parameter.

lims_list  List of optimization limits for each transformation from trans_list. This should
be a list the same length as trans_list. Each element of the list is a two-
element vector that sets the optimization limits for the parameter of each trans-
formation family.

opt_control  Optional optimization controlling parameters for DEoptim control argument.
See the DEoptim package for details.

opt_method  Which optimization method to use. Defaults to DEoptim. Other choice is nloptr.

z  The O-step cutoff value. Points are removed if their robust z-score is above z in
magnitude.

q  The Z-step winsorizing quantile cutoff. The quantile at which to winsorize the
data when calculating the robust z-scores.

verbose  a boolean, if TRUE then save optimization output in log_dir.

log_dir  directory for verbose output. Defaults to ".rrscale/

zeros  How to deal with zeros in the data set. If set to FALSE the algorithm will fail if
it encounters a zero. If set to a number or 'NA' then the zeros are replaced by
this number or 'NA'.

opts  Boolean determining if optimization output is returned. Defaults to FALSE.

seed  Sets the seed before running any other analyses.

Value

A list of output:

- opts: the optimization output for all transformation families and all columns
- pars: the optimal parameters for each column for the optimal family
- par_hat: the estimated optimal parameter
- NT: the original data
- RR: the robust-rescaled data
- G: gaussianized data
- Z: robust z-transformed data
- O: data with outliers removed
- rr_fn: a function to apply the estimated RR transformation to new data. Takes arguments
  - Y: the data,
  - z: the z-score cutoff (defaults to 4),
  - q: the winsorizing quantile cutoff (defaults to 0.001),
svdc

- lambda: the transformation parameter to use (defaults to the estimated one),
- T: the transformation function family (defaults to the optimal estimated family),
- mu: the mean to be used in the robust z-score step (re-estimates if NULL)
- sigma: the s.d. to be used in the robust z-score step (re-estimates if NULL)

• T: the optimal family
• T_deriv: the derivative of the optimal family
• T_name: name of the optimal family
• alg_control: the parameters passed to the algorithm

Examples

Y <- rlnorm(10)%*%t(rlnorm(10))
rr.out <- rrscale(Y)
Yt <- rr.out$RR

svdc

The completed SVD

Description

This calculates right and left singular vectors of a data matrix possibly containing missing values.

Usage

svdc(X, nu = NULL, nv = NULL)

Arguments

X the data matrix of which to calculate the completed SVD.

nu the number of left singular vectors to calculate

nv the number of right singular vectors to calculate

Examples

Y <- rlnorm(10)%*%t(rlnorm(10))
Y[1,1] <- NA
svdc.out <- svdc(Y)
Description

Winsorizes the data

Usage

winsor(x, fraction = 0.01)

Arguments

x the data.

fraction the top and bottom quantiles to cap.

Examples

Y <- rlnorm(10) %*% t(rlnorm(10))
Yw <- winsor(Y, 1E-2)
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