

Package: Transform (via r-universe)

November 1, 2024

Type Package

Title Statistical Transformations

Version 1.0

Date 2023-06-07

Depends R (>= 3.2.0)

Author Muge Coskun Yildirim [aut], Osman Dag [aut, cre]

Maintainer Osman Dag <osman.dag@outlook.com>

Description Performs various statistical transformations; Box-Cox and Log (Box and Cox, 1964) <doi:10.1111/j.2517-6161.1964.tb00553.x>, Glog (Durbin et al., 2002) <doi:10.1093/bioinformatics/18.suppl_1.S105>, Neglog (Whittaker et al., 2005) <doi:10.1111/j.1467-9876.2005.00520.x>, Reciprocal (Tukey, 1957), Log Shift (Feng et al., 2016) <doi:10.1002/sta4.104>, Bickel-Docksum (Bickel and Doksum, 1981) <doi:10.1080/01621459.1981.10477649>, Yeo-Johnson (Yeo and Johnson, 2000) <doi:10.1093/biomet/87.4.954>, Square Root (Medina et al., 2019), Manly (Manly, 1976) <doi:10.2307/2988129>, Modulus (John and Draper, 1980) <doi:10.2307/2986305>, Dual (Yang, 2006) <doi:10.1016/j.econlet.2006.01.011>, Gpower (Kelmansky et al., 2013) <doi:10.1515/sagmb-2012-0030>. It also performs graphical approaches, assesses the success of the transformation via tests and plots.

License GPL (>= 2)

NeedsCompilation no

Date/Publication 2023-06-08 17:42:53 UTC

Repository https://osmandag.r-universe.dev

RemoteUrl https://github.com/cran/Transform

RemoteRef HEAD

RemoteSha 151918fbc8e1e535dc8c7cf9a576c8f7346b7eea

Contents

bcTransform	2
bdTransform	4
dlTransform	5
glTransform	7
gpTransform	8
lgTransform	10
lsTransform	11
mdTransform	13
mnTransform	14
nlTransform	16
rpTransform	17
ssTransform	18
Transform	20
yjTransform	21
Index	23

bcTransform	<i>Box-Cox Transformation for Normality</i>
-------------	---

Description

bcTransform performs Box-Cox transformation for normality of a variable and provides graphical analysis.

Usage

```
bcTransform(data, lambda = seq(-3,3,0.01), lambda2 = NULL, plot = TRUE,
  alpha = 0.05, verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (-3,3) with increment 0.01.
lambda2	a numeric for an additional shifting parameter. Default is set to lambda2 = NULL.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Box-Cox power transformation is defined by:

$$y' = \begin{cases} \frac{y^\lambda - 1}{\lambda}, & \text{if } \lambda \neq 0 \\ \log(y), & \text{if } \lambda = 0 \end{cases}$$

If the data include any non- positive observations, a shifting parameter λ_2 can be included in the transformation given by:

$$y' = \begin{cases} \frac{(y+\lambda_2)^\lambda - 1}{\lambda}, & \text{if } \lambda \neq 0 \\ \log(y + \lambda_2), & \text{if } \lambda = 0 \end{cases}$$

Value

A list with class "bc" containing the following elements:

method	method to estimate Box-Cox transformation parameter
lambda.hat	estimate of Box-Cox Power transformation parameter
lambda2	additional shifting parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

Box, G.E., Cox, D.R. (1964). An Analysis of Transformations. *Journal of the Royal Statistical Society: Series B (Methodological)*, **26:2**, 211–43.

Examples

```
data <- cars$dist

library(Transform)
out <- bcTransform(data)
out$lambda.hat # the estimate of Box-Cox parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

bdTransform	<i>Bickel-Docksum Transformation for Normality</i>
-------------	--

Description

bdTransform performs Bickel-Docksum transformation for normality of a variable and provides graphical analysis.

Usage

```
bdTransform(data, lambda = seq(0.01,6,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (0.01,6) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Bickel-Docksum power transformation is defined by:

$$y' = \frac{|y|^\lambda \text{Sign}(y) - 1}{\lambda}, \text{ if } \lambda > 0$$

Value

A list with class "bd" containing the following elements:

method	method to estimate Bickel-Docksum transformation parameter
lambda.hat	estimate of Bickel-Docksum transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

Bickel, P.J., Doksum, K.A. (1981). An Analysis of Transformations Revisited. *Journal of the American Statistical Association*, **76:374**, 296–311.

Examples

```
data <- cars$dist

library(Transform)
out <- bdTransform(data)
out$lambda.hat # the estimate of Bickel-Docksum parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

dlTransform	<i>Dual Transformation for Normality</i>
-------------	--

Description

dlTransform performs Dual transformation for normality of a variable and provides graphical analysis.

Usage

```
dlTransform(data, lambda = seq(0,6,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (0,6) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Dual power transformation is defined by:

$$y' = \begin{cases} \frac{y^\lambda - y^{-\lambda}}{2\lambda}, & \text{if } \lambda > 0 \\ \log(y), & \text{if } \lambda = 0 \end{cases}$$

Value

A list with class "dl" containing the following elements:

method	method to estimate Dual transformation parameter
lambda.hat	estimate of Dual transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

Yang, Z. (2006). A Modified Family of Power Transformations. *Economics Letters*. **92:1**, 14–9.

Examples

```
data <- cars$dist

library(Transform)
out <- dlTransform(data)
out$lambda.hat # the estimate of Dual parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

glTransform

Glog Transformation for Normality

Description

glTransform performs Glog transformation for normality of a variable and provides graphical analysis.

Usage

```
glTransform(data, plot = TRUE, alpha = 0.05, verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Glog power transformation is defined by:

$$y' = \log(y + \sqrt{y^2 + 1})$$

Value

A list with class "gl" containing the following elements:

method	method name
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

Durbin, B.P., Hardin, J.S., Hawkins, D.M., Rocke, D.M. (2002). A Variance-Stabilizing Transformation for Gene-expression Microarray Data. *Bioinformatics*, **18(suppl_1)**, 105–110.

Examples

```
data <- cars$dist

library(Transform)
out <- glTransform(data)
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

gpTransform

Gpower Transformation for Normality

Description

gpTransform performs Gpower transformation for normality of a variable and provides graphical analysis.

Usage

```
gpTransform(data, lambda = seq(-3,3,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (-3,3) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Gpower power transformation is defined by:

$$y' = \begin{cases} \frac{(y + \sqrt{y^2 + 1})^\lambda - 1}{\lambda}, & \text{if } \lambda \neq 0 \\ \log(y + \sqrt{y^2 + 1}), & \text{if } \lambda = 0 \end{cases}$$

Value

A list with class "gp" containing the following elements:

method	method to estimate Gpower transformation parameter
lambda.hat	estimate of Gpower transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

- Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.
- Kelmansky, D.M., Martinez, E.J., Leiva, V. (2013). A New Variance Stabilizing Transformation for Gene Expression Data Analysis. *Statistical Applications in Genetics and Molecular Biology*, **12:6**, 653–66.

Examples

```
data <- cars$dist

library(Transform)
out <- gpTransform(data)
out$lambda.hat # the estimate of Gpower parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

lgTransform

*Log Transformation for Normality***Description**

lgTransform performs Log transformation for normality of a variable and provides graphical analysis.

Usage

```
lgTransform(data, lambda2 = NULL, plot = TRUE, alpha = 0.05, verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda2	a numeric for an additional shifting parameter. Default is set to lambda2 = NULL.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Log power transformation is defined by:

$$y' = \log(y)$$

If the data include any nonpositive observations, a shifting parameter λ_2 can be included in the transformation given by:

$$y' = \log(y + \lambda_2)$$

Value

A list with class "lg" containing the following elements:

method	method name
lambda2	additional shifting parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

Box, G.E., Cox, D.R. (1964). An Analysis of Transformations. *Journal of the Royal Statistical Society: Series B (Methodological)*, **26:2**, 211–43.

Examples

```
data <- cars$dist

library(Transform)
out <- lgTransform(data)
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

lsTransform

Log-shift Transformation for Normality

Description

lsTransform performs Log-shift transformation for normality of a variable and provides graphical analysis.

Usage

```
lsTransform(data, lambda = seq(-3,3,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (-3,3) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Log-shift power transformation is defined by:

$$y' = \log(y + \lambda)$$

Value

A list with class "ls" containing the following elements:

method	method to estimate Log-shift transformation parameter
lambda.hat	estimate of Log-shift transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

- Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.
- Feng, Q., Hannig, J., Marron, J. (2015). A Note on Automatic Data Transformation. *Stat*, **5:1**, 82–7.

Examples

```
data <- cars$dist

library(Transform)
out <- lsTransform(data)
out$lambda.hat # the estimate of Log-shift parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

mdTransform	<i>Modulus Transformation for Normality</i>
-------------	---

Description

mdTransform performs Modulus transformation for normality of a variable and provides graphical analysis.

Usage

```
mdTransform(data, lambda = seq(-3,3,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (-3,3) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Modulus power transformation is defined by:

$$y' = \begin{cases} \text{Sign}(y) \frac{(|y|+1)^\lambda - 1}{\lambda}, & \text{if } \lambda \neq 0 \\ \text{Sign}(y) \log(|y| + 1), & \text{if } \lambda = 0 \end{cases}$$

Value

A list with class "md" containing the following elements:

method	method to estimate Modulus transformation parameter
lambda.hat	estimate of Modulus transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

John, J., Draper, N.R. (1980). An Alternative Family of Transformations. *Journal of the Royal Statistical Society Series C: Applied Statistics*, **29:2**, 190–7.

Examples

```
data <- cars$dist

library(Transform)
out <- mdTransform(data)
out$lambda.hat # the estimate of Modulus parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

mnTransform

Manly Transformation for Normality

Description

mnTransform performs Manly transformation for normality of a variable and provides graphical analysis.

Usage

```
mnTransform(data, lambda = seq(-3,3,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (-3,3) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Manly power transformation is defined by:

$$y' = \begin{cases} \frac{e^{\lambda y} - 1}{\lambda}, & \text{if } \lambda \neq 0 \\ y, & \text{if } \lambda = 0 \end{cases}$$

Value

A list with class "mn" containing the following elements:

method	method to estimate Manly transformation parameter
lambda.hat	estimate of Manly transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

Manly, B.F. (1976). Exponential Data Transformations. *Journal of the Royal Statistical Society: Series D (The Statistician)*, **25:1**, 37–42.

Examples

```
data <- cars$dist

library(Transform)
out <- mnTransform(data)
out$lambda.hat # the estimate of Manly parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

nlTransform

Neglog Transformation for Normality

Description

nlTransform performs Neglog transformation for normality of a variable and provides graphical analysis.

Usage

```
nlTransform(data, plot = TRUE, alpha = 0.05, verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Neglog power transformation is defined by:

$$y' = \text{Sign}(y) \log(|y| + 1)$$

Value

A list with class "nl" containing the following elements:

method	method name
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.

Whittaker, J., Whitehead, C., Somers, M. (2005). The Neglog Transformation and Quantile Regression for the Analysis of a Large Credit Scoring Database. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, **54:5**, 863–78.

Examples

```
data <- cars$dist

library(Transform)
out <- nlTransform(data)
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

rpTransform	<i>Reciprocal Transformation for Normality</i>
-------------	--

Description

rpTransform performs Reciprocal transformation for normality of a variable and provides graphical analysis.

Usage

```
rpTransform(data, plot = TRUE, alpha = 0.05, verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Dual power transformation is defined by:

$$y' = \frac{1}{y}$$

Value

A list with class "rp" containing the following elements:

method	method name
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

- Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.
- Tukey, J.W. (1957). On the Comparative Anatomy of Transformations. *The Annals of Mathematical Statistics*, 602–32.

Examples

```
data <- cars$dist

library(Transform)
out <- rpTransform(data)
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

ssTransform

Square Root Transformation for Normality

Description

ssTransform performs Square Root transformation for normality of a variable and provides graphical analysis.

Usage

```
ssTransform(data, lambda = seq(-3,3,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (-3,3) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Square Root power transformation is defined by:

$$y' = \sqrt{y + \lambda}$$

Value

A list with class "ss" containing the following elements:

method	method to estimate Square Root transformation parameter
lambda.hat	estimate of Square Root transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

- Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.
- Medina, L., Castro, P., Kreutzmann, A. (2018). Rojas-Perilla N. trafo: Estimation, Comparison and Selection of Transformations. *R package version*. **1.0.1**.

Examples

```

data <- cars$speed

library(Transform)
out <- ssTransform(data)
out$lambda.hat # the estimate of Square Root parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set

```

Transform

Statistical Transformations for Normality

Description

Transform performs transformations for normality of a variable and provides graphical analysis.

Usage

```

Transform(data, method = "dl", lambda = seq(0,6,0.01), lambda2 = NULL, plot = TRUE,
  alpha = 0.05, verbose = TRUE)

```

Arguments

data	a numeric vector of data values.
method	a character string. Different transformation methods can be used for the estimation of the optimal transformation parameter: Box-Cox ("bc"), Log-shift ("ls"), Bickel-Doksum ("bd"), Yeo-Johnson ("yj"), Square Root ("ss"), Manly ("mn"), Modulus ("md"), Dual ("dl"), Gpower ("gp"), Log ("lg"), Glog ("gl"), Neglog ("nl"), Reciprocal ("rp"). Default is set to method = "dl".
lambda	a vector which includes the sequence of candidate lambda values. Please see the corresponding method to learn the lambda range. Default is set to (0,6) with increment 0.01.
lambda2	a numeric for an additional shifting parameter. Please see the corresponding method to learn the lambda2. Default is set to lambda2 = NULL.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Value

See the corresponding transformation method.

Author(s)

Muge Coskun Yildirim, Osman Dag

Examples

```
data <- cars$dist

library(Transform)
out <- Transform(data, method = "bc")
out$lambda.hat # the estimate of Box-Cox parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

 yjTransform

Yeo- Johnson Transformation for Normality

Description

yjTransform performs Yeo- Johnson transformation for normality of a variable and provides graphical analysis.

Usage

```
yjTransform(data, lambda = seq(-3,3,0.01), plot = TRUE, alpha = 0.05,
  verbose = TRUE)
```

Arguments

data	a numeric vector of data values.
lambda	a vector which includes the sequence of candidate lambda values. Default is set to (-3,3) with increment 0.01.
plot	a logical to plot histogram with its density line and qqplot of raw and transformed data. Defaults plot = TRUE.
alpha	the level of significance to check the normality after transformation. Default is set to alpha = 0.05.
verbose	a logical for printing output to R console.

Details

Denote y the variable at the original scale and y' the transformed variable. The Yeo-Johnson power transformation is defined by:

$$y' = \begin{cases} \frac{(y+1)^\lambda - 1}{\lambda}, & \text{if } \lambda \neq 0, y \geq 0 \\ \log(y + 1), & \text{if } \lambda = 0, y \geq 0 \\ \frac{(1-y)^{2-\lambda} - 1}{\lambda - 2}, & \text{if } \lambda \neq 2, y < 0 \\ -\log(1 - y), & \text{if } \lambda = 2, y < 0 \end{cases}$$

Value

A list with class "yj" containing the following elements:

method	method to estimate Yeo-Johnson transformation parameter
lambda.hat	estimate of Yeo-Johnson transformation parameter
statistic	Shapiro-Wilk test statistic for transformed data
p.value	Shapiro-Wilk test p.value for transformed data
alpha	level of significance to assess normality
tf.data	transformed data set
var.name	variable name

Author(s)

Muge Coskun Yildirim, Osman Dag

References

- Asar, O., Ilk, O., Dag, O. (2017). Estimating Box-Cox Power Transformation Parameter via Goodness of Fit Tests. *Communications in Statistics - Simulation and Computation*, **46:1**, 91–105.
- Yeo, I.K., Johnson, R.A. (2000). A New Family of Power Transformations to Improve Normality or Symmetry. *Biometrika*, **87:4**, 954–9.

Examples

```
data <- cars$dist

library(Transform)
out <- yjTransform(data)
out$lambda.hat # the estimate of Yeo- Johnson parameter based on Shapiro-Wilk test statistic
out$p.value # p.value of Shapiro-Wilk test for transformed data
out$tf.data # transformed data set
```

Index

* functions

- bcTransform, 2
- bdTransform, 4
- dlTransform, 5
- glTransform, 7
- gpTransform, 8
- lgTransform, 10
- lsTransform, 11
- mdTransform, 13
- mnTransform, 14
- nlTransform, 16
- rpTransform, 17
- ssTransform, 18
- Transform, 20
- yjTransform, 21

- bcTransform, 2
- bdTransform, 4

- dlTransform, 5

- glTransform, 7
- gpTransform, 8

- lgTransform, 10
- lsTransform, 11

- mdTransform, 13
- mnTransform, 14

- nlTransform, 16

- rpTransform, 17

- ssTransform, 18

- Transform, 20

- yjTransform, 21