

# Package ‘AutoTransQF’

May 6, 2026

**Type** Package

**Title** A Novel Automatic Shifted Log Transformation

**Version** 0.1.3

**Date** 2023-09-13

**Description** A novel parametrization of log transformation and a shift parameter to automate the transformation process are proposed in R package 'AutoTransQF' based on Feng et al. (2016). Please read Feng et al. (2016) <[doi:10.1002/sta4.104](https://doi.org/10.1002/sta4.104)> for more details of the method.

**License** GPL-3

**URL** <https://github.com/yyuehhu/AutoTransQF>

**Imports** VGAM, matlab2r, moments, stats (>= 4.2.2)

**Suggests** nortest

**LazyData** true

**RoxygenNote** 7.2.3

**Encoding** UTF-8

**Depends** R (>= 3.5)

**NeedsCompilation** no

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**Repository** CRAN

**Date/Publication** 2023-09-15 19:14:40 UTC

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AutoTransQF-package    *A Novel Automatic Shifted Log Transformation*

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**Description**

The R package AutoTransQF based on Feng et al.(2016) introduces a novel parametrization of log transformation and a shift parameter to automate the transformation process. Please read Feng et al. (2016) <doi: 10.1002/sta4.104> for more details of the method.

**Author(s)**

Yue Hu [aut, cre], Hyeon Lee [aut], J. S. Marron [aut]

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ADStatQF                      *Calculates Anderson-Darling Test Statistic*

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**Description**

The function is used to calculate the Anderson-Darling test statistic of standard normal distribution. The input needs to be vectors with seven or more entries.

**Usage**

```
## Calculate Anderson-Darling test statistic for vector x:  
ADStatQF(x)
```

**Arguments**

x                      a vector with seven or more entries.

**Value**

Returns the Anderson-Darling test statistic for the given vector.

**Author(s)**

Yue Hu, Hyeon Lee, J. S. Marron

**References**

Feng, Q. , Hannig J. , Marron, J. S. (2016). A Note on Automatic Data Transformation. STAT, 5, 82-87. doi: 10.1002/sta4.104

**See Also**

[autotransfuncQF](#), [AutoTransQF](#)

## Examples

```
## Generate a vector z from normal distribution with mean 0 and standard deviation 6.
z = rnorm(10, mean = 0, sd = 6)

## Calculate the Anderson-Darling test statistic for z
ADStatQF(z)
```

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autotransfuncQF      *Transforms Individual Vectors into Normality*

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## Description

This function transforms individual vectors into normality. Paper from Feng et al. (2016) includes more details about the transformation mechanism.

## Usage

```
autotransfuncQF(vari, istat, paraindex)
```

## Arguments

vari	a vector needs to be transformed
istat	a value representing the type of test statistic for evaluation of normality of the transformed vector. If istat = 1, Anderson-Darling test statistic is chosen; if istat = 2, standard skewness statistic is chosen.
paraindex	a value delivered to calculate the specific shift parameter beta

## Value

Returns a transformed vector with the shift parameter calculated by the input paraindex

## Author(s)

Yue Hu, Hyeon Lee, J. S. Marron

## References

Feng, Q. , Hannig J. , Marron, J. S. (2016). A Note on Automatic Data Transformation. STAT, 5, 82-87. doi: 10.1002/sta4.104

## See Also

[ADStatQF](#), [AutoTransQF](#)

**Examples**

```
## Generate a vector vec from Gamma distribution with parameters shape 1 and scale 2.
vec = rgamma(50, shape = 1, scale = 2)

## Choose Anderson-Darling test statistic for transformed vector.
## Assign paraindex to be 0.9.
autotransfuncQF(vec, istat = 1, paraindex = 0.9)

## Choose skewness for transformed vector
## Assign paraindex to be 0.9
autotransfuncQF(vec, istat = 2, paraindex = 0.9)
```

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AutoTransQF

*Transforms Datasets into Normality*


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**Description**

This function helps to transform each vector of the matrix into normality based on the optimal test statistic of transformed vectors.

**Usage**

```
## The function tries to transform each vector of mdata into normality
AutoTransQF(mdata, paramstruct = list(istat, iscreenwrite, FeatureNames))
```

**Arguments**

mdata	the matrix needs to be transformed.
paramstruct	A list with three entries istat, iscreenwrite and FeatureNames respectively. Missing entries will be set to default.
istat	a value representing the type of test statistic for evaluation of normality of the transformed vector with default to be istat = 1. If istat = 1, Anderson-Darling test statistic is chosen; if istat = 2, standard skewness statistic is chosen.
iscreenwrite	Whether there is screenwrite with default to be iscreenwrite = 0. If iscreenwrite = 1, to write progress to screen; if iscreenwrite = 0, no screenwrite.
FeatureNames	Contains feature names of each vector with default to be 'Feature1'

**Value**

Returns a list with three elements:

data	the transformed matrix
beta	a list of all shift parameters beta
alpha	a list of all shift parameters alpha

**Note**

When a vector of the original matrix is not transformed, its corresponding alpha and beta are both -1.

**Author(s)**

Yue Hu, Hyeon Lee, J. S. Marron

**References**

Feng, Q. , Hannig J. , Marron, J. S. (2016). A Note on Automatic Data Transformation. *STAT*, 5, 82-87. doi: 10.1002/sta4.104

**See Also**

[ADStatQF](#), [autotransfuncQF](#)

**Examples**

```
## Create a random matrix x.
x = matrix(rgamma(40, shape = 1, scale = 2), nrow = 4)

## Transform matrix x in default setting and
## output transformed data
AutoTransQF(x)$data

## Transform matrix x in default setting and
## output a list of shift parameter beta
AutoTransQF(x)$beta

## Transform matrix x with feature names and
## output a list of shift parameter alpha
Names = c('Feature1', 'Feature2', 'Feature3', 'Feature4')
AutoTransQF(x, paramstruct = list(FeatureNames = Names))$alpha

## Transform matrix x with feature names, progress to screen,
## and apply standard skewness statistic to transformed vectors
AutoTransQF(x, paramstruct = list(istat = 2, iscreenwrite = 1, FeatureNames = Names))

## Transform matrix x with progress to screen and
## apply standard skewness statistic to transformed vectors
AutoTransQF(x, paramstruct = list(istat = 2, iscreenwrite = 1))
```

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Melanoma

*MelanomaFeatures from Miedema et al. (2012)*

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**Description**

The dataset from Miedema et al. (2012) is built based on 49 hematoxylin and eosin stained slides of distinctive melanocytic lesions.

**Usage**

Melanoma

**Format**

A data frame with 10152 observations on 49 variables where columns serve as data objects and rows serve as features. All 49 features are numeric variables including Area, Hu . 1, Hu . 2 etc.

**Source**

Miedema, Jayson, et al. (2012). Image and statistical analysis of melanocytic histology. *Histopathology*, 61(3), pp.436-444. doi: 10.1111/j.1365-2559.2012.04229.x

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