

Package ‘pguIMP’

May 9, 2026

Title Visually Guided Preprocessing of Bioanalytical Laboratory Data

Version 0.1.1

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Description Reproducible cleaning of biomedical laboratory data using visualization, error correction, and transformation methods implemented as interactive R notebooks. A detailed description of the methods can be found in Malkusch, S., Hahnefeld, L., Gurke, R. and J. Lotsch. (2021) <[doi:10.1002/psp4.12704](https://doi.org/10.1002/psp4.12704)>.

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Encoding UTF-8

URL <https://github.com/JornLotsch/pguIMP>

BugReports <https://github.com/JornLotsch/pguIMP/issues>

Imports R6 (>= 2.4.1), DT, DataVisualizations, dbscan, dplyr, e1071, finalfit, ggplot2, ggthemes, Hmisc, magrittr, MASS, RWeka, VIM, bbmle, grid, gridExtra, mice, nortest, outliers, plotly, psych, purrr, rcompanion, readr, readxl, rlang, rmarkdown, robust, shiny, stats, stringr, tibble, tidyr, tidyselect, tools, writexl

Collate 'dLogLikelihood.R' 'importDataSet.R' 'normalDistribution.R' 'pguCorrValidator.R' 'pguCorrelator.R' 'pguDMwR.R' 'pguFile.R' 'pguData.R' 'pguFilter.R' 'pguLimitsOfQuantification.R' 'pguImporter.R' 'pguStatus.R' 'pguReporter.R' 'pguExporter.R' 'pguValidator.R' 'pguImputation.R' 'pguOutlierDetection.R' 'pguOutliers.R' 'pguMissingsCharacterizer.R' 'pguMissings.R' 'pguNormalizer.R' 'sLogLikelihood.R' 'pguNormDist.R' 'pguModel.R' 'pguTransformer.R' 'pguOptimizer.R' 'pguExplorer.R' 'pguDelegate.R' 'transposeTibble.R' 'pguIMP.R' 'pguRegressor.R'

Suggests knitr, devtools, ellipsis (>= 0.3.2), roxygen2

NeedsCompilation no

RoxygenNote 7.3.3

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Repository CRAN

Date/Publication 2026-02-20 10:40:26 UTC

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Description

Reproducible cleaning of biomedical laboratory data using visualization, error correction, and transformation methods implemented as interactive R notebooks. A detailed description of the methods can be found in Malkusch, S., Hahnefeld, L., Gurke, R. and J. Lotsch. (2021) <doi:10.1002/psp4.12704>.

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References

Malkusch S, Hahnefeld L, Gurke R, Lotsch J (2021). "Visually guided preprocessing of bioanalytical laboratory data using an interactive R notebook (pguIMP)." *CPT: Pharmacometrics and Systems Pharmacology*, **10**(11), 1371–1381. doi:[10.1002/psp4.12704](https://doi.org/10.1002/psp4.12704)

Examples

```
# simple examples of the most important functions
```

centralValue*centralValue*

Description

Returns the central value of a variable.

Usage

```
centralValue(x, ws = NULL)
```

Arguments

x	variable
ws	weights

Details

Function that obtains a statistic of centrality of a variable, given a sample of values. If the variable is numeric it returns the median, if it is a factor it returns the mode. In other cases it tries to convert to a factor and then returns the mode. Taken from: <https://github.com/ltorgo/DMwR2/>

Value

central value

Author(s)

Luis Torgo

Examples

```
centralValue(x = seq(1,10,1))
```

dLogLikelihood

dLogLikelihood

Description

Calculates the log Likelihood of a normally distributed event.

Usage

```
dLogLikelihood(x = "numeric", pars = c(mu = 0, sigma = 1))
```

Arguments

<code>x</code>	The x-value(numeric)
<code>pars</code>	Numeric vector with two entries <code>c(mu, sigma)</code> . Where <code>mu</code> is the expectation value and <code>sigma</code> is the standard deviation. (numeric)

Value

The logLikelihood. (numeric)

Author(s)

Sebastian Malkusch

Examples

```
y <- pguIMP::dLogLikelihood(x=5, pars = c(mu=0.0, sigma=1.0))
```

importDataSet	<i>importDataSet</i>
---------------	----------------------

Description

Imports a data set to the shiny 'pguIMP' web interface. Extracts import options from a 'pguIMP::file' instance and imports the desired record based on the passed information.

Usage

```
importDataSet(obj = "pgu.file")
```

Arguments

obj Instance of the R6 class pguIMP::pgu.file.

Value

A data frame that contains the imported data (tibble::tibble)

Author(s)

Sebastian Malkusch

knnImputation	<i>knnImputation</i>
---------------	----------------------

Description

Imputes missings using kNN.

Usage

```
knnImputation(data, k = 10, scale = TRUE, meth = "weighAvg", distData = NULL)
```

Arguments

data	data frame containing missing values
k	number of nearest neighbors
scale	Indicates if data should be scaled
meth	Method for estimating the missing value
distData	Distance to the case

Details

Function that fills in all unknowns using the k Nearest Neighbours of each case with unknowns. By default it uses the values of the neighbours and obtains an weighted (by the distance to the case) average of their values to fill in the unknowns. If meth='median' it uses the median/most frequent value, instead. Taken from <https://github.com/ltorgo/DMwR2/>

Value

cleaned data

Author(s)

Luis Torgo

Examples

```
centralValue(x = seq(1,10,1))
```

 nnk

nnk

Description

Outlier detection using kth Nearest Neighbour Distance method Takes a dataset and finds its outliers using distance-based method

Usage

```
nnk(
  x,
  k = 0.05 * nrow(x),
  cutoff = 0.95,
  Method = "euclidean",
  rnames = FALSE,
  boottimes = 100
)
```

Arguments

x	dataset for which outliers are to be found
k	No. of nearest neighbours to be used, default value is 0.05*nrow(x)
cutoff	Percentile threshold used for distance, default value is 0.95
Method	Distance method, default is Euclidean
rnames	Logical value indicating whether the dataset has rownames, default value is False
boottimes	Number of bootstrap samples to find the cutoff, default is 100 samples

Details

nnk computes kth nearest neighbour distance of an observation and based on the bootstrapped cut-off, labels an observation as outlier. Outlierliness of the labelled 'Outlier' is also reported and it is the bootstrap estimate of probability of the observation being an outlier. For bivariate data, it also shows the scatterplot of the data with labelled outliers.

Value

Outlier Observations: A matrix of outlier observations

Location of Outlier: Vector of Sr. no. of outliers

Outlier probability: Vector of proportion of times an outlier exceeds local bootstrap cutoff

Author(s)

Vinay Tiwari, Akanksha Kashikar

References

Hautamaki, V., Karkkainen, I., and Franti, P. 2004. Outlier detection using k-nearest neighbour graph. In Proc. IEEE Int. Conf. on Pattern Recognition (ICPR), Cambridge, UK.

Examples

```
#Create dataset
X=iris[,1:4]
#Outlier detection
nnk(X,k=4)
```

normalDistribution *normalDistribution*

Description

Probability density distribution of a normally distributed variable.

Usage

```
normalDistribution(x = "numeric", mu = "numeric", sigma = "numeric")
```

Arguments

x	The x-value (numeric)
mu	The expectation value (numeric)
sigma	The standard deviation (numeric)

Details

Calculates $p(x | \mu, \sigma)$. Where p is the probability of observing an event x given the expected value μ and the standard deviation σ .

Value

The probability of observing event x given μ and σ . (numeric)

Author(s)

Sebastian Malkusch

Examples

```
y <- pguIMP::normalDistribution(x=5, mu=0.0, sigma=1.0)
```

pgu.correlator

pgu.correlator

Description

An R6 class that performs pairwise correlation on the pguIMP data set.

Format

[R6::R6Class] object.

Construction

```
x <- pguIMP::pgu.correlator$new()
```

Active bindings

`featureNames` Returns the instance variable `featureNames`. (character)

`setFeatureNames` Sets the instance variable `featureNames`. It further initializes the instance variables: `intercept`, `pIntercept`, `slope`, `pSlope`. (character)

`method` Returns the instance variable `method`. (character)

`r` Returns the instance variable `r`. (matrix)

`pPearson` Returns the instance variable `pPearson`. (matrix)

`tau` Returns the instance variable `tau`. (matrix)

`pKendall` Returns the instance variable `pKendall`. (matrix)

`rho` Returns the instance variable `rho`. (matrix)

`pSpearman` Returns the instance variable `pSpearman`. (matrix)

`abscissa` Returns the instance variable `abscissa`. (character)

setAbscissa Sets the instance variable abscicca to value.
 ordinate Returns the instance variable ordinate. (character)
 setOrdinate Sets the instance variable ordinate to value.
 test Returns the instance variable test. (stats::cor.test)

Methods

Public methods:

- `pgu.correlator$new()`
- `pgu.correlator$finalize()`
- `pgu.correlator$print()`
- `pgu.correlator$resetCorrelator()`
- `pgu.correlator$resetMatrix()`
- `pgu.correlator$featureIdx()`
- `pgu.correlator$calcCorrelationNumeric()`
- `pgu.correlator$createCorrelationMatrixPearson()`
- `pgu.correlator$createCorrelationMatrixKendall()`
- `pgu.correlator$createCorrelationMatrixSpearman()`
- `pgu.correlator$correlate()`
- `pgu.correlator$printFeature()`
- `pgu.correlator$printRTbl()`
- `pgu.correlator$printPPearsonTbl()`
- `pgu.correlator$printTauTbl()`
- `pgu.correlator$printPKendallTbl()`
- `pgu.correlator$printRhoTbl()`
- `pgu.correlator$printPSpearmanTbl()`
- `pgu.correlator$clone()`

Method `new()`: Creates and returns a new 'pgu.correlator' object.

Usage:

```
pgu.correlator$new(data = "tbl_df")
```

Arguments:

data The data to be modeled. (tibble::tibble)

Returns: A new 'pgu.correlator' object. (pguIMP::pgu.correlator)

Method `finalize()`: Clears the heap and indicates if instance of 'pgu.correlator' is removed from heap.

Usage:

```
pgu.correlator$finalize()
```

Method `print()`: Prints instance variables of a 'pgu.correlator' object.

Usage:

```
pgu.correlator$print()
```

Returns: string

Method `resetCorrelator()`: Performes pair-wise correlation analysis on the attributes of the data frame. Progresse is indicated by the progress object passed to the function.

Usage:

```
pgu.correlator$resetCorrelator(data = "tbl_df", progress = "Progress")
```

Arguments:

`data` Dataframe with at least two numeric attributes. (tibble::tibble)

`progress` Keeps track of the analysis progress. (shiny::Progress)

Method `resetMatrix()`: Creates a square matrix which dimension corresponds to the length of the instance variable `featureNames`. The matrix entries are set to a distict 'value'.

Usage:

```
pgu.correlator$resetMatrix(value = "numeric")
```

Arguments:

`value` The value the matrix entries are set to. (numeric)

Returns: A square matrix. (matrix)

Method `featureIdx()`: Determines the numerical index of the column of an attribute based on the attribute name.

Usage:

```
pgu.correlator$featureIdx(feature = "character")
```

Arguments:

`feature` The attribute's name. (character)

Returns: The attributes column index. (numeric)

Method `calcCorrelationNumeric()`: Creates a correlation test between two attributes of a dataframe. The test is stored as instance variable.

Usage:

```
pgu.correlator$calcCorrelationNumeric(
  abscissa = "numeric",
  ordinate = "numeric",
  method = "character"
)
```

Arguments:

`abscissa` The abscissa values. (numeric)

`ordinate` The ordinate values. (numeric)

`method` The cname of the correlation test. Valid coiced are defined by the instance variable 'method'. (chatacter)

Method `createCorrelationMatrixPearson()`: Performs the actual correlation test routine after Pearson. Iteratively runs through the attributes known to the class and calculates Pearson's correlation for each valid attribute pair. The test results are stored in the instance variables: `r`, `pPearson`. Here, `pX` represents the p-value of the respective parameter X. Displays the progress if shiny is loaded.

Usage:

```
pgu.correlator$createCorrelationMatrixPearson(
  data = "tbl_df",
  progress = "Progress"
)
```

Arguments:

data The data to be analysed. (tibble::tibble)
progress If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Method `createCorrelationMatrixKendall()`: Performs the actual correlation test routine after Kendall. Iteratively runs through the attributes known to the class and calculates Kendall's correlation for each valid attribute pair. The test results are stored in the instance variables: tau, pKendall. Here, pX represents the p-value of the respective parameter X. Displays the progress if shiny is loaded.

Usage:

```
pgu.correlator$createCorrelationMatrixKendall(
  data = "tbl_df",
  progress = "Progress"
)
```

Arguments:

data The data to be analysed. (tibble::tibble)
progress If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Method `createCorrelationMatrixSpearman()`: Performs the actual correlation test routine after Spearman. Iteratively runs through the attributes known to the class and calculates Spearman's correlation for each valid attribute pair. The test results are stored in the instance variables: rho, pSpearman. Here, pX represents the p-value of the respective parameter X. Displays the progress if shiny is loaded.

Usage:

```
pgu.correlator$createCorrelationMatrixSpearman(
  data = "tbl_df",
  progress = "Progress"
)
```

Arguments:

data The data to be analysed. (tibble::tibble)
progress If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Method `correlate()`: Performs the all three correlation test routines defined within the instance variable 'method'. Displays the progress if shiny is loaded.

Usage:

```
pgu.correlator$correlate(data = "tbl_df", progress = "Progress")
```

Arguments:

data The data to be analysed. (tibble::tibble)
progress If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Method printFeature(): Transforms the results of the correlation procedure for a valid pair of attributes to a dataframe and returns it.

Usage:

```
pgu.correlator$printFeature()
```

Returns: The analysis result as a dataframe. (tibble::tibble)

Method printRTbl(): Transforms instance variable 'r' to a dataframe and returns it.

Usage:

```
pgu.correlator$printRTbl()
```

Returns: Dataframe of instance variable 'r'. (tibble::tibble)

Method printPPearsonTbl(): Transforms instance variable 'pPearson' to a dataframe and returns it.

Usage:

```
pgu.correlator$printPPearsonTbl()
```

Returns: Dataframe of instance variable 'pPearson'. (tibble::tibble)

Method printTauTbl(): Transforms instance variable 'tau' to a dataframe and returns it.

Usage:

```
pgu.correlator$printTauTbl()
```

Returns: Dataframe of instance variable 'tau'. (tibble::tibble)

Method printPKendallTbl(): Transforms instance variable 'pKendall' to a dataframe and returns it.

Usage:

```
pgu.correlator$printPKendallTbl()
```

Returns: Dataframe of instance variable 'pKendall'. (tibble::tibble)

Method printRhoTbl(): Transforms instance variable 'rho' to a dataframe and returns it.

Usage:

```
pgu.correlator$printRhoTbl()
```

Returns: Dataframe of instance variable 'rho'. (tibble::tibble)

Method printPSpearmanTbl(): Transforms instance variable 'pSpearman' to a dataframe and returns it.

Usage:

```
pgu.correlator$printPSpearmanTbl()
```

Returns: Dataframe of instance variable 'pSpearman'. (tibble::tibble)

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.correlator$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

Examples

```
require(dplyr)
require(tibble)
data(iris)
data_df <- iris %>%
  tibble::as_tibble() %>%
  dplyr::select(-c("Species"))
correlator = pguIMP::pgu.correlator$new(data_df)
```

pgu.corrValidator *pgu.corrValidator*

Description

An R6 class that performs pairwise correlation of the features of the original and the imputed data set. The correlation results of both data sets are compared by subtraction.

Format

[R6::R6Class] object.

Construction

```
x <- pguIMP::pgu.corrValidator$new()
```

Active bindings

`featureNames` Returns the instance variable `featureNames`. (character)

`orgR_mat` Returns the instance variable `orgR_mat`. (matrix)

`impR_mat` Returns the instance variable `impR_mat`. (matrix)

`orgP_mat` Returns the instance variable `orgP_mat`. (matrix)

`impP_mat` Returns the instance variable `impP_mat`. (matrix)

`corr_df` Returns the instance variable `corr_df`. (tibble::tibble)

`summary_df` Returns the instance variable `summary_df`. (tibble::tibble)

Methods

Public methods:

- `pgu.corrValidator$new()`
- `pgu.corrValidator$print()`
- `pgu.corrValidator$reset()`
- `pgu.corrValidator$fit()`
- `pgu.corrValidator$correlationScatterPlot()`
- `pgu.corrValidator$correlationBarPlot()`
- `pgu.corrValidator$correlationBoxPlot()`
- `pgu.corrValidator$correlationCompoundPlot()`
- `pgu.corrValidator$clone()`

Method `new()`: Clears the heap and indicates if instance of 'pgu.corrValidator' is removed from heap.

Summary of the correlation deviation distribution.

Creates a square matrix which dimension corresponds to the length of the instance variable `featureNames`. The matrix entries are set to a distinct 'value'.

Flattens the results transforms them into a dataframe and stores it into the instance variable `corr_df`.

Creates and returns a new 'pgu.corrValidator' object.

Usage:

```
pgu.corrValidator$new(org_df = "tbl_df", imp_df = "tbl_df")
```

Arguments:

`org_df` The original data to be analyzed. (tibble::tibble)

`imp_df` The imputed version of the `org_df` data.

Returns: A new 'pgu.corrValidator' object. (pguIMP::pgu.corrValidator)

Method `print()`: Prints instance variables of a 'pgu.corrValidator' object.

Usage:

```
pgu.corrValidator$print()
```

Returns: string

Method `reset()`: Resets the object 'pgu.corrValidator' based on the instance variable `featureNames`.

Usage:

```
pgu.corrValidator$reset()
```

Method `fit()`: Runs the correlation analysis.

Usage:

```
pgu.corrValidator$fit(org_df = "tbl_df", imp_df = "tbl_df")
```

Arguments:

`org_df` A dataframe comprising the original data. (tibble::tibble)

`imp_df` Adataframe comprising the imputed data. (tibble::tibble)

Method `correlationScatterPlot()`: Plots the correlation analysis results.

Usage:

```
pgu.corrValidator$correlationScatterPlot()
```

Method `correlationBarPlot()`: Creates and returns a histogram from the `cor_delat` values.

Usage:

```
pgu.corrValidator$correlationBarPlot()
```

Returns: Bar plot (ggplot2::ggplot)

Method `correlationBoxPlot()`: Plots the correlation analysis results.

Usage:

```
pgu.corrValidator$correlationBoxPlot()
```

Method `correlationCompoundPlot()`: Creates and returns a compound graphical analysis of the `cor_delta` values.

Usage:

```
pgu.corrValidator$correlationCompoundPlot()
```

Returns: Compound plot (gridExtra::grid.arrange)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.corrValidator$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

Examples

```
require(dplyr)
require(tibble)
data(iris)
data_df <- iris %>%
  tibble::as_tibble()
comp_df <- data_df %>%
  dplyr::mutate(Sepal.Length = sample(Sepal.Length))
corr_obj = pguIMP::pgu.corrValidator$new()
corr_obj$fit(data_df, comp_df)
print(corr_obj)
```

pgu.data

pgu.data

Description

Handles the pguIMP dataset.

Format

[R6::R6Class] object.

Details

Stores the pguIMP dataset as instance variable and keeps track of the attributes of interest. Provides additionally fast access to several statistical information about the data set. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`rawData` Returns the instance variable `rawData` (tibble::tibble)

`setRawData` Sets the instance variable `rawData` (tibble::tibble)

`attributeNames` Returns the instance variable `attributeNames` (character)

`numericalAttributeNames` Returns the instance variable `numericalAttributeNames` (character)

`categoricalAttributeNames` Returns the instance variable `categoricalAttributeNames` (character)

`classInformation` Returns the instance variable `classInformation` (tibble::tibble)

`statistics` Returns the instance variable `statistics` (tibble::tibble)

`reducedStatistics` Returns the instance variable `reducedStatistics` (tibble::tibble)

`missingsStatistics` Returns the instance variable `missingsStatistics` (tibble::tibble)

Methods

Public methods:

- `pgu.data$new()`
- `pgu.data$print()`
- `pgu.data$fit()`
- `pgu.data$attribute_index()`
- `pgu.data$numerical_data()`
- `pgu.data$categorical_data()`
- `pgu.data$clone()`

Method `new()`: Clears the heap and indicates that instance of `pguIMP::pgu.data` is removed from heap.

Summarizes information on the instance variable `rawData` and retruns it in form of a compact data frame.

Summarizes a vector of numericals and returns summary.

Iterativley calls the function `summarize_numerical_data` on all numerical attributes of the instance variable `rawData` and returns the result in form of a data frame.

Calls the function `calculate_statistics` filters the result for the attribute names and arithmetic mean values. and returns the result in form of a data frame.

Calls the class' function `dataStatistics` filters the result for the attribute names and information about missing values. and returns the result in form of a data frame.

Creates and returns a new `pguIMP::pgu.data` object.

Usage:

```
pgu.data$new(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (`tibble::tibble`)

`val` Vector of numericals to be summarized. (`numeric`)

Returns: A new `pguIMP::pgu.data` object. (`pguIMP::pgu.data`)

Method `print()`: Prints instance variables of a `pguIMP::pgu.data` object.

Usage:

```
pgu.data$print()
```

Returns: string

Method `fit()`: Extracts information about the instance variable `rawData`.

Usage:

```
pgu.data$fit()
```

Method `attribute_index()`: Returns the index of an attribute within the instance variable `attributeNames`.

Usage:

```
pgu.data$attribute_index(attribute = "character")
```

Arguments:

`attribute` Attribute's name. (`character`)

Returns: Index of attribute's name in `rawData` (`numeric`)

Method `numerical_data()`: Returns the numeric attributes of the instance variable `rawData`.

Usage:

```
pgu.data$numerical_data()
```

Returns: A data frame (`tibble::tibble`)

Method `categorical_data()`: Returns the categorical attributes of the instance variable `rawData`.

Usage:

```
pgu.data$categorical_data()
```

Returns: A data frame (tibble::tibble)

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.data$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

Examples

```
require(dplyr)
require(tibble)
data(iris)
data_df <- iris %>%
  tibble::as_tibble()
data_obj = pguIMP::pgu.data$new(data_df)
```

pgu.delegate

pgu.delegate

Description

Manages the communication between the shiny gui layer and the classes of the pguIMP package

Format

[R6::R6Class](#) object.

Details

Comprises all needed classes from the pguIMP package and manages the communication between the gui and the analysis. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

status Returns the instance variable status (pguIMP::pgu.status)
 fileName Returns the instance variable fileName (pguIMP::pgu.file)
 loqFileName Returns the instance variable loqFileName (pguIMP::pgu.file)
 rawData Returns the instance variable rawData (pguIMP::pgu.data)
 filterSet Returns the instance variable filterSet (pguIMP::pgu.filter)
 filteredData Returns the instance variable filteredData (pguIMP::pgu.data)
 loq Returns the instance variable loq (pguIMP::pgu.limitsOfQuantification)
 loqMutatedData Returns the instance variable loqMutatedData (pguIMP::pgu.data)
 explorer Returns the instance variable explorer (pguIMP::pgu.explorer)
 optimizer Returns the instance variable optimizer (pguIMP::pgu.optimizer)
 transformator Returns the instance variable transformator (pguIMP::pgu.transformator)
 model Returns the instance variable model (pguIMP::pgu.model)
 transformedData Returns the instance variable transformedData (pguIMP::pgu.data)
 featureModel Returns the instance variable featureModel (pguIMP::pgu.normDist)
 normalizer Returns the instance variable normalizer (pguIMP::pgu.normalizer)
 normalizedData Returns the instance variable normalizedData (pguIMP::pgu.data)
 missings Returns the instance variable missings (pguIMP::pgu.missings)
 missingsCharacterizer Returns the instance variable missingsCharacterizer (pguIMP::pgu.missingsCharacterizer)
 outliers Returns the instance variable outlierd (pguIMP::pgu.outliers)
 imputer Returns the instance variable imputer (pguIMP::pgu.imputation)
 imputedData Returns the instance variable imputedData (pguIMP::pgu.data)
 cleanedData Returns the instance variable cleanedData (pguIMP::pgu.data)
 validator Returns the instance variable validator (pguIMP::pgu.validator)
 corrValidator Returns the instance variable corrValidator (pguIMP::pgu.corrValidator)
 exporter Returns the instance variable exporter (pguIMP::pgu.exporter)
 reporter Returns the instance variable reporter (pguIMP::pgu.reporter)

Methods**Public methods:**

- [pgu.delegate\\$new\(\)](#)
- [pgu.delegate\\$print\(\)](#)
- [pgu.delegate\\$update_import_gui\(\)](#)
- [pgu.delegate\\$query_data\(\)](#)
- [pgu.delegate\\$import_data\(\)](#)
- [pgu.delegate\\$update_import_data_Types_tbl\(\)](#)
- [pgu.delegate\\$update_import_data_statistics_tbl\(\)](#)
- [pgu.delegate\\$update_import_missings_statistics_tbl\(\)](#)

- `pgu.delegate$update_filter_select_tbl()`
- `pgu.delegate$update_filter()`
- `pgu.delegate$update_filter_inverse()`
- `pgu.delegate$reset_filter()`
- `pgu.delegate$filter_data()`
- `pgu.delegate$update_filter_statistics_tbl()`
- `pgu.delegate$update_filter_missings_tbl()`
- `pgu.delegate$update_exploration_gui()`
- `pgu.delegate$update_exploration_abcissa()`
- `pgu.delegate$update_exploration_ordinate()`
- `pgu.delegate$update_exploration_graphic()`
- `pgu.delegate$update_exploration_abcissa_graphic()`
- `pgu.delegate$update_exploration_ordinate_graphic()`
- `pgu.delegate$update_exploration_abcissa_table()`
- `pgu.delegate$update_exploration_ordinate_table()`
- `pgu.delegate$reset_loq_values()`
- `pgu.delegate$update_loq_upload_gui()`
- `pgu.delegate$query_loq()`
- `pgu.delegate$import_loq()`
- `pgu.delegate$update_loq_define_gui()`
- `pgu.delegate$update_loq_define_feature()`
- `pgu.delegate$update_loq_define_lloq()`
- `pgu.delegate$update_loq_define_uhq()`
- `pgu.delegate$update_loq_define_table()`
- `pgu.delegate$update_loq_define_menu()`
- `pgu.delegate$set_loq_define_values()`
- `pgu.delegate$set_loq_define_values_globally()`
- `pgu.delegate$update_loq_detect_gui()`
- `pgu.delegate$update_loq_na_handling()`
- `pgu.delegate$init_detect_loq()`
- `pgu.delegate$detect_loq()`
- `pgu.delegate$update_loq_detect_statistics_tbl()`
- `pgu.delegate$update_loq_detect_outlier_tbl()`
- `pgu.delegate$update_loq_detect_statistics_graphic()`
- `pgu.delegate$update_loq_detect_attribute_graphic()`
- `pgu.delegate$update_loq_detect_attribute_tbl()`
- `pgu.delegate$update_loq_mutate_gui()`
- `pgu.delegate$update_lloq_substitute()`
- `pgu.delegate$update_uhq_substitute()`
- `pgu.delegate$init_mutate_loq()`
- `pgu.delegate$mutate_loq()`
- `pgu.delegate$update_loq_mutate_data_tbl()`

- pgu.delegate\$update_loq_mutate_statistics_graphic()
- pgu.delegate\$update_loq_mutate_attribute_graphic()
- pgu.delegate\$init_loq_mutate_attribute_tbl()
- pgu.delegate\$update_loq_mutate_attribute_tbl()
- pgu.delegate\$optimizeTrafoParameter()
- pgu.delegate\$updateDetectedTrafoTypes()
- pgu.delegate\$updateDetectedTrafoParameter()
- pgu.delegate\$updateTrafoDetectGui()
- pgu.delegate\$updateTrafoMutateFeature()
- pgu.delegate\$updateTrafoMutateType()
- pgu.delegate\$updateTrafoMutateLambda()
- pgu.delegate\$updateTrafoMutateMirror()
- pgu.delegate\$resetTrafoMutateGui()
- pgu.delegate\$updateTrafoMutateGui()
- pgu.delegate\$trafoMutateFit()
- pgu.delegate\$trafoMutateGlobal()
- pgu.delegate\$trafoMutateFeature()
- pgu.delegate\$updateTrafoMutateFeatureGraphic()
- pgu.delegate\$updateTrafoMutateFeatureParameterTbl()
- pgu.delegate\$updateTrafoMutateFeatureQualityTbl()
- pgu.delegate\$updateTrafoMutateGlobalParameterTbl()
- pgu.delegate\$updateTrafoMutateGlobalModelTbl()
- pgu.delegate\$updateTrafoMutateGlobalQualityTbl()
- pgu.delegate\$updateTrafoMutateGlobalTestsTbl()
- pgu.delegate\$updateTrafoMutateGlobalDataTbl()
- pgu.delegate\$updateTrafoNormFeature()
- pgu.delegate\$updateTrafoNormMethod()
- pgu.delegate\$updateTrafoNormGui()
- pgu.delegate\$trafoNormMutate()
- pgu.delegate\$updateTrafoNormFeatureGraphic()
- pgu.delegate\$resetTrafoNormGui()
- pgu.delegate\$updateTrafoNormFeatureStatisticsTbl()
- pgu.delegate\$updateTrafoNormStatisticsTbl()
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- pgu.delegate\$imputeMissingsAnalyze()
- pgu.delegate\$updateImputeMissingsGraphic()
- pgu.delegate\$updateImputeMissingsStatisticsTbl()
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- pgu.delegate\$updateImputeMissingCharacteristicsGraphic()
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- `pgu.delegate$updateImputeOutliersMethod()`
- `pgu.delegate$updateImputeOutliersFeature()`
- `pgu.delegate$updateImputeOutliersAlpha()`
- `pgu.delegate$updateImputeOutliersEpsilon()`
- `pgu.delegate$updateImputeOutliersMinSamples()`
- `pgu.delegate$updateImputeOutliersGamma()`
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- `pgu.delegate$updateImputeOutliersCutoff()`
- `pgu.delegate$updateImputeOutliersK()`
- `pgu.delegate$updateImputeOutliersSeed()`
- `pgu.delegate$updateImputeOutliersGui()`
- `pgu.delegate$resetImputeOutliersGui()`
- `pgu.delegate$imputeOutliersDetect()`
- `pgu.delegate$updateImputeOutliersGraphic()`
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- `pgu.delegate$updateImputeOutliersFeatureTbl()`
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- `pgu.delegate$updateImputeOutliersDetailTbl()`
- `pgu.delegate$updateImputeMutateFeature()`
- `pgu.delegate$updateImputeMutateMethod()`
- `pgu.delegate$updateImputeMutateNNeighbors()`
- `pgu.delegate$updateImputeMutatePredFrac()`
- `pgu.delegate$updateImputeMutateOutfluxThr()`
- `pgu.delegate$updateImputeMutateSeed()`
- `pgu.delegate$updateImputeMutateIterations()`
- `pgu.delegate$updateImputeMutateGui()`
- `pgu.delegate$resetImputeMutateGui()`
- `pgu.delegate$imputeMutateMutate()`
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- `pgu.delegate$updateImputeMutateGraphic()`
- `pgu.delegate$updateImputeMutateStatisticsTbl()`
- `pgu.delegate$updateImputeMutateDistributionTbl()`
- `pgu.delegate$updateImputeMutateFeatureDetailGraphic()`
- `pgu.delegate$updateImputeMutateFeatureDetailTbl()`
- `pgu.delegate$updateImputeMutateDetailTbl()`
- `pgu.delegate$updateImputeMutateDataTbl()`
- `pgu.delegate$validate()`
- `pgu.delegate$updateAnalysisValidationGui()`
- `pgu.delegate$updateAnalysisValidationGraphic()`
- `pgu.delegate$updateAnalysisValidationTestTbl()`
- `pgu.delegate$updateCentralMomentsOrgTbl()`
- `pgu.delegate$updateCentralMomentsImpTbl()`

- pgu.delegate\$updateCentralMomentsDeltaTbl()
- pgu.delegate\$updateCorrelationValidationScatterGraphic()
- pgu.delegate\$updateCorrelationValidationBoxPlotGraphic()
- pgu.delegate\$updateCorrelationValidationDeviationTbl()
- pgu.delegate\$updateCorrelationValidationDataTbl()
- pgu.delegate\$exportFileName()
- pgu.delegate\$exportData()
- pgu.delegate\$reportFileName()
- pgu.delegate\$writeReport()
- pgu.delegate\$hide_outdated_results()
- pgu.delegate\$update_help_html()
- pgu.delegate\$clone()

Method new(): Clears the heap and indicates that instance of pgu.delegate is removed from heap.

Creates and returns a new pgu.delegate object.

Usage:

```
pgu.delegate$new(data = "tbl_df")
```

Arguments:

data The data to be analyzed. (tibble::tibble)

Returns: A new pgu.delegate object. (pguIMP::pgu.delegate)

Method print(): Prints instance variables of a pgu.delegate object.

Usage:

```
pgu.delegate$print()
```

Returns: string

Method update_import_gui(): Updates the import gui

Usage:

```
pgu.delegate$update_import_gui(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method query_data(): Manages the data upload to the R server. Updates the instance class status.

Usage:

```
pgu.delegate$query_data(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `import_data()`: Imports uploaded data from the R server into the instance variable `rawData`. Updates the instance class status.

Usage:

```
pgu.delegate$import_data(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `update_import_data_Types_tbl()`: Updates the `tbl.importDataTypes` table.

Usage:

```
pgu.delegate$update_import_data_Types_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `update_import_data_statistics_tbl()`: Updates the `tbl.importDataStatistics` table.

Usage:

```
pgu.delegate$update_import_data_statistics_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `update_import_missings_statistics_tbl()`: Updates the `tbl.importMissingsStatistics` table.

Usage:

```
pgu.delegate$update_import_missings_statistics_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `update_filter_select_tbl()`: Updates the `tbl.filter` table.

Usage:

```
pgu.delegate$update_filter_select_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `update_filter()`: Queries the filter parameters selected by the user in the gui and stores them in the instance variable `filterSet`.

Usage:

```
pgu.delegate$update_filter(input, output, session)
```

Arguments:

`input` Pointer to shiny input
`output` Pointer to shiny output
`session` Pointer to shiny session

Method `update_filter_inverse()`: Queries the filter parameters selected by the user in the gui inverts them and stores them in the instance variable `filterSet`.

Usage:

```
pgu.delegate$update_filter_inverse(input, output, session)
```

Arguments:

`input` Pointer to shiny input
`output` Pointer to shiny output
`session` Pointer to shiny session

Method `reset_filter()`: Generates a filter set that selects the whole data frame. Stores them in the instance variable `filterSet`. Updates the gui.

Usage:

```
pgu.delegate$reset_filter(input, output, session)
```

Arguments:

`input` Pointer to shiny input
`output` Pointer to shiny output
`session` Pointer to shiny session

Method `filter_data()`: Filters the data corresponding to the user defined parameters stored in the instance variable `filterSet`. Results are stored in the instance variables `filteredData` and `filteredMetadata`. Updated the instance variable `filterSet`.

Usage:

```
pgu.delegate$filter_data(input, output, session)
```

Arguments:

`input` Pointer to shiny input
`output` Pointer to shiny output
`session` Pointer to shiny session

Method `update_filter_statistics_tbl()`: Updates the `tbl.filterStatistics` table.

Usage:

```
pgu.delegate$update_filter_statistics_tbl(input, output, session)
```

Arguments:

`input` Pointer to shiny input
`output` Pointer to shiny output

session Pointer to shiny session

Method `update_filter_missings_tbl()`: Updates the `tbl.filterMissings` table.

Usage:

```
pgu.delegate$update_filter_missings_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_exploration_gui()`: Updates the gui.

Usage:

```
pgu.delegate$update_exploration_gui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_exploration_abscissa()`: Transfers the information oabout the selected abscissa attribute to the explorer class.

Usage:

```
pgu.delegate$update_exploration_abscissa(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_exploration_ordinate()`: Transfers the information oabout the selected ordinate attribute to the explorer class.

Usage:

```
pgu.delegate$update_exploration_ordinate(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_exploration_graphic()`: Updates the exploration abscissa vs. ordinate scatter plot corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$update_exploration_graphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output

session Pointer to shiny session

Method `update_exploration_abscissa_graphic()`: Updates the abscissa compound plot corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$update_exploration_abscissa_graphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_exploration_ordinate_graphic()`: Updates the ordinate compound plot corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$update_exploration_ordinate_graphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_exploration_abscissa_table()`: Updates the numerical abscissa analysis table. corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$update_exploration_abscissa_table(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_exploration_ordinate_table()`: Updates the numerical ordinate analysis table. corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$update_exploration_ordinate_table(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `reset_loq_values()`: Initializes the LOQ object after filtering.

Usage:

```
pgu.delegate$reset_loq_values(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_upload_gui()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_upload_gui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `query_loq()`: Manages the loq data upload to the R server.

Usage:

```
pgu.delegate$query_loq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `import_loq()`: Imports the loq data upload to the R server.

Usage:

```
pgu.delegate$import_loq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_define_gui()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_define_gui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_define_feature()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_define_feature(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_define_lloq()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_define_lloq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_define_uhq()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_define_uhq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_define_table()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_define_table(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_define_menu()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_define_menu(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `set_loq_define_values()`: Updates loq class.

Usage:

```
pgu.delegate$set_loq_define_values(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `set_loq_define_values_globally()`: Updates loq class.

Usage:

```
pgu.delegate$set_loq_define_values_globally(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Details: Imports uploaded data from the R server into the instance variable loqData. Updates the instance class status.

Example code:

```
importLoq = function(input, output, session){
  if (private$.status$query(processName = "dataImported")){
    tryCatch({
      private$.loq$setLoq <- private$.importer$importLoq(self$fileName)
      private$.status$update(processName = "loqImported", value = TRUE)
    },
    error = function(e) {
      private$.status$update(processName = "loqImported", value = FALSE)
      shiny::showNotification(paste(e), type = "error", duration = 10)
    }#error
  )#tryCatch
}#if
else{
  private$.status$update(processName = "loqImported", value = FALSE)
  shiny::showNotification(paste("No file uploaded to import. Please upload a valid file first."), ty
}#else
}, #function
```

Method update_loq_detect_gui(): Updates the gui.

Usage:

```
pgu.delegate$update_loq_detect_gui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method update_loq_na_handling(): Updates the si.loqHandling shiny widget corresponding to the respective user defined parameter.

Usage:

```
pgu.delegate$update_loq_na_handling(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method init_detect_loq(): Runs the outlier detection routine of the instance variable outliers. Updates the instance class status.

Usage:

```
pgu.delegate$init_detect_loq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `detect_loq()`: Runs the outlier detection routine of the instance variable outliers. Updates the instance class status.

Usage:

```
pgu.delegate$detect_loq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_detect_statistics_tbl()`: Updates the numerical loq statistics analysis table

Usage:

```
pgu.delegate$update_loq_detect_statistics_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_detect_outlier_tbl()`: Updates the numerical loq table.

Usage:

```
pgu.delegate$update_loq_detect_outlier_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_detect_statistics_graphic()`: Updates the loq statistics graphic.

Usage:

```
pgu.delegate$update_loq_detect_statistics_graphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_detect_attribute_graphic()`: Updates the loq feature compound graphic.

Usage:

```
pgu.delegate$update_loq_detect_attribute_graphic(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `update_loq_detect_attribute_tbl()`: Updates the numerical loq feature table.

Usage:

```
pgu.delegate$update_loq_detect_attribute_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `update_loq_mutate_gui()`: Updates the gui.

Usage:

```
pgu.delegate$update_loq_mutate_gui(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `update_lloq_substitute()`: Updates the si.lloqSubstitute shiny widget.

Usage:

```
pgu.delegate$update_lloq_substitute(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `update_uhq_substitute()`: Updates the si.uhqSubstitute shiny widget.

Usage:

```
pgu.delegate$update_uhq_substitute(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `init_mutate_loq()`: Calls the mutation routine of the instance variable loq on the instance variable filteredData. The result is stored in the instance variable loqMutatedData Updates the instance class status.

Usage:

```
pgu.delegate$init_mutate_loq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `mutate_loq()`: Calls the mutation routine of the instance variable `loq` on the instance variable `filteredData`. The result is stored in the instance variable `loqMutatedData`. Updates the instance class status.

Usage:

```
pgu.delegate$mutate_loq(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_mutate_data_tbl()`: Updates the numerical `loq` mutate outliers table.

Usage:

```
pgu.delegate$update_loq_mutate_data_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_mutate_statistics_graphic()`: Updates the `loq` mutate statistics graphic.

Usage:

```
pgu.delegate$update_loq_mutate_statistics_graphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_mutate_attribute_graphic()`: Updates the `loq` mutate feature graphic.

Usage:

```
pgu.delegate$update_loq_mutate_attribute_graphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `init_loq_mutate_attribute_tbl()`: Updates the numeric `loq` mutate feature table.

Usage:

```
pgu.delegate$init_loq_mutate_attribute_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `update_loq_mutate_attribute_tbl()`: Updates the numeric loq mutate feature table.

Usage:

```
pgu.delegate$update_loq_mutate_attribute_tbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `optimizeTrafoParameter()`: Calls the optimize routine of the instance variable optimizer on the instance variable loqMutatedData. Updates the instance class status.

Usage:

```
pgu.delegate$optimizeTrafoParameter(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateDetectedTrafoTypes()`: Updates the detected trafo types table.

Usage:

```
pgu.delegate$updateDetectedTrafoTypes(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateDetectedTrafoParameter()`: Updates the detected trafo parameters table.

Usage:

```
pgu.delegate$updateDetectedTrafoParameter(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoDetectGui()`: Updates the gui.

Usage:

```
pgu.delegate$updateTrafoDetectGui(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoMutateFeature(): Updates the si.trafoMutateFeature shiny widget.

Usage:

```
pgu.delegate$updateTrafoMutateFeature(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoMutateType(): Updates the si.trafoMutateType shiny widget.

Usage:

```
pgu.delegate$updateTrafoMutateType(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoMutateLambda(): Updates the ni.trafoMutateLambda shiny widget.

Usage:

```
pgu.delegate$updateTrafoMutateLambda(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoMutateMirror(): Updates the cb.trafoMutateMirror shiny widget.

Usage:

```
pgu.delegate$updateTrafoMutateMirror(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method resetTrafoMutateGui(): Updates the gui.

Usage:

```
pgu.delegate$resetTrafoMutateGui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoMutateGui(): Updates the gui.

Usage:

```
pgu.delegate$updateTrafoMutateGui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method trafoMutateFit(): Estimates the optimal transformation parameters. Updates the GUI

Usage:

```
pgu.delegate$trafoMutateFit(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method trafoMutateGlobal(): Calls the transformation routine of the instance variable transformer on the instance variable loqMutatedData. Updates the instance class status.

Usage:

```
pgu.delegate$trafoMutateGlobal(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method trafoMutateFeature(): Calls the transformation routine of the instance variable transformer on a user defined attribute of the instance variable loqMutatedData.

Usage:

```
pgu.delegate$trafoMutateFeature(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoMutateFeatureGraphic(): Updates the trafo mutate feature graphic.

Usage:

```
pgu.delegate$updateTrafoMutateFeatureGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoMutateFeatureParameterTbl()`: Updates the trafo mutate feature parameter table.

Usage:

```
pgu.delegate$updateTrafoMutateFeatureParameterTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoMutateFeatureQualityTbl()`: Updates the trafo mutate feature quality table.

Usage:

```
pgu.delegate$updateTrafoMutateFeatureQualityTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoMutateGlobalParameterTbl()`: Updates the trafo mutate global parameter table.

Usage:

```
pgu.delegate$updateTrafoMutateGlobalParameterTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoMutateGlobalModelTbl()`: Updates the tbl.trafoMutateGlobalModel table.

Usage:

```
pgu.delegate$updateTrafoMutateGlobalModelTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoMutateGlobalQualityTbl()`: Updates the tbl.trafoMutateGlobalQuality table.

Usage:

```
pgu.delegate$updateTrafoMutateGlobalQualityTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output

session Pointer to shiny session

Method `updateTrafoMutateGlobalTestsTbl()`: Updates the `tbl.trafoMutateGlobalTests` table.

Usage:

```
pgu.delegate$updateTrafoMutateGlobalTestsTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoMutateGlobalDataTbl()`: Updates the `tbl.trafoMutateGlobalData` table.

Usage:

```
pgu.delegate$updateTrafoMutateGlobalDataTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoNormFeature()`: Updates the `si.trafoNormFeature` shiny widget.

Usage:

```
pgu.delegate$updateTrafoNormFeature(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoNormMethod()`: Updates the `si.trafoNormMethod` shiny widget.

Usage:

```
pgu.delegate$updateTrafoNormMethod(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateTrafoNormGui()`: Updates the `gui`.

Usage:

```
pgu.delegate$updateTrafoNormGui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method trafoNormMutate(): Calls the scale routine of the instance variable normalizer on the instance variable transformedData. Updates the instance class status.

Usage:

```
pgu.delegate$trafoNormMutate(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoNormFeatureGraphic(): Updates the impute norm feature compound graphic.

Usage:

```
pgu.delegate$updateTrafoNormFeatureGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method resetTrafoNormGui(): Updates the gui.

Usage:

```
pgu.delegate$resetTrafoNormGui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoNormFeatureStatisticsTbl(): Updates the numerical impute norm analysis table for a user defined feature. corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$updateTrafoNormFeatureStatisticsTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateTrafoNormStatisticsTbl(): Updates the numerical impute norm analysis table. corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$updateTrafoNormStatisticsTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output

session Pointer to shiny session

Method `updateTrafoNormParameterTbl()`: Updates the impute norm parameter table. corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$updateTrafoNormParameterTbl(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `updateTrafoNormDataTbl()`: Updates the impute norm scaled data table. corresponding to the respective user defined attributes.

Usage:

```
pgu.delegate$updateTrafoNormDataTbl(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `imputeMissingsAnalyze()`: Calls the missing detection routine of the instance variable imputer on the instance variable `normalizedData`. Updates the instance class status.

Usage:

```
pgu.delegate$imputeMissingsAnalyze(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `updateImputeMissingsGraphic()`: Updates the `plt.imputeMissingsSummary` graphic.

Usage:

```
pgu.delegate$updateImputeMissingsGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `updateImputeMissingsStatisticsTbl()`: Updates the `tbl.imputeMissingsStatistics` table.

Usage:

```
pgu.delegate$updateImputeMissingsStatisticsTbl(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output
 session Pointer to shiny session

Method `updateImputeMissingsDistributionTbl()`: Updates the `tbl.imputeMissingsDistribution` table.

Usage:

```
pgu.delegate$updateImputeMissingsDistributionTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `updateImputeMissingCharacteristicsGraphic()`: Updates the `plt.imputeMissingsPairs` graphic.

Usage:

```
pgu.delegate$updateImputeMissingCharacteristicsGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `updateImputeMissingsCharacteristicsTbl()`: Updates the `tbl.imputeMissingsCharacteristics` table.

Usage:

```
pgu.delegate$updateImputeMissingsCharacteristicsTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

Method `updateImputeMissingsDetailTbl()`: Updates the `tbl.imputeDetectDetail` table.

Usage:

```
pgu.delegate$updateImputeMissingsDetailTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
 output Pointer to shiny output
 session Pointer to shiny session

```
updateImputeMissingsDataTbl = function(input, output, session){
  if(self$status$query(processName = "naDetected")){
    output$tbl.imputeMissingsData <- DT::renderDataTable(
      self$filteredMetadata$rawData %>%
      dplyr::right_join(self$normalizedData$rawData, by = "Sample Name") %>%
      format.data.frame(scientific = TRUE, digits = 4) %>%
```

```

DT::datatable(
  extensions = "Buttons",
  options = list(
    scrollX = TRUE,
    scrollY = '350px',
    paging = FALSE,
    dom = "Blfrtip",
    buttons = list(list(
      extend = 'csv',
      filename = self$fileName$predict("imputationSiteDetectionData") %>%
        tools::file_path_sans_ext(),
      text = "Download"
    ))#buttons
  )#options
)#DT::datatable
)#output
}#if
else{
output$tbl.imputeMissingsData <- DT::renderDataTable(NULL)
}#else
}, #function

```

Method `updateImputeOutliersMethod()`: Updates the `si.imputeOutliersMethod` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersMethod(input, output, session)
```

Arguments:

`input` Pointer to shiny input
`output` Pointer to shiny output
`session` Pointer to shiny session

Method `updateImputeOutliersFeature()`: Updates the `si.imputeOutliersFeature` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersFeature(input, output, session)
```

Arguments:

`input` Pointer to shiny input
`output` Pointer to shiny output
`session` Pointer to shiny session

Method `updateImputeOutliersAlpha()`: Updates the `ni.imputeOutliersAlpha` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersAlpha(input, output, session)
```

Arguments:

`input` Pointer to shiny input

output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeOutliersEpsilon()`: Updates the `ni.imputeOutliersEpsilon` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersEpsilon(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeOutliersMinSamples()`: Updates the `ni.imputeOutliersMinSamples` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersMinSamples(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeOutliersGamma()`: Updates the `ni.imputeOutliersGamma` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersGamma(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeOutliersNu()`: Updates the `ni.imputeOutliersNu` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersNu(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeOutliersCutoff()`: Updates the `ni.imputeOutliersCutoff` shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersCutoff(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output

session Pointer to shiny session

Method updateImputeOutliersK(): Updates the ni.imputeOutliersK shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersK(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method updateImputeOutliersSeed(): Updates the ni.imputeOutliersSeed shiny widget.

Usage:

```
pgu.delegate$updateImputeOutliersSeed(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method updateImputeOutliersGui(): Updates the gui.

Usage:

```
pgu.delegate$updateImputeOutliersGui(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method resetImputeOutliersGui(): Updates the gui.

Usage:

```
pgu.delegate$resetImputeOutliersGui(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method imputeOutliersDetect(): Calls the detectOutliers routine of the instance variable outliers on the instance variable normalizedData. Updates the instance class status.

Usage:

```
pgu.delegate$imputeOutliersDetect(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method `updateImputeOutliersGraphic()`: Updates the `plt.outliersImputeSummary` graphic.

Usage:

```
pgu.delegate$updateImputeOutliersGraphic(input, output, session)
```

Arguments:

`input` Pointer to shiny input

`output` Pointer to shiny output

`session` Pointer to shiny session

Method `updateImputeOutliersFeatureGraphic()`: Updates the `plt.outliersImputeFeature` graphic.

Usage:

```
pgu.delegate$updateImputeOutliersFeatureGraphic(input, output, session)
```

Arguments:

`input` Pointer to shiny input

`output` Pointer to shiny output

`session` Pointer to shiny session

Method `updateImputeOutliersFeatureTbl()`: Updates the numeric outlier feature table.

Usage:

```
pgu.delegate$updateImputeOutliersFeatureTbl(input, output, session)
```

Arguments:

`input` Pointer to shiny input

`output` Pointer to shiny output

`session` Pointer to shiny session

Method `updateImputeOutliersStatisticsTbl()`: Updates the numerical loq statistics analysis table

Usage:

```
pgu.delegate$updateImputeOutliersStatisticsTbl(input, output, session)
```

Arguments:

`input` Pointer to shiny input

`output` Pointer to shiny output

`session` Pointer to shiny session

Method `updateImputeOutliersDetailTbl()`: Updates the numerical outlier table.

Usage:

```
pgu.delegate$updateImputeOutliersDetailTbl(input, output, session)
```

Arguments:

`input` Pointer to shiny input

`output` Pointer to shiny output

`session` Pointer to shiny session

Method `updateImputeMutateFeature()`: Updates the `si.imputeMutateFeature` shiny widget.

Usage:

```
pgu.delegate$updateImputeMutateFeature(input, output, session)
```

Arguments:

```
input  Pointer to shiny input  
output Pointer to shiny output  
session Pointer to shiny session
```

Method `updateImputeMutateMethod()`: Updates the `si.imputeMutateMethod` shiny widget.

Usage:

```
pgu.delegate$updateImputeMutateMethod(input, output, session)
```

Arguments:

```
input  Pointer to shiny input  
output Pointer to shiny output  
session Pointer to shiny session
```

Method `updateImputeMutateNNeighbors()`: Updates the `ni.imputeMutateNumberOfNeighbors` shiny widget.

Usage:

```
pgu.delegate$updateImputeMutateNNeighbors(input, output, session)
```

Arguments:

```
input  Pointer to shiny input  
output Pointer to shiny output  
session Pointer to shiny session
```

Method `updateImputeMutatePredFrac()`: Updates the `ni.imputeMutatePredFrac` shiny widget.

Usage:

```
pgu.delegate$updateImputeMutatePredFrac(input, output, session)
```

Arguments:

```
input  Pointer to shiny input  
output Pointer to shiny output  
session Pointer to shiny session
```

Method `updateImputeMutateOutfluxThr()`: Updates the `ni.imputeMutateOutfluxThr` shiny widget.

Usage:

```
pgu.delegate$updateImputeMutateOutfluxThr(input, output, session)
```

Arguments:

```
input  Pointer to shiny input  
output Pointer to shiny output  
session Pointer to shiny session
```

Method `updateImputeMutateSeed()`: Updates the `ni.imputeMutateSeed` shiny widget.

Usage:

```
pgu.delegate$updateImputeMutateSeed(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateIterations()`: Updates the `ni.imputeMutateIterations` shiny widget.

Usage:

```
pgu.delegate$updateImputeMutateIterations(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateGui()`: Updates the gui.

Usage:

```
pgu.delegate$updateImputeMutateGui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `resetImputeMutateGui()`: Resets the gui.

Usage:

```
pgu.delegate$resetImputeMutateGui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `imputeMutateMutate()`: Calls the mutate imputation site routine of the instance variable `imputer` on the instance variable `transformedData`. Updates the instance class status.

Usage:

```
pgu.delegate$imputeMutateMutate(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeFluxGraphic()`: Updates the `plt.imputeMutateFlux` graphic.

Usage:

```
pgu.delegate$updateImputeFluxGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateGraphic()`: Updates the `plt.imputeMutateSummary` graphic.

Usage:

```
pgu.delegate$updateImputeMutateGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateStatisticsTbl()`: Updates the `tbl.imputeMutateStatistics` table.

Usage:

```
pgu.delegate$updateImputeMutateStatisticsTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateDistributionTbl()`: Updates the `tbl.imputeMutateDistribution` table.

Usage:

```
pgu.delegate$updateImputeMutateDistributionTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateFeatureDetailGraphic()`: Updates the `plt.imputeMutateFeatureDetail` graphic.

Usage:

```
pgu.delegate$updateImputeMutateFeatureDetailGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateFeatureDetailTbl()`: Updates the `tbl.imputeMutateFeatureDetail` table.

Usage:

```
pgu.delegate$updateImputeMutateFeatureDetailTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateDetailTbl()`: Updates the `tbl.imputeMutateDetail` table.

Usage:

```
pgu.delegate$updateImputeMutateDetailTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateImputeMutateDataTbl()`: Updates the `tbl.imputeMutateData` table.

Usage:

```
pgu.delegate$updateImputeMutateDataTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `validate()`: Calls the `validate` routine of the instance variable `validator` on the instance variables `rawData` and `cleanedData`. Updates the instance class status.

Usage:

```
pgu.delegate$validate(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateAnalysisValidationGui()`: Updates the `si.analysisValidationFeature` shiny widget.

Usage:

```
pgu.delegate$updateAnalysisValidationGui(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateAnalysisValidationGraphic()`: Updates the `plt.analysisValidationFeature` shiny widget.

Usage:

```
pgu.delegate$updateAnalysisValidationGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateAnalysisValidationTestTbl()`: Updates the `tbl.analysisValidationTest` table.

Usage:

```
pgu.delegate$updateAnalysisValidationTestTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateCentralMomentsOrgTbl()`: Updates the `tbl.centralMomentsOrg` table.

Usage:

```
pgu.delegate$updateCentralMomentsOrgTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateCentralMomentsImpTbl()`: Updates the `tbl.centralMomentsImp` table.

Usage:

```
pgu.delegate$updateCentralMomentsImpTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateCentralMomentsDeltaTbl()`: Updates the `tbl.centralMomentsDelta` table.

Usage:

```
pgu.delegate$updateCentralMomentsDeltaTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method `updateCorrelationValidationScatterGraphic()`: Updates the `plt.correlationValidationScatter` graphic.

Usage:

```
pgu.delegate$updateCorrelationValidationScatterGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateCorrelationValidationBoxPlotGraphic(): Updtates the plt.correlationValidationBoxPlot graphic.

Usage:

```
pgu.delegate$updateCorrelationValidationBoxPlotGraphic(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateCorrelationValidationDeviationTbl(): Updtates the tbl.correlationValidationDeviation table.

Usage:

```
pgu.delegate$updateCorrelationValidationDeviationTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method updateCorrelationValidationDataTbl(): Updtates the tbl.correlationValidationData table.

Usage:

```
pgu.delegate$updateCorrelationValidationDataTbl(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Method exportFileName(): Creates and returns an export filename.

Usage:

```
pgu.delegate$exportFileName(input, output, session)
```

Arguments:

input Pointer to shiny input
output Pointer to shiny output
session Pointer to shiny session

Returns: export filename (character)

Method exportData(): Exports the pguIMP analysis results

Usage:

```
pgu.delegate$exportData(input, file)
```

Arguments:

input Pointer to shiny input

file export filename (character)

Method reportFileName(): Creates and returns a report filename.

Usage:

```
pgu.delegate$reportFileName(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Returns: export filename (character)

Method writeReport(): Exports a report on the pguIMP analysis in pdf format.

Usage:

```
pgu.delegate$writeReport(input, file)
```

Arguments:

input Pointer to shiny input

file export filename (character)

Method hide_outdated_results(): Updates the gui if analysis parameters change.

Usage:

```
pgu.delegate$hide_outdated_results(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method update_help_html(): Updates the gui if analysis parameters change.

Usage:

```
pgu.delegate$update_help_html(input, output, session)
```

Arguments:

input Pointer to shiny input

output Pointer to shiny output

session Pointer to shiny session

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.delegate$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.explorer

pgu.explorer

Description

Visual exploration of the pguIMP dataset.

Format

[R6::R6Class] object.

Details

Pariwise analysis of attributes from the pguIMP dataset. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`rawData` Returns the instance variable `rawData` (tibble::tibble)

`setRawData` Sets the instance variable `rawData` (tibble::tibble)

`abscissa` Returns the instance variable `abscissa` (character)

`setAbscissa` Sets the instance variable `abscissa` (character)

`ordinate` Returns the instance variable `ordinate` (character)

`setOrdinate` Sets the instance variable `ordinate` (character)

`abscissaStatistics` Returns the instance variable `abscissaStatistics` (character)

`ordinateStatistics` Returns the instance variable `ordinateStatistics` (character)

Methods

Public methods:

- `pgu.explorer$new()`
- `pgu.explorer$print()`
- `pgu.explorer$reset()`
- `pgu.explorer$fit()`
- `pgu.explorer$scatterPlot()`
- `pgu.explorer$abscissaBarPlot()`
- `pgu.explorer$abscissaBoxPlot()`
- `pgu.explorer$abscissaPlot()`
- `pgu.explorer$ordinateBarPlot()`
- `pgu.explorer$ordinateBoxPlot()`
- `pgu.explorer$ordinatePlot()`
- `pgu.explorer$clone()`

Method `new()`: Tests if the abscissa attribute is of type numeric.
 Tests if the ordinate attribute is of type numeric.
 Summarizes the numeric values of a vector.
 Calculates the statistics of the abscissa values. Stores the result in the instance variable `abscissaStatistics`.
 Calculates the statistics of the ordinate values. Stores the result in the instance variable `ordinateStatistics`.
 Clears the heap and indicates that instance of 'pgu.explorer' is removed from heap.
 Creates and returns a new 'pgu.explorer' object.

Usage:

```
pgu.explorer$new(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (tibble::tibble)

Returns: A new 'pgu.explorer' object. (pguIMP::pgu.optimizer)

Method `print()`: Prints instance variables of a 'pgu.explorer' object.

Usage:

```
pgu.explorer$print()
```

Returns: string

Method `reset()`: Resets the instance of the pgu.explorer class

Usage:

```
pgu.explorer$reset(data_df = "tbl_df", abs = "character", ord = "character")
```

Arguments:

`data_df` The data to be analyzed. (tibble::tibble)

`abs` The abscissa attribute (character)

`ord` The ordinate attribute (character)

Method `fit()`: Calculates the abscissa and ordinate statistics

Usage:

```
pgu.explorer$fit()
```

Method `scatterPlot()`: Creates and returns a scatter plot abscissa and ordinate value pairs.

Usage:

```
pgu.explorer$scatterPlot()
```

Returns: Scatter plot (ggplot2::ggplot)

Method `abscissaBarPlot()`: Creates and returns a histogram from the abscissa values.

Usage:

```
pgu.explorer$abscissaBarPlot()
```

Returns: Bar plot (ggplot2::ggplot)

Method `abscissaBoxPlot()`: Creates and returns a box plot from the abscissa values.

Usage:

```
pgu.explorer$abscissaBoxPlot()
```

Returns: Box plot (ggplot2::ggplot)

Method `abscissaPlot()`: Creates and returns a compound graphical analysis of the abscissa values.

Usage:

```
pgu.explorer$abscissaPlot()
```

Returns: Compound plot (gridExtra::grid.arrange)

Method `ordinateBarPlot()`: Creates and returns a histogram from the ordinate values.

Usage:

```
pgu.explorer$ordinateBarPlot()
```

Returns: Bar plot (ggplot2::ggplot)

Method `ordinateBoxPlot()`: Creates and returns a box plot from the ordinate values.

Usage:

```
pgu.explorer$ordinateBoxPlot()
```

Returns: Box plot (ggplot2::ggplot)

Method `ordinatePlot()`: Creates and returns a compound graphical analysis of the ordinate values.

Usage:

```
pgu.explorer$ordinatePlot()
```

Returns: Compound plot (gridExtra::grid.arrange)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.explorer$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.exporter

pgu.exporter

Description

A class that writes the results of the pguIMP analysis to an Excel file.

Format

[R6::R6Class] object.

Details

Creates a download file name and saves a list of tibbles to an Excel file. Each tibble is written to a separate sheet. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

fileName Returns the fileName. (character)

setFileName Set the fileName. (character)

suffix Returns the file suffix. (character)

Methods

Public methods:

- `pgu.exporter$new()`
- `pgu.exporter$finalize()`
- `pgu.exporter$print()`
- `pgu.exporter$extractSuffix()`
- `pgu.exporter$writeDataToExcel()`
- `pgu.exporter$clone()`

Method `new()`: Creates and returns a new 'pgu.exporter' object.

Usage:

```
pgu.exporter$new()
```

Returns: A new 'pgu.exporter' object. (pguIMP::pgu.exporter)

Method `finalize()`: Clears the heap and indicates if instance of 'pgu.exporter' is removed from heap.

Usage:

```
pgu.exporter$finalize()
```

Method `print()`: Prints instance variables of a 'pgu.exporter' object.

Usage:

```
pgu.exporter$print()
```

Returns: string

Method `extractSuffix()`: extracts the suffix from the `fileName`

Usage:

```
pgu.exporter$extractSuffix()
```

Method `writeDataToExcel()`: writes tibble to an excel file of the name `fileName`.

Usage:

```
pgu.exporter$writeDataToExcel(obj = "list")
```

Arguments:

`obj` A tibble or list of tibble. If `obj` is a list, each member will be written to a separate sheet.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.exporter$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.file

pgu.fe

Description

Handles file names for the pguIMP shiny web interface.

Format

[R6::R6Class] object.

Details

The class stores filenames and upload specifications for the pguIMP shiny web interface in its instance variables. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

uploadFileName Returns the instance variable uploadFileName (character)
 fileName Returns the instance variable fileName (character)
 baseName Returns the instance variable baseName (character)
 folderName Returns the instance variable folderName (character)
 suffix Returns the instance variable suffix (character)
 exportSuffix Returns the instance variable exportSuffix (character)
 timeString Returns the instance variable timeString (character)
 sheetIndex Returns the instance variable sheetIndex (numeric)
 separator Returns the instance variable separator (character)
 skipRows Returns the instance variable skipRows (numeric)
 columnNames Returns the instance variable columnNames (logical)
 naChar Returns the instance variable naChar (character)

Methods**Public methods:**

- [pgu.file\\$new\(\)](#)
- [pgu.file\\$print\(\)](#)
- [pgu.file\\$reset\(\)](#)
- [pgu.file\\$fit\(\)](#)
- [pgu.file\\$predict\(\)](#)
- [pgu.file\\$fit_predict\(\)](#)
- [pgu.file\\$clone\(\)](#)

Method new(): Clears the heap and indicates that instance of 'pgu.file' is removed from heap. Splits fileName and writes the results in the class' instance variables folderName, baseName, suffix.

Stores the current system time into the instance variable timeString.

Creates and returns a new object of type pgu.file.

Usage:

```
pgu.file$new(
  uploadFileName = "",
  fileName = "",
  sheetIndex = 1,
  separator = ",",
  skipRows = 0,
  columnNames = TRUE,
  naChar = "NA"
)
```

Arguments:

uploadFileName Name of uploaded file. (string)

fileName Actual file name. (string)
 sheetIndex Index excel sheet to import. (integer)
 separator Character for column separation. (character)
 skipRows Number of rows to skip. (integer)
 columnNames Indicates if the data source file has a columnNames. (logical)
 naChar Character for missing values. (string)
Returns: A new pgu.file object. (pguIMP::pgu.file)

Method print(): Prints the instance variables of the object.

Usage:
 pgu.file\$print()
Returns: string

Method reset(): Resets the instance variables of the object.

Usage:

```

pgu.file$reset(
  uploadFileName = "",
  fileName = "",
  sheetIndex = 1,
  separator = ",",
  skipRows = 0,
  columnNames = TRUE,
  naChar = "NA"
)

```

Arguments:

uploadFileName Name of uploaded file. (string)
 fileName Actual file name. (string)
 sheetIndex Index excel sheet to import. (integer)
 separator Character for column separation. (character)
 skipRows Number of rows to skip. (integer)
 columnNames Indicates if the data source file has a columnNames. (logical)
 naChar Character for missing values. (string)

Method fit(): Extracts information about upload specifications from the instance variables.

Usage:
 pgu.file\$fit()

Method predict(): Predicts an export file name.

Usage:
 pgu.file\$predict(affix = "analysis")
Arguments:
 affix User dedined file name affix. (string)
Returns: A file name. (string)

Method `fit_predict()`: Extracts information about upload specifications from the instance variables and predicts an export file name.

Usage:

```
pgu.file$fit_predict(affix = "analysis")
```

Arguments:

`affix` User dedined file name affix. (string)

Returns: A file name. (string)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.file$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.filter

pgu.filter

Description

Filter the pguIMP dataset.

Format

[R6::R6Class] object.

Details

The filtering is done by column and row indices. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`colIdx` Returns the instance variable `colIdx` (numeric)

`setColIdx` Sets the instance variable `colIdx` (numeric)

`rowIdx` Returns the instance variable `rowIdx` (numeric)

`setRowIdx` Sets the instance variable `rowIdx` (numeric)

Methods**Public methods:**

- `pgu.filter$new()`
- `pgu.filter$print()`
- `pgu.filter$reset()`
- `pgu.filter$predict()`
- `pgu.filter$clone()`

Method `new()`: Resets the filter parameter `colIdx` to the full dataframe.

Resets the filter parameter `rowIdx` to the full dataframe.

Clears the heap and indicates that instance of `pguIMP::pgu.filter` is removed from heap.

Creates and returns a new `pguIMP::pgu.filter` object.

Usage:

```
pgu.filter$new(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (`tibble::tibble`)

Returns: A new `pguIMP::pgu.filter` object. (`pguIMP::pgu.filter`)

Method `print()`: Prints instance variables of a `pguIMP::pgu.filter` object.

Usage:

```
pgu.filter$print()
```

Returns: string

Method `reset()`: Resets the filter parameter `colIdx` and `rowIdx` to the full dataframe.

Usage:

```
pgu.filter$reset(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (`tibble::tibble`)

Method `predict()`: Filters and returns the given data frame.

Usage:

```
pgu.filter$predict(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (`tibble::tibble`)

Returns: The filtered data frame (`tibble::tibble`)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.filter$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.importer

pgu.importer

Description

Handles the data import

Format

[R6::R6Class] object.

Details

Manages the import of the pguIMP dataset This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`suffixes` Returns the instance variable suffixes (character)

Methods

Public methods:

- `pgu.importer$new()`
- `pgu.importer$finalize()`
- `pgu.importer$print()`
- `pgu.importer$suffixIsKnown()`
- `pgu.importer$importData()`
- `pgu.importer$importLoq()`
- `pgu.importer$importMetadata()`
- `pgu.importer$clone()`

Method `new()`: Creates and returns a new ‘pgu.importer’ object.

Usage:

```
pgu.importer$new()
```

Returns: A new ‘pgu.importer’ object. (pguIMP::pgu.importer)

Method `finalize()`: Clears the heap and indicates that instance of ‘pgu.importer’ is removed from heap.

Usage:

```
pgu.importer$finalize()
```

Method `print()`: Prints instance variables of a ‘pgu.importer’ object.

Usage:

```
pgu.importer$print()
```

Returns: string

Method `suffixIsKnown()`: Takes an instance of `pgu.file` and tests if the suffix is valid.

Usage:

```
pgu.importer$suffixIsKnown(obj = "pgu.file")
```

Arguments:

obj instance of `pgu.file`. (`pguIMP::pgu.file`)

Returns: test result (logical)

Method `importData()`: Takes an instance of `pgu.file` imports a dataset.

Usage:

```
pgu.importer$importData(obj = "pgu.file")
```

Arguments:

obj instance of `pgu.file`. (`pguIMP::pgu.file`)

Returns: data frame (`tibble::tibble`)

Method `importLoq()`: Takes an instance of `pgu.file` imports a loq dataset.

Usage:

```
pgu.importer$importLoq(obj = "pgu.file")
```

Arguments:

obj instance of `pgu.file`. (`pguIMP::pgu.file`)

Returns: data frame (`tibble::tibble`)

Method `importMetadata()`: Takes an instance of `pgu.file` imports a metadata dataset.

Usage:

```
pgu.importer$importMetadata(obj = "pgu.file")
```

Arguments:

obj instance of `pgu.file`. (`pguIMP::pgu.file`)

Returns: data frame (`tibble::tibble`)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.importer$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.imputation *pgu.imputation*

Description

Analyses and substitutes imputation sites in a data set.

Format

[R6::R6Class] object.

Details

Analyses imputation sites in a data set. Replaces imputation sites by missing values and substitutes NAs by classical and ML-powered substitution algorithms. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`imputationStatistics` Returns the instance variable `imputationStatistics`. (tibble::tibble)
`imputationSites` Returns the instance variable `imputationSites`. (tibble::tibble)
`one_hot_df` Returns the positions of missings in `one_hot` encoding (tibble::tibble)
`imputationSiteDistribution` Returns the instance variable `imputationSiteDistribution`. (matrix)
`imputationAgentAlphabet` Returns the instance variable `imputationagentAlphabet`. (character)
`imputationAgent` Returns the instance variable `imputationAgent`. (character)
`setImputationAgent` Sets the instance variable `imputationAgent`. (character)
`nNeighbors` Returns the instance variable `nNeighbors`. (integer)
`setNNeighbors` Sets the instance variable `nNeighbors`. (integer)
`flux_df` Returns the instance variable `flux_df` (tibble::tibble)
`outflux_thr` Returns the instance variable `outflux_thr`. (numeric)
`setOutflux_thr` Sets the instance variable `outflux_thr`. (numeric)
`pred_frac` Returns the instance variable `pred_frac`. (numeric)
`setPred_frac` Sets the instance variable `pred_frac`. (numeric)
`pred_mat` Returns the instance variable `pred_mat`. (matrix)
`exclude_vec` Returns the instance variable `exclude_vec` (character)
`seed` Returns the instance variable `seed`. (numeric)
`setSeed` Sets the instance variable `seed`. (numeric)
`iterations` Returns the instance variable `iterations`. (numeric)
`setIterations` Sets the instance variable `iterations`. (numeric)
`amv` Returns the instance variable `amv`. (numeric)
`success` Returns the instance variable `success`. (logical)

Methods**Public methods:**

- `pgu.imputation$new()`
- `pgu.imputation$finalize()`
- `pgu.imputation$print()`
- `pgu.imputation$gatherImputationSites()`
- `pgu.imputation$gatherImputationSiteStatistics()`
- `pgu.imputation$gatherImputationSiteDistribution()`
- `pgu.imputation$insertImputationSites()`
- `pgu.imputation$one_hot()`
- `pgu.imputation$analyzeImputationSites()`
- `pgu.imputation$imputationSiteIdxByFeature()`
- `pgu.imputation$nanFeatureList()`
- `pgu.imputation$average_number_of_predictors()`
- `pgu.imputation$detectPredictors()`
- `pgu.imputation$handleImputationSites()`
- `pgu.imputation$imputeByMedian()`
- `pgu.imputation$imputeByMean()`
- `pgu.imputation$imputeByExpectationValue()`
- `pgu.imputation$imputeByMC()`
- `pgu.imputation$imputeByKnn()`
- `pgu.imputation$imputeByMice()`
- `pgu.imputation$imputeByM5P()`
- `pgu.imputation$imputationSiteHeatMap()`
- `pgu.imputation$featureBarPlot()`
- `pgu.imputation$featureBoxPlotWithSubset()`
- `pgu.imputation$featurePlot()`
- `pgu.imputation$fluxPlot()`
- `pgu.imputation$clone()`

Method `new()`: Creates and returns a new 'pgu.imputation' object.

Usage:

```
pgu.imputation$new(
  seed = 42,
  iterations = 4,
  imputationAgent = "none",
  nNeighbors = 3,
  pred_frac = 1,
  outflux_thr = 0.5
)
```

Arguments:

`seed` Initially sets the instance variable `seed`. Default is 42. (integer)

`iterations` Initially sets the instance variable `iterations`. Default is 4. (integer)

imputationAgent Initially sets the instance variable `imputationAgent`. Default is "none". Options are: ""none", "median", "mean", "expValue", "monteCarlo", "knn", "pmm", "cart", "randomForest", "M5P". (string)

nNeighbors Initially sets the instance variable `nNeighbors`. (integer)

pred_frac Initially sets the instance variable `pred_frac`. (numeric)

outflux_thr Initially sets the instance variable `outflux_thr`

Returns: A new 'pgu.imputation' object. (pguIMP::pgu.imputation)

Method finalize(): Clears the heap and indicates that instance of 'pgu.imputation' is removed from heap.

Usage:

```
pgu.imputation$finalize()
```

Method print(): Prints instance variables of a 'pgu.imputation' object.

Usage:

```
pgu.imputation$print()
```

Returns: string

Method gatherImputationSites(): Gathers imputation sites from pguIMP's missings and outliers class.

Usage:

```
pgu.imputation$gatherImputationSites(
  missings_df = "tbl_df",
  outliers_df = "tbl_df"
)
```

Arguments:

missings_df Dataframe comprising information about the imputation sites of pguIMP's missings class. (tibble::tibble)

outliers_df Dataframe comprising information about the imputation sites of pguIMP's outliers class. (tibble::tibble)

Method gatherImputationSiteStatistics(): Gathers statistical information about imputation sites The information is stored within the classes instance variable 'imputationStatistics'

Usage:

```
pgu.imputation$gatherImputationSiteStatistics(data_df = "tbl_df")
```

Arguments:

data_df The data frame to be analyzed. (tibble::tibble)

Method gatherImputationSiteDistribution(): Gathers the distribution of imputation sites within the data frame. The information is stored within the classes instance variable `imputationSiteDistribution`.

Usage:

```
pgu.imputation$gatherImputationSiteDistribution(data_df = "tbl_df")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

Returns: A data frame (tibble::tibble)

Method `insertImputationSites()`: Takes a dataframe, replaces the imputation sites indicated by the instance variable 'imputationsites' by NA, and returns the mutated dataframe.

Usage:

```
pgu.imputation$insertImputationSites(data_df = "tbl_df")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

Returns: A mutated version of `data_df`. (tibble::tibble)

Method `one_hot()`: Gathers statistical information about missing values in one hot format. The result is stored in the instance variable `one_hot_df`.

Usage:

```
pgu.imputation$one_hot(data_df = "tbl_df")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

Method `analyzeImputationSites()`: Takes a dataframe and analyses the imputation sites.

Usage:

```
pgu.imputation$analyzeImputationSites(data_df = "tbl_df")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

Method `imputationSiteIdxByFeature()`: Returns the position of an attribute's imputation sites within a data frame.

Usage:

```
pgu.imputation$imputationSiteIdxByFeature(featureName = "character")
```

Arguments:

`featureName` The attribute's name. (character)

Returns: The position of the imputation sites. (numeric)

Method `nanFeatureList()`: Characterizes each row of the data frame as either 'complete' or indicates which attribute are missing within the row. If multiple attributes' row entries are missing, the row is characterized by 'multiple'.

Usage:

```
pgu.imputation$nanFeatureList(data_df = "tbl_df")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

Returns: Vector of row characteristics. (character)

Method `average_number_of_predictors()`: Calculates the average number of predictors for a given dataframe and minpuc and mincor variables using the `mice::quickpred` routine.

Usage:

```
pgu.imputation$average_number_of_predictors(
  data_df = "tbl_df",
  minpuc = 0,
  mincor = 0.1
)
```

Arguments:

`data_df` The dataframe to be analyzed (tibble::tibble)
`minpuc` Specifies the minimum threshold for the proportion of usable cases. (numeric)
`mincor` Specifies the minimum threshold against which the absolute correlation in the dataframe is compared. (numeric)

Returns: Average_number_of_predictors. (numeric)

Method `detectPredictors()`: Identifies possible predictors for each feature. Analysis results are written to the instance variable `pred_mat`. Intermediate analysis results are an influx/outflux dataframe that is written to the instance variable `flux_df` and detect predictors and a list of features that is excluded from the search for possible predictors that is written to the instance variable `exclude_vec`.

Usage:

```
pgu.imputation$detectPredictors(data_df = "tbl_df")
```

Arguments:

`data_df` The dataframe to be analyzed. (tibble::tibble)

Method `handleImputationSites()`: Chooses a cleaning method based upon the instance variable 'imputationAgent' and handles the imputation sites in the dataframe. Returns a cleaned data set. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$handleImputationSites(data_df = "tbl_df", progress = "Progress")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)
`progress` If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputeByMedian()`: Substitutes imputation sites by the median of the respective attribute. Returns the cleaned dataframe. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$imputeByMedian(data_df = "tbl_df", progress = "Progress")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)
`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputeByMean()`: Substitutes imputation sites by the arithmetic mean of the respective attribute. Returns the cleaned dataframe. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$imputeByMean(data_df = "tbl_df", progress = "Progress")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputeByExpectationValue()`: Substitutes imputation sites by the expectation value of the respective attribute. Returns the cleaned dataframe. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$imputeByExpectationValue(  
  data_df = "tbl_df",  
  progress = "Progress"  
)
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputeByMC()`: Substitutes imputation sites by values generated by a monte carlo simulation. The procedure runs several times as defined by the instance variable 'iterations'. The run with the best result is identified and used for substitution. Returns the cleaned dataframe. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$imputeByMC(data_df = "tbl_df", progress = "Progress")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputeByKnn()`: Substitutes imputation sites by predictions of a KNN analysis of the whole dataframe. Returns the cleaned dataframe. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$imputeByKnn(data_df = "tbl_df", progress = "Progress")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputeByMice()`: Substitutes imputation sites by values generated by a different methods of the mice package. The procedure runs several times as defined by the instance variable 'iterations'. The run with the best result is identified and used for substitution. Returns the cleaned dataframe. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$imputeByMice(data_df, progress = "Progress")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputeByM5P()`: Substitutes imputation sites by predictions of a M5P tree trained on the whole dataframe. Returns the cleaned dataframe. Display the progress if shiny is loaded.

Usage:

```
pgu.imputation$imputeByM5P(data_df = "tbl_df", progress = "Progress")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: Cleaned dataframe. (tibble:tibble)

Method `imputationSiteHeatMap()`: Displays the distribution of missing values in form of a heatmap.

Usage:

```
pgu.imputation$imputationSiteHeatMap()
```

Returns: A heatmap plot. (ggplot2::ggplot)

Method `featureBarPlot()`: Displays the distribution of an attribute values as histogram.

Usage:

```
pgu.imputation$featureBarPlot(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)

`feature` attribute to be shown. (character)

Returns: A histogram. (ggplot2::ggplot)

Method `featureBoxPlotWithSubset()`: Displays the distribution of an attribute's values as box plot.

Usage:

```
pgu.imputation$featureBoxPlotWithSubset(
  data_df = "tbl_df",
  feature = "character"
)
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)
`feature` attribute to be shown. (character)

Returns: A box plot. (ggplot2::ggplot)

Method `featurePlot()`: Displays the distribution of an attribute's values as a composition of a box plot and a histogram.

Usage:

```
pgu.imputation$featurePlot(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)
`feature` attribute to be shown. (character)

Returns: A composite plot. (ggplot2::ggplot)

Method `fluxPlot()`: Displays an influx/outflux plot

Usage:

```
pgu.imputation$fluxPlot()
```

Returns: A composite plot. (ggplot2::ggplot)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.imputation$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.limitsOfQuantification

pgu.limitsOfQuantification

Description

Handles values in the pguIMP dataset that exceed the limits of quantification. This object is used by the shiny based gui and is not for use in individual R-scripts!

Format

[R6::R6Class](#) object.

Details

more information

Active bindings

loq Returns the instance variable loq (tibble::tibble)

setLoq Sets the instance variable loq (tibble::tibble)

outliers Returns instance variable outliers (tibble::tibble)

lloqSubstituteAlphabet Returns the instance variable lloqSubstituteAlphabet (character)

lloqSubstituteAgent Returns the instance variable lloqSubstituteAgent (character)

setLloqSubstituteAgent Sets the instance variable lloqSubstituteAgent (character)

uloqSubstituteAlphabet Returns the instance variable uloqSubstituteAlphabet (character)

uloqSubstituteAgent Returns the instance variable uloqSubstituteAgent (character)

setUloqSubstituteAgent Sets the instance variable uloqSubstituteAgent (character)

naHandlingAlphabet Returns the instance variable naHandlingAlphabet (character)

naHandlingAgent Returns the instance variable naHandlingAgent (character)

setNaHandlingAgent Sets the instance variable naHandlingAgent (character)

loqStatistics Returns the instance variable loqStatistics

Methods

The following public methods are available:

- 'new()': Creates a new pgu.limitsOfQuantification object
- 'print()': Prints instance variables
- 'reset()': Resets the object
- 'fit()': Analyzes data for LOQ violations
- 'predict()': Applies LOQ corrections
- 'attribute_lloq()': Get LOQ values
- 'set_attribute_lloq()': Set LOQ values
- 'attribute_uloq()': Get outliers for an attribute
- 'plot_loq_distribution()': Plot LOQ statistics
- 'attribute_bar_plot()': Create diagnostic plots
- 'attribute_box_plot_with_subset()': Create diagnostic plots
- 'clone()': Clone the object

Author(s)

Sebastian Malkusch

See Also

Other pguIMP classes: [pgu.missings](#)

pgu.missings

pgu.missings

Description

Detects and substitutes missing values from data set.

Format

[R6::R6Class](#) object.

Details

Detects missing values in the transformed and normalized data set. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`imputationParameter` Returns the instance variable `imputationParameter` (`tibble::tibble`)

`imputationSites` Returns the instance variable `imputationSites` (`tibble::tibble`)

`one_hot_df` Returns the positions of missings in `one_hot` encoding (`tibble::tibble`)

`amv` Returns the instance variable `amv` (numeric)

Methods

The following public methods are available:

- `new()`: Creates a new `pgu.missings` object - `print()`: Prints instance variables - `resetImputationParameter()`: Resets imputation parameters - `featureIdx()`: Get feature position - `filterFeatures()`: Filter features with missings - `gatherMeasurements()`, `gatherMissings()`, `gatherExistings()`, `gatherFractionOfMissings()`: Gather missing value statistics - `gatherImputationStatistics()`: Collect imputation statistics - `one_hot()`: Create one-hot encoding of missings - `detectImputationSites()`: Detect missing value positions - `imputationSiteDistribution()`: Get missing value distribution - `imputationSiteHeatMap()`: Create missing value heatmap - `clone()`: Clone the object

Author(s)

Sebastian Malkusch

See Also

Other `pguIMP` classes: [pgu.limitsOfQuantification](#)

pgu.missingsCharacterizer
pgu.missingsCharacterizer

Description

A class that characterizes the origin of missing values.

Format

[R6::R6Class] object.

Details

A class that characterizes the origin of missing values. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`featureAlphabet` Returns the instance variable `featureAlphabet`. (character)
`featureAgent` Returns the instance variable `featureAgent`. (character)
`setFeatureAgent` Sets the instance variable `featureAgent`. (character)
`missingsCharacteristics_df` Returns the instance variable `missingsCharacteristics_df`. (tibble::tibble)

Methods

Public methods:

- `pgu.missingsCharacterizer$new()`
- `pgu.missingsCharacterizer$finalize()`
- `pgu.missingsCharacterizer$print()`
- `pgu.missingsCharacterizer$reset()`
- `pgu.missingsCharacterizer$analyze()`
- `pgu.missingsCharacterizer$plot_pair_dist()`
- `pgu.missingsCharacterizer$clone()`

Method `new()`: Creates and returns a new ‘pgu.missingsCharacterizer’ object.

Usage:

```
pgu.missingsCharacterizer$new(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (tibble::tibble)

Returns: A new ‘pgu.missingsCharacterizer’ object. (pguIMP::pgu.missingsCharacterizer)

Method `finalize()`: Clears the heap and indicates if instance of ‘pgu.missingsCharacterizer’ is removed from heap.

Usage:

```
pgu.missingsCharacterizer$finalize()
```

Method print(): Prints instance variables of a 'pgu.missingsCharacterizer' object.

Usage:

```
pgu.missingsCharacterizer$print()
```

Returns: string

Method reset(): Takes a dataframe that will be analyzed using the analyze function and resets the instance variables.

Usage:

```
pgu.missingsCharacterizer$reset(data_df = "tbl_df")
```

Arguments:

data_df The data to be analyzed. (tibble::tibble)

Method analyze(): resets the instance variables and analyzes a dataframe.

Usage:

```
pgu.missingsCharacterizer$analyze(data_df = "tbl_df", progress = "Progress")
```

Arguments:

data_df The data to be analyzed. (tibble::tibble)

progress If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Method plot_pair_dist(): Plots the analysis result.

Usage:

```
pgu.missingsCharacterizer$plot_pair_dist(data_df = "tbl_df")
```

Arguments:

data_df The data to be analyzed. (tibble::tibble)

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.missingsCharacterizer$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.model

pgu.model

Description

Comprises a list of models for data manipulation.

Format

[R6::R6Class] object.

Details

Comprises a list of pgu.normDist objects and model parameters. These can be used to scale data. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

modelList Returns a vector of pgu-normDist objects. (pgu.normDist)

modelParameter Returns a dataframe comprising model parameters. (tibble::tibble)

Methods

Public methods:

- `pgu.model$new()`
- `pgu.model$finalize()`
- `pgu.model$print()`
- `pgu.model$resetModelParameter()`
- `pgu.model$resetModelList()`
- `pgu.model$resetModel()`
- `pgu.model$setNormDist()`
- `pgu.model$featureIdx()`
- `pgu.model$fitFeature()`
- `pgu.model$fitData()`
- `pgu.model$logFitResultsFeature()`
- `pgu.model$logFailedFitResultsFeature()`
- `pgu.model$scaleNumeric()`
- `pgu.model$scaleData()`
- `pgu.model$rescaleNumeric()`
- `pgu.model$rescaleData()`
- `pgu.model$modelParameterData()`
- `pgu.model$modelParameterFeature()`
- `pgu.model$modelQualityData()`
- `pgu.model$modelQualityFeature()`

- `pgu.model$fitResultData()`
- `pgu.model$fitResultFeature()`
- `pgu.model$testResultData()`
- `pgu.model$testResultFeature()`
- `pgu.model$plotModel()`
- `pgu.model$clone()`

Method `new()`: Creates and returns a new 'pgu.model' object.

Usage:

```
pgu.model$new(data = "tbl_df")
```

Arguments:

data The data to be analyzed. (tibble::tibble)

Returns: A new 'pgu.model' object. (pguIMP::pgu.model)

Method `finalize()`: Clears the heap and indicates that instance of 'pgu.model' is removed from heap.

Usage:

```
pgu.model$finalize()
```

Method `print()`: Prints instance variables of a 'pgu.model' object.

Usage:

```
pgu.model$print()
```

Returns: string

Method `resetModelParameter()`: Resets instance variable 'modelParameter'

Usage:

```
pgu.model$resetModelParameter(data = "tbl_df")
```

Arguments:

data Dataframe to be analyzed. (tibble::tibble)

Method `resetModelList()`: Resets instance variable 'modelList'

Usage:

```
pgu.model$resetModelList(data = "tbl_df")
```

Arguments:

data Dataframe to be analyzed. (tibble::tibble)

Method `resetModel()`: Resets instance variable 'modelList'. Resets instance variable 'modelParameter'. Displays progress if shiny is loaded.

Usage:

```
pgu.model$resetModel(data = "tbl_df", progress = "Progress")
```

Arguments:

data Dataframe to be analyzed. (tibble::tibble)

progress If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method setNormDist(): Stores the information of a pgu.normDist object in an entry of the instance variable 'modelList'

Usage:

```
pgu.model$setNormDist(data = "pgu.normDist", feature = "character")
```

Arguments:

data Instance of pgu.normDist (pguIMP::pgu.normDist)

feature Attribute corresponding to the pgu.normDist object data. (character)

Method featureIdx(): Returns the index of a pgu.normDist object within the instance variable 'modelParameter'.

Usage:

```
pgu.model$featureIdx(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Index of attribute entry in dataframe (numeric)

Method fitFeature(): Runs the fit function of a pgu.normDist object at a user defined position within the instance variable modelList.

Usage:

```
pgu.model$fitFeature(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Method fitData(): Loops through all attributes and calls the object's fitFeature function. Displays progress if shiny is loaded.

Usage:

```
pgu.model$fitData(progress = "Progress")
```

Arguments:

progress If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method logFitResultsFeature(): Stores results from fitting procedure of a user defined attribute into the corresponding attribute of instance variable 'modelParameter'.

Usage:

```
pgu.model$logFitResultsFeature(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Method logFailedFitResultsFeature(): Stores results from fitting procedure of a user defined attribute into the corresponding attribute of instance variable 'modelParameter' in case of a failed fitting routine.

Usage:

```
pgu.model$logFailedFitResultsFeature(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Method scaleNumeric(): Scales numeric data based upon the model of a user defined attribute.

Usage:

```
pgu.model$scaleNumeric(value = "numeric", feature = "character")
```

Arguments:

value Numeric vector (numeric)

feature Attribute's name. (character)

Returns: scaled version of the given vector (numeric)

Method scaleData(): Scales a dataframe based upon a list of models stored in the instance variable modelList..

Usage:

```
pgu.model$scaleData(data = "tbl_df")
```

Arguments:

data Dataframe to be analyzed. (tibble::tibble)

Returns: scaled version of the given dataframe (tibble::tibble)

Method rescaleNumeric(): Re-scales numeric data based upon the model of a user defined attribute.

Usage:

```
pgu.model$rescaleNumeric(value = "numeric", feature = "character")
```

Arguments:

value Numeric vector (numeric)

feature Attribute's name. (character)

Returns: Re-scaled version of the given vector (numeric)

Method rescaleData(): Re-scales a dataframe based upon a list of models stored in the instance variable modelList..

Usage:

```
pgu.model$rescaleData(data = "tbl_df")
```

Arguments:

data Dataframe to be analyzed. (tibble::tibble)

Returns: Re-scaled version of the given dataframe (tibble::tibble)

Method modelParameterData(): Returns the model parameter (expectation value, standard deviation).

Usage:

```
pgu.model$modelParameterData()
```

Returns: Dataframe comprising model parameter. (tibble::tibble)

Method modelParameterFeature(): Returns the model parameter (expectation value, standard deviation) for a user deined attribute.

Usage:

```
pgu.model$modelParameterFeature(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Dataframe comprising model parameter. (tibble::tibble)

Method modelQualityData(): Returns the model parameters connected to model quality.

Usage:

```
pgu.model$modelQualityData()
```

Returns: Dataframe comprising model parameter. (tibble::tibble)

Method modelQualityFeature(): Returns the model parameters connected to model quality for a user deined attribute.

Usage:

```
pgu.model$modelQualityFeature(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Dataframe comprising model parameter. (tibble::tibble)

Method fitResultData(): Returns the model fit results.

Usage:

```
pgu.model$fitResultData()
```

Returns: Dataframe comprising model fit results. (tibble::tibble)

Method fitResultFeature(): Returns the model fit results for a user deined attribute.

Usage:

```
pgu.model$fitResultFeature(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Dataframe comprising model fit results. (tibble::tibble)

Method testResultData(): Returns the hypothesis test results.

Usage:

```
pgu.model$testResultData()
```

Returns: Dataframe comprising the hypothesis test results. (tibble::tibble)

Method testResultFeature(): Returns the hypothesis test results. for a user deined attribute.

Usage:

```
pgu.model$testResultFeature(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Dataframe comprising the hypothesis test results. (tibble::tibble)

Method plotModel(): Creates and returns a composite graphical analysis of the modeling procedure of a user defined attribute.

Usage:

```
pgu.model$plotModel(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Composite result plot. (ggplot2::ggplot)

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.model$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.normalizer

pgu.normalizer

Description

Normalization of data. Part of pguIMP.

Format

[R6::R6Class] object.

Details

Performs a data normalization in order to achieve a standardized version of the dataframe. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

normAgentAlphabet Returns the instance variable normAgentAlphabt.

normAgent Returns the instance variable normAgent. (character)

setNormAgent Sets the instance variable normAgent. (character)

features Returns instance variable features. (character)

normParameter Returns the instance variable normParameter.

Methods

Public methods:

- `pgu.normalizer$new()`
- `pgu.normalizer$finalize()`
- `pgu.normalizer$print()`
- `pgu.normalizer$detectNormParameter()`
- `pgu.normalizer$scale_data()`
- `pgu.normalizer$scale_minMax()`
- `pgu.normalizer$scale_minMax_numeric()`
- `pgu.normalizer$scale_mean()`
- `pgu.normalizer$scale_mean_numeric()`
- `pgu.normalizer$scale_zScore()`
- `pgu.normalizer$scale_zScore_numeric()`
- `pgu.normalizer$rescale_data()`
- `pgu.normalizer$rescale_minMax()`
- `pgu.normalizer$rescale_minMax_numeric()`
- `pgu.normalizer$rescale_mean()`
- `pgu.normalizer$rescale_mean_numeric()`
- `pgu.normalizer$rescale_zScore()`
- `pgu.normalizer$rescale_zScore_numeric()`
- `pgu.normalizer$featureBarPlot()`
- `pgu.normalizer$featureBoxPlotWithSubset()`
- `pgu.normalizer$featurePlot()`
- `pgu.normalizer$clone()`

Method `new()`: Creates and returns a new 'pgu.normalizer' object.

Usage:

```
pgu.normalizer$new(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (tibble::tibble)

Returns: A new 'pgu.normalizer' object. (pguIMP::pgu.normalizer)

Method `finalize()`: Clears the heap and indicates that instance of 'pgu.normalizer' is removed from heap.

Usage:

```
pgu.normalizer$finalize()
```

Method `print()`: Prints instance variables of a 'pgu.normalizer' object.

Usage:

```
pgu.normalizer$print()
```

Returns: string

Method `detectNormParameter()`: Resets instance variable 'normParameter'

Usage:

```
pgu.normalizer$detectNormParameter(data_df = "tbl_df")
```

Arguments:

data_df Dataframe to be analyzed. (tibble::tibble)

Method scale_data(): Scales a tibble using the method defined by the instance variable normAgent

Usage:

```
pgu.normalizer$scale_data(data_df = "tbl_df")
```

Arguments:

data_df Dataframe to be scaled (tibble::tibble)

Returns: A normalized version of the dataframe. (tibble::tibble)

Method scale_minMax(): Scales a tibble using min-max normalization

Usage:

```
pgu.normalizer$scale_minMax(data_df = "tbl_df")
```

Arguments:

data_df Dataframe to be scaled (tibble::tibble)

Returns: A min-max normalized version of the dataframe

Method scale_minMax_numeric(): Scales a numeric object using min-max normalization

Usage:

```
pgu.normalizer$scale_minMax_numeric(values = "numeric", feature = "character")
```

Arguments:

values Values to be scaled. Either a number or a vector (numeric)

feature Character to identify the proper normalization parameters. (character)

Returns: A min-max normalized version of the numeric object

Method scale_mean(): Scales a tibble using mean normalization

Usage:

```
pgu.normalizer$scale_mean(data_df = "tbl_df")
```

Arguments:

data_df Dataframe to be scaled. (tibble::tibble)

Returns: A mean normalized version of the dataframe

Method scale_mean_numeric(): Scales a numeric object using mean normalization

Usage:

```
pgu.normalizer$scale_mean_numeric(values = "numeric", feature = character)
```

Arguments:

values Values to be scaled. Either a number or a vector (numeric)

feature Character to identify the proper normalization parameters. (character)

Returns: A mean normalized version of the numeric object

Method `scale_zScore()`: Scales a tibble using z-score normalization

Usage:

```
pgu.normalizer$scale_zScore(data_df = "tbl_df")
```

Arguments:

`data_df` Dataframe to be scaled (tibble::tibble)

Returns: A z-score normalized version of the dataframe

Method `scale_zScore_numeric()`: Scales a numeric object using z-score normalization

Usage:

```
pgu.normalizer$scale_zScore_numeric(values = "numeric", feature = character)
```

Arguments:

`values` Values to be scaled. Either a number or a vector (numeric)

`feature` Character to identify the proper normalization parameters. (character)

Returns: A z-score normalized version of the numeric object

Method `rescale_data()`: Rescales a tibble using the method defined by the instance variable `normAgent`

Usage:

```
pgu.normalizer$rescale_data(data_df = "tbl_df")
```

Arguments:

`data_df` Normalized dataframe to be rescaled (tibble::tibble)

Returns: A rescaled version of the normalized dataframe. (tibble::tibble)

Method `rescale_minMax()`: Rescales a tibble using min-max normalization

Usage:

```
pgu.normalizer$rescale_minMax(data_df = "tbl_df")
```

Arguments:

`data_df` Normalized dataframe to be rescaled (tibble::tibble)

Returns: A rescaled version of a min-max normalized dataframe

Method `rescale_minMax_numeric()`: Rescales a numeric object using min-max normalization

Usage:

```
pgu.normalizer$rescale_minMax_numeric(values = "numeric", feature = character)
```

Arguments:

`values` Normalized values to be rescaled. Either a number or a vector (numeric)

`feature` Character to identify the proper normalization parameters. (character)

Returns: Rescaled version of min-max normalized numeric object

Method `rescale_mean()`: Rescales a tibble using mean normalization

Usage:

```
pgu.normalizer$rescale_mean(data_df = "tbl_df")
```

Arguments:

data_df Normalized dataframe to be rescaled (tibble::tibble)

Returns: A rescaled version of a mean normalized dataframe

Method rescale_mean_numeric(): Rescales a numeric object using mean normalization

Usage:

```
pgu.normalizer$rescale_mean_numeric(values = "numeric", feature = character)
```

Arguments:

values Normalized values to be rescaled. Either a number or a vector (numeric)

feature Character to identify the proper normalization parameters. (character)

Returns: Rescaled version of mean normalized numeric object

Method rescale_zScore(): Rescales a tibble using z-score normalization

Usage:

```
pgu.normalizer$rescale_zScore(data_df = "tbl_df")
```

Arguments:

data_df Normalized dataframe to be rescaled (tibble::tibble)

Returns: A rescaled version of a z-score normalized dataframe

Method rescale_zScore_numeric(): Rescales a numeric object using z-score normalization

Usage:

```
pgu.normalizer$rescale_zScore_numeric(values = "numeric", feature = character)
```

Arguments:

values Normalized values to be rescaled. Either a number or a vector (numeric)

feature Character to identify the proper normalization parameters. (character)

Returns: Rescaled version of z-score normalized numeric object

Method featureBarPlot(): Displays the distribution of an attribute values as histogram.

Usage:

```
pgu.normalizer$featureBarPlot(data_df = "tbl_df", feature = "character")
```

Arguments:

data_df dataframe to be analyzed. (tibble::tibble)

feature attribute to be shown. (character)

Returns: A histogram. (ggplot2::ggplot)

Method featureBoxPlotWithSubset(): Displays the distribution of an attribute's values as box plot.

Usage:

```
pgu.normalizer$featureBoxPlotWithSubset(  
  data_df = "tbl_df",  
  feature = "character"  
)
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)

`feature` attribute to be shown. (character)

Returns: A box plot. (ggplot2::ggplot)

Method `featurePlot()`: Displays the distribution of an attribute's values as a composition of a box plot and a histogram.

Usage:

```
pgu.normalizer$featurePlot(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)

`feature` attribute to be shown. (character)

Returns: A composite plot. (ggplot2::ggplot)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.normalizer$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.normDist

pgu.normDist

Description

Compares the distribution of a single attribute's values to normal distribution by using several statistic tests.

Format

[R6::R6Class] object.

Details

The distribution of a single value is tested for normality by Shapiro-Wilk test, Kolmogorov-Smirnov test, Anderson-Darling test. The expectation value and standard deviation of a normal distribution representing the data are determined by maximizing the log Likelihood with respect to the expectation value and standard deviation. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

featureName Returns the instance variable featureName. (character)
 rawData Returns the instance variable rawData. (tibble::tibble)
 setRawData Sets the instance variable rawData. (tibble::tibble)
 histogram Returns the instance variable histogram. (tibble::tibble)
 expMu Returns the instance variable expMu. (numeric)
 expSigma Returns the instance variable expSigma. (numeric)
 dataPoints Returns the instance variable dataPoints. (numeric)
 logLikelihood Returns the instance variable logLikelihood. (numeric)
 degOfFreedom Returns the instance variable degOfFreedom. (numeric)
 n Returns the instance variable n. (integer)
 bic Returns the instance variable bic. (numeric)
 aic Returns the instance variable aic. (numeric)
 aicc Returns the instance variable aicc. (numeric)
 rmse Returns the instance variable rmse. (numeric)
 fitSuccess Returns the instance variable fitSuccess. (logical)
 testNames Returns the instance variable testNames. (character)
 testParameterNames Returns the instance variable testParameterNames. (character)
 alpha Returns the instance variable alpha. (numeric)
 w.shapiro Returns the instance variable w.shapiro. (numeric)
 p.shapiro Returns the instance variable p.shapiro. (numeric)
 d.kolmogorow Returns the instance variable d.kolmogorow. (numeric)
 p.kolmogorow Returns the instance variable p.kolmogorow. (numeric)
 a.anderson Returns the instance variable a.anderson. (numeric)
 p.anderson Returns the instance variable p.anderson. (numeric)

Methods**Public methods:**

- [pgu.normDist\\$new\(\)](#)
- [pgu.normDist\\$finalize\(\)](#)
- [pgu.normDist\\$print\(\)](#)
- [pgu.normDist\\$resetNormDist\(\)](#)
- [pgu.normDist\\$resetFail\(\)](#)
- [pgu.normDist\\$optimize\(\)](#)
- [pgu.normDist\\$createHistogram\(\)](#)
- [pgu.normDist\\$normalQQData\(\)](#)
- [pgu.normDist\\$test.shapiro\(\)](#)
- [pgu.normDist\\$test.kolmogorow\(\)](#)

- `pgu.normDist$test.anderson()`
- `pgu.normDist$fitResult()`
- `pgu.normDist$testResult()`
- `pgu.normDist$testResultCompendium()`
- `pgu.normDist$plotHistogram()`
- `pgu.normDist$plotResiduals()`
- `pgu.normDist$plotResidualDist()`
- `pgu.normDist$plotRawResidualDist()`
- `pgu.normDist$plotRawDataDist()`
- `pgu.normDist$normalQQPlot()`
- `pgu.normDist$fit()`
- `pgu.normDist$clone()`

Method `new()`: Creates and returns a new ‘pgu.normDist’ object.

Usage:

```
pgu.normDist$new(data = "tbl_df")
```

Arguments:

data The data to be analyzed. (tibble::tibble)

Returns: A new ‘pgu.normDist’ object. (pguIMP::pgu.normDist)

Method `finalize()`: Clears the heap and indicates that instance of ‘pgu.normDist’ is removed from heap.

Usage:

```
pgu.normDist$finalize()
```

Method `print()`: Prints instance variables of a ‘pgu.normDist’ object.

Usage:

```
pgu.normDist$print()
```

Returns: string

Method `resetNormDist()`: Resets instance variables

Usage:

```
pgu.normDist$resetNormDist(data = "tbl_df")
```

Arguments:

data Dataframe to be analyzed. (tibble::tibble)

Method `resetFail()`: Resets instance variables in case of a failed analysis.

Usage:

```
pgu.normDist$resetFail()
```

Method `optimize()`: Optimizes the logLikelihood between the data and a normal distribution with respect to the expectation value and standard deviation. The quality of the best model is calculated subsequently.

Usage:

```
pgu.normDist$optimize()
```

Method createHistogram(): Creates a histogram from the instance variable 'rawData'. The histogram is stored in the instance variable 'histogram'.

Usage:

```
pgu.normDist$createHistogram()
```

Method normalQQData(): Performs a qq-analysis of the instance variable 'rawData'. The qq-analysis is stored in the attributes 'sample_quantile' and 'theoretical_quantile' of the instance variable 'rawData'.

Usage:

```
pgu.normDist$normalQQData()
```

Method test.shapiro(): Performs Shapiro-Wilk's test for normality on the instance variable 'rawData'. The test result is stored in the instance variable 'w.shapiro'. The p-value of the test is stored in the instance variable 'p.shapiro'.

Usage:

```
pgu.normDist$test.shapiro()
```

Method test.kolmogorow(): Performs Kolmogorow-Smirnow's test for normality on the instance variable 'rawData'. The test result is stored in the instance variable 'd.kolmogorow'. The p-value of the test is stored in the instance variable 'p.kolmogorow'.

Usage:

```
pgu.normDist$test.kolmogorow()
```

Method test.anderson(): Performs Anderson-Darling's test for normality on the instance variable 'rawData'. The test result is stored in the instance variable 'a.anderson'. The p-value of the test is stored in the instance variable 'p.anderson'.

Usage:

```
pgu.normDist$test.anderson()
```

Method fitResult(): Returns the result of the classes optimize function in form of a formatted string.

Usage:

```
pgu.normDist$fitResult()
```

Returns: String of the results of the fitting routine (character)

Method testResult(): Returns the result of the classes test functions in form of a formatted string.

Usage:

```
pgu.normDist$testResult(testName = "Shapiro-Wilk")
```

Arguments:

testName Defines the test which result shall be returned. Can be of type: 'Shapiro-Wilk', 'Kolmogorow-Smirnow' or 'Anderson-Darling'. (character)

Returns: String of the results of the testing routine (character)

Method `testResultCompendium()`: Returns the result of the classes test functions ‘Shapiro-Wilk’, ‘Kolmogorow-Smirnow’ and ‘Anderson-Darling’ in form of a formatted string. (character)

Usage:

```
pgu.normDist$testResultCompendium()
```

Returns: String of the results of the testing routine (character)

Method `plotHistogram()`: Displays the instance variable ‘histogram’ in form of a bar plot and overlays the corresponding normal distribution.

Usage:

```
pgu.normDist$plotHistogram()
```

Returns: A bar plot. (ggplot2::ggplot)

Method `plotResiduals()`: Displays the residuals between the instance variable ‘histogram’ and the corresponding normal distribution.

Usage:

```
pgu.normDist$plotResiduals()
```

Returns: A scatter plot. (ggplot2::ggplot)

Method `plotResidualDist()`: Displays the distribution of the residuals between the distribution of the instance variable ‘histogram’ in form of a histogram.

Usage:

```
pgu.normDist$plotResidualDist()
```

Returns: A bar plot. (ggplot2::ggplot)

Method `plotRawResidualDist()`: Displays the distribution of the residuals between the distribution of the instance variable ‘rawData’ in form of a histogram.

Usage:

```
pgu.normDist$plotRawResidualDist()
```

Returns: A bar plot. (ggplot2::ggplot)

Method `plotRawDataDist()`: Displays the distribution of the instance variable ‘rawData’ in form of a histogram.

Usage:

```
pgu.normDist$plotRawDataDist()
```

Returns: A bar plot. (ggplot2::ggplot)

Method `normalQQPlot()`: Displays a qqplot of the instance variable ‘rawData’.

Usage:

```
pgu.normDist$normalQQPlot()
```

Returns: A qq-plot. (ggplot2::ggplot)

Method `fit()`: Runs the optimization process and performs all implemented quality controls. Additionally performs hypothesis tests for normality.

Usage:

```
pgu.normDist$fit()
```

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.normDist$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.optimizer

pgu.optimizer

Description

Finds the transformation models that result in distributions that come closest to a normal distribution.

Format

[R6::R6Class] object.

Details

Analysis is performed individually on each attribute. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

features Returns the instance variable features. (character)

trafoAlphabet Returns the instance variable trafoAlphabet. (character)

setTrafoAlphabet Sets the instance variable trafoAlphabet to data. (character)

mirror Returns the instance variable mirror (logical)

setMirror Sets the instance variable mirror to data (logical)

optParameter Returns the instance variable optParameter (tibble::tibble)

optTypes Returns the instance variable optTypes (tibble::tibble)

Methods

Public methods:

- `pgu.optimizer$new()`
- `pgu.optimizer$finalize()`
- `pgu.optimizer$print()`
- `pgu.optimizer$resetFeatures()`
- `pgu.optimizer$resetOptParameter()`
- `pgu.optimizer$resetOptTypes()`
- `pgu.optimizer$resetOptimizer()`
- `pgu.optimizer$featureIdx()`
- `pgu.optimizer$modelParameterIsBigger()`
- `pgu.optimizer$modelParameterIsSmaller()`
- `pgu.optimizer$updateTrafoType()`
- `pgu.optimizer$updateMirrorLogic()`
- `pgu.optimizer$updateOptParameter()`
- `pgu.optimizer$optimize()`
- `pgu.optimizer$trafoAlpahbetTblDf()`
- `pgu.optimizer$clone()`

Method `new()`: Creates and returns a new ‘pgu.optimizer’ object.

Usage:

```
pgu.optimizer$new(data = "tbl_df")
```

Arguments:

`data` The data to be analyzed. (tibble::tibble)

Returns: A new ‘pgu.optimizer’ object. (pguIMP::pgu.optimizer)

Method `finalize()`: Clears the heap and indicates that instance of ‘pgu.optimizer’ is removed from heap.

Usage:

```
pgu.optimizer$finalize()
```

Method `print()`: Prints instance variables of a ‘pgu.optimizer’ object.

Usage:

```
pgu.optimizer$print()
```

Returns: string

Method `resetFeatures()`: Extract the attribute names from the given data frame and stores them in the class’ instance variable features,

Usage:

```
pgu.optimizer$resetFeatures(data = "tbl_df")
```

Arguments:

`data` The data to be analyzed. (tibble::tibble)

Method `resetOptParameter()`: Initializes the instance variable `optParameter`.

Usage:

```
pgu.optimizer$resetOptParameter()
```

Method `resetOptTypes()`: Initializes the instance variable `optTypes`.

Usage:

```
pgu.optimizer$resetOptTypes()
```

Method `resetOptimizer()`: Initializes the optimizer instance variables. Here, initialization defines a consecutive sequence of the class' functions: `resetFeatures`, `setTrafoAlphabet`, `setMirror`, `resetOptParameter` and `resetOptTypes`.

Usage:

```
pgu.optimizer$resetOptimizer(data = "tbl_df")
```

Arguments:

`data` The data to be analyzed. (tibble::tibble)

Method `featureIdx()`: Determines the numerical index of the column of an attribute based on the attribute name.

Usage:

```
pgu.optimizer$featureIdx(feature = "character")
```

Arguments:

`feature` The attribute's name. (character)

Returns: The attributes column index. (numeric)

Method `modelParameterIsBigger()`: Compares a model parameter to a reference parameter and tests, if the model parameter is bigger.

Usage:

```
pgu.optimizer$modelParameterIsBigger(  
  modelParameter = "numeric",  
  referenceParameter = "numeric"  
)
```

Arguments:

`modelParameter` The model parameter (numeric)

`referenceParameter` The reference parameter (numeric)

Returns: Test Result (logical)

Method `modelParameterIsSmaller()`: Compares a model parameter to a reference parameter and tests, if the model parameter is smaller.

Usage:

```
pgu.optimizer$modelParameterIsSmaller(  
  modelParameter = "numeric",  
  referenceParameter = "numeric"  
)
```

Arguments:

modelParameter The model parameter (numeric)

referenceParameter The reference parameter (numeric)

Returns: Test Result (logical)

Method updateTrafoType(): Takes an instance of the pgu.transfromator class and sets the transformation type to a user defined value.

Usage:

```
pgu.optimizer$updateTrafoType(
  transformator = "pgu.transformator",
  type = "character"
)
```

Arguments:

transformator An instance of the pgu.transformator class (pguIMP::pgu.transformator)

type A transfromation type (character)

Returns: An updated instance of the pgu.transformator class (pguIMP::pgu.transformator)

Method updateMirrorLogic(): Takes an instance of the pgu.transfromator class and sets the mirrorLogic parameter to a user defined value.

Usage:

```
pgu.optimizer$updateMirrorLogic(
  transformator = "pgu.transformator",
  logic = "logical"
)
```

Arguments:

transformator An instance of the pgu.transformator class (pguIMP::pgu.transformator)

logic The mirrorLogic parameter (logic)

Returns: An updated instance of the pgu.transformator class (pguIMP::pgu.transformator)

Method updateOptParameter(): Takes an instance of the pgu.model class and analyzes it. Keeps track of the optimal model parameters during optimization and stores them in the instance variables optTypes and optParameter.

Usage:

```
pgu.optimizer$updateOptParameter(
  model = "pgu.model",
  type = "character",
  logic = "character"
)
```

Arguments:

model An instance of the pgu.model class (pguIMP::pgu.model)

type A transfromation type (character)

logic The mirrorLogic parameter (logic)

Method optimize(): Permutates all possible variations of data transfromations and iterates through them. Analysis the optimal transformation parameters for each attribute in the data frame and stores them in the instance variables optParameter, optTypes.

Usage:

```
pgu.optimizer$optimize(data = "tbl_df", progress = "Progress")
```

Arguments:

`data` The data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Method `trafoAlphabetTblDf()`: Returns information on the optimization progress

Usage:

```
pgu.optimizer$trafoAlphabetTblDf()
```

Returns: The data frame comprizing analysis information. (tibble::tibble)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.optimizer$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.outliers

pgu.outliers

Description

Detects and replaces possible outliers from data set.

Format

[R6::R6Class] object.

Details

Performs Grubb's test for outliers to detect outliers in the normalized and Z-score transformed data set. Replace missing values with substitutes by classical and AI-powered substitution algorithms. For this purpose outliers are handled as imputation sites.

Active bindings

outliersParameter Returns the instance variable outliersParameter. (tibble::tibble)
 outliers Returns the instance variable outliers. (tibble::tibble)
 one_hot_df Returns the positions of missings in one_hot encoding (tibble::tibble)
 outliersStatistics Returns the instance variable outliersStatistics. (tibble::tibble)
 outliersAgentAlphabet Returns the instance variable of outliersAgentAlphabet (character)
 outliersAgent Returns the instance variable outliersAgent. (character)
 setOutliersAgent Sets the instance variable outliersAgent. (character)
 featureData Returns the instance variable featureData. (numeric)
 alpha Returns the instance variable alpha. (numeric)
 setAlpha Set the instance variable alpha. (numeric)
 epsilon Returns the instance variable epsilon. (numeric)
 setEpsilon Set the instance variable epsilon. (numeric)
 minSamples Returns the instance variable minSamples. (integer)
 setMinSamples Set the instance variable minSamples. (integer)
 gamma Returns the instance variable gamma. (numeric)
 setGamma Set the instance variable gamma. (numeric)
 nu Returns the instance variable nu. (numeric)
 setNu Set the instance variable nu. (numeric)
 k Returns the instance variable k (integer)
 setK Sets the instance variable k. (integer)
 cutoff Returns the instance variable cutoff. (numeric)
 setCutoff Sets the instance variable cutoff. (numeric)
 seed Returns the instance variable seed. (integer)
 setSeed Set the instance variable seed. (integer)

Methods**Public methods:**

- [pgu.outliers\\$new\(\)](#)
- [pgu.outliers\\$finalize\(\)](#)
- [pgu.outliers\\$print\(\)](#)
- [pgu.outliers\\$resetOutliers\(\)](#)
- [pgu.outliers\\$filterFeatures\(\)](#)
- [pgu.outliers\\$checkFeatureValidity\(\)](#)
- [pgu.outliers\\$detectOutliersParameter\(\)](#)
- [pgu.outliers\\$outliersFeatureList\(\)](#)
- [pgu.outliers\\$featureOutlier\(\)](#)
- [pgu.outliers\\$one_hot\(\)](#)

- `pgu.outliers$detectOutliers()`
- `pgu.outliers$detectByGrubbs()`
- `pgu.outliers$grubbs_numeric()`
- `pgu.outliers$detectByDbscan()`
- `pgu.outliers$dbscan_numeric()`
- `pgu.outliers$detectBySvm()`
- `pgu.outliers$svm_numeric()`
- `pgu.outliers$detectByKnn()`
- `pgu.outliers$knn_numeric()`
- `pgu.outliers$setImputationSites()`
- `pgu.outliers$calcOutliersStatistics()`
- `pgu.outliers$outlierTable()`
- `pgu.outliers$plotOutliersDistribution()`
- `pgu.outliers$featureBarPlot()`
- `pgu.outliers$featureBoxPlotWithSubset()`
- `pgu.outliers$featurePlot()`
- `pgu.outliers$clone()`

Method `new()`: Creates and returns a new ‘pgu.outliers’ object.

Usage:

```
pgu.outliers$new(
  data_df = "tbl_df",
  alpha = 0.05,
  epsilon = 0.1,
  minSamples = 4,
  gamma = 0.05,
  nu = 0.1,
  k = 4,
  cutoff = 0.99,
  seed = 42
)
```

Arguments:

`data_df` The data to be cleaned. (tibble::tibble)
`alpha` Initial definition of the instance variable alpha. (numeric)
`epsilon` Initial definition of the instance variable epsilon. (numeric)
`minSamples` Initial definition of the instance variable minSamples. (integer)
`gamma` Initial definition of the instance variable gamma. (numeric)
`nu` Initial definition of the instance variable nu. (numeric)
`k` Initial definition of the instance variable k. (integer)
`cutoff` Initial definition of the instance variable cutoff. (numeric)
`seed` Initial definition of the instance variable seed. (integer)

Returns: A new ‘pgu.outliers’ object. (pguIMP::pgu.outliers)

Method `finalize()`: Clears the heap and indicates that instance of ‘pgu.outliers’ is removed from heap.

Usage:

```
pgu.outliers$finalize()
```

Method print(): Prints instance variables of a ‘pgu.outliers’ object.

Usage:

```
pgu.outliers$print()
```

Returns: string

Method resetOutliers(): Resets instance variables and performs Grubb’s test for outliers to detect outliers in the normalized and Z-score transformed data set. Progress is indicated by the progress object passed to the function.

Usage:

```
pgu.outliers$resetOutliers(data_df = "tbl_df")
```

Arguments:

data_df Dataframe to be analyzed. (tibble::tibble)

Method filterFeatures(): Filters attributes from the given dataframe that are known to the class.

Usage:

```
pgu.outliers$filterFeatures(data_df = "tbl_df")
```

Arguments:

data_df Dataframe to be filtered. (tibble::tibble)

Returns: A filtered dataframe. (tibble::tibble)

Method checkFeatureValidity(): Checks if the feature consists of a sufficient number of instances.

Usage:

```
pgu.outliers$checkFeatureValidity(data_df = "tbl_df", feature = "character")
```

Arguments:

data_df Dataframe to be analyzed (tibble::tibble)

feature The attribute to be analyzed. (character)

Method detectOutliersParameter(): determines the outliers parameter by analyzing the tibble data_df and the instance variable outliers. Results are stored to instance variable outliersParameter.

Usage:

```
pgu.outliers$detectOutliersParameter(data_df = "tbl_df")
```

Arguments:

data_df Dataframe to be analyzed. (tibble::tibble)

Method outliersFeatureList(): Characterizes each row of the data frame as either ‘complete’ or indicates which attribute has been identified as an outlier within the row. If multiple attributes’ row entries were identified as outliers, the row is characterized by ‘multiple’.

Usage:

```
pgu.outliers$outliersFeatureList(data_df = "tbl_df")
```

Arguments:

data_df The data frame to be analyzed. (tibble::tibble)

Returns: Vector of row characteristics. (character)

Method featureOutlier(): Returns the detected outliers of a given attribute.

Usage:

```
pgu.outliers$featureOutlier(feature = "character")
```

Arguments:

feature The attribute to be analyzed (character)

Returns: The attribute's outliers (tibble::tibble)

Method one_hot(): Gathers statistical information about missing values in one hot format. The result is stored in the instance variable one_hot_df.

Usage:

```
pgu.outliers$one_hot(data_df = "tbl_df")
```

Arguments:

data_df The data frame to be analyzed. (tibble::tibble)

Method detectOutliers(): Chooses a method for identification of anomalies based upon the instance variable 'outliersAgent'. Detects anomalies in a data frame by one-dimensional analysis of each feature.

Usage:

```
pgu.outliers$detectOutliers(data_df = "tbl_df", progress = "Progress")
```

Arguments:

data_df Data frame to be analyzed. (tibble::tibble)

progress If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method detectByGrubbs(): Identifies anomalies in the data frame based on Grubb's test. Iterates over the whole data frame. Calls the object's public function 'grubbs_numeric' until no more anomalies are identified. The threshold for anomaly detection is defined in the instance variable 'alpha'. Display the progress if shiny is loaded.

Usage:

```
pgu.outliers$detectByGrubbs(data_df = "tbl_df", progress = "Progress")
```

Arguments:

data_df Data frame to be analyzed. (tibble::tibble)

progress If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method grubbs_numeric(): Performs Grubb's test for anomalies to detect a single outlier in the provided attributes data. If an outlier is found, it is added to the instance variable 'outliers'. The threshold for anomaly detection is defined in the instance variable 'alpha'. The function indicates a find by a positive feedback.

Usage:

```
pgu.outliers$grubbs_numeric(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

`feature` The attribute within the data frame to be analyzed.

Returns: Feedback if an outlier was found. (logical)

Method `detectByDbscan()`: Identifies anomalies in the data frame based on DBSCAN. Iterates over the whole data frame. Calls the object's public function 'dbscan_numeric' until all features are analyzed. The cluster hyper parameter are defined in the instance variables 'epsilon' and 'minSamples'. The results of the 'dbscan_numeric' routine are added to the instance variable 'outliers'. Display the progress if shiny is loaded.

Usage:

```
pgu.outliers$detectByDbscan(data_df = "tbl_df", progress = "Progress")
```

Arguments:

`data_df` Data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method `dbscan_numeric()`: Identifies anomalies in a single feature of a data frame based on DBSCAN. The cluster hyperparameter are defined in the instance variables 'epsilon' and 'minSamples'. Display the progress if shiny is loaded.

Usage:

```
pgu.outliers$dbscan_numeric(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` Data frame to be analyzed. (tibble::tibble)

`feature` Feature to be analyzed (character)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: A data frame comprising the information about detected anomalies of the feature. (tibble::tibble)

Method `detectBySvm()`: Identifies anomalies in the data frame based on one class SVM. Iterates over the whole data frame. Calls the object's public function 'svm_numeric' until all features are analyzed. The cluster hyper parameter are defined in the instance variables 'gamma' and 'nu'. The results of the 'svm_numeric' routine are added to the instance variable 'outliers'. Display the progress if shiny is loaded.

Usage:

```
pgu.outliers$detectBySvm(data_df = "tbl_df", progress = "Process")
```

Arguments:

`data_df` Data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method `svm_numeric()`: Identifies anomalies in a single feature of a data frame based on one class SVM. The cluster hyperparameter are defined in the instance variables 'gamma' and 'nu'. Display the progress if shiny is loaded.

Usage:

```
pgu.outliers$svm_numeric(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` Data frame to be analyzed. (tibble::tibble)

`feature` Feature to be analyzed (character)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: A data frame comprising the information about detected anomalies of the feature. (tibble::tibble)

Method `detectByKnn()`: Identifies anomalies in the data frame based on knnO. Iterates over the whole data frame. Calls the object's public function 'svm_numeric' until all features are analyzed. The cluster hyper parameter are defined in the instance variables 'alpha' and 'minSamples'. The results of the 'knn_numeric' routine are added to the instance variable 'outliers'. Display the progress if shiny is loaded.

Usage:

```
pgu.outliers$detectByKnn(data_df = "tbl_df", progress = "Process")
```

Arguments:

`data_df` Data frame to be analyzed. (tibble::tibble)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method `knn_numeric()`: Identifies anomalies in a single feature of a data frame based on knnO. The cluster hyperparameter are defined in the instance variables 'alpha' and 'minSmamples'. Display the progress if shiny is loaded.

Usage:

```
pgu.outliers$knn_numeric(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` Data frame to be analyzed. (tibble::tibble)

`feature` Feature to be analyzed (character)

`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Returns: A data frame comprising the information about detected anomalies of the feature. (tibble::tibble)

Method `setImputationSites()`: Replaces the detected anomalies of a user provided data frame with 'NA' for further imputation routines.

Usage:

```
pgu.outliers$setImputationSites(data_df = "tbl_df")
```

Arguments:

`data_df` Data frame to be mutated. (tibble::tibble)

Returns: A data frame with anomalies replaced by 'NA'. (tibble::tibble)

Method `calcOutliersStatistics()`: Calculates the statistics on the previously performed outlier detection analysis and stores the results in the instance variable 'outliersStatistics'.

Usage:

```
pgu.outliers$calcOutliersStatistics(data_df = "tbl_df")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

Method `outlierTable()`: Creates a datatable with substituted outliers highlights by colored background.

Usage:

```
pgu.outliers$outlierTable(data_df = "tbl_df")
```

Arguments:

`data_df` The data frame to be analyzed. (tibble::tibble)

Returns: A colored datatable (DT::datatable)

Method `plotOutliersDistribution()`: Displays the occurrence of outlier candidates per attribute as bar plot.

Usage:

```
pgu.outliers$plotOutliersDistribution()
```

Returns: A bar plot. (ggplot2::ggplot)

Method `featureBarPlot()`: Displays the distribution of an attribute's values as histogram.

Usage:

```
pgu.outliers$featureBarPlot(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)

`feature` attribute to be shown. (character)

Returns: A histogram. (ggplot2::ggplot)

Method `featureBoxPlotWithSubset()`: Displays the distribution of an attribute's values as box plot.

Usage:

```
pgu.outliers$featureBoxPlotWithSubset(
  data_df = "tbl_df",
  feature = "character"
)
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)

`feature` attribute to be shown. (character)

Returns: A box plot. (ggplot2::ggplot)

Method `featurePlot()`: Displays the distribution of an attribute's values as a composition of a box plot and a histogram.

Usage:

```
pgu.outliers$featurePlot(data_df = "tbl_df", feature = "character")
```

Arguments:

`data_df` dataframe to be analyzed. (tibble::tibble)

`feature` attribute to be shown. (character)

Returns: A composite plot. (ggplot2::ggplot)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.outliers$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.regressor

pgu.regressor

Description

A class that performs pairwise robust regression on the pguIMP data set.

Format

[R6::R6Class] object.

Details

A class that performs pairwise robust regression on the pguIMP data set. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

`featureNames` Returns the instance variable `featureNames`. (character)

`setFeatureNames` Sets the instance variable `featureNames`. It further initializes the instance variables: `intercept`, `pIntercept`, `slope`, `pSlope`. (character)

`intercept` Returns the instance variable `intercept`. (matrix)

`pIntercept` Returns instance variable `pIntercept`. (matrix)

`slope` Returns the instance variable `slope`. (matrix)

`pSlope` Returns the instance variable `pSlope`. (matrix)

`model` Returns the instance variable `model`. (robust::lmRob)

Methods

Public methods:

- `pgu.regressor$new()`
- `pgu.regressor$finalize()`
- `pgu.regressor$print()`
- `pgu.regressor$resetRegressor()`
- `pgu.regressor$resetDiagonal()`
- `pgu.regressor$resetMatrix()`
- `pgu.regressor$featureIdx()`
- `pgu.regressor$featureIsValid()`
- `pgu.regressor$featurePairIsValid()`
- `pgu.regressor$createModel()`
- `pgu.regressor$createRegressionMatrix()`
- `pgu.regressor$printModel()`
- `pgu.regressor$printInterceptTbl()`
- `pgu.regressor$printPInterceptTbl()`
- `pgu.regressor$printSlopeTbl()`
- `pgu.regressor$printPSlopeTbl()`
- `pgu.regressor$plotRegression()`
- `pgu.regressor$plotResidualDist()`
- `pgu.regressor$plotResidualBox()`
- `pgu.regressor$plotModel()`
- `pgu.regressor$clone()`

Method `new()`: Creates and returns a new 'pgu.regressor' object.

Usage:

```
pgu.regressor$new(data = "tbl_df")
```

Arguments:

`data` The data to be modeled. (tibble::tibble)

Returns: A new 'pgu.regressor' object. (pguIMP::pgu.regressor)

Method `finalize()`: Clears the heap and indicates if instance of 'pgu.regressor' is removed from heap.

Usage:

```
pgu.regressor$finalize()
```

Method `print()`: Prints instance variables of a 'pgu.regressor' object.

Usage:

```
pgu.regressor$print()
```

Returns: string

Method `resetRegressor()`: Performs pair-wise robust linear regression on the attributes of the data tibble. Progress is indicated by the progress object passed to the function.

Usage:

```
pgu.regressor$resetRegressor(data = "tbl_df", progress = "Progress")
```

Arguments:

data Dataframe with at least two numeric attributes. (tibble::tibble)
 progress Keeps track of the analysis progress. (shiny::Progress)

Method resetDiagonal(): Sets the diagonal of a square matrix to NA.

Usage:

```
pgu.regressor$resetDiagonal(data = "matrix")
```

Arguments:

data The matrix whose diagonal is to be reset. (matrix)

Returns: A matrix with its diagonal reset to NA. (matrix)

Method resetMatrix(): Creates a square matrix which dimension corresponds to the length of the instance variable featureNames. The matrix entries are set to a distinct 'value'. The diagonal is set to NA.

Usage:

```
pgu.regressor$resetMatrix(value = "numeric")
```

Arguments:

value The value the matrix entries are set to. (numeric)

Returns: A square matrix. (matrix)

Method featureIdx(): Determines the numerical index of the column of an attribute based on the attribute name.

Usage:

```
pgu.regressor$featureIdx(feature = "character")
```

Arguments:

feature The attribute's name. (character)

Returns: The attributes column index. (numeric)

Method featureIsValid(): Checks if the feature is known to the class.

Usage:

```
pgu.regressor$featureIsValid(feature = "character")
```

Arguments:

feature An attribute's name that is to be checked. (character)

Returns: The test result. (logical)

Method featurePairIsValid(): Checks a if a pair of attributes different and known to the class.

Usage:

```
pgu.regressor$featurePairIsValid(
  abscissa = "character",
  ordinate = "character"
)
```

Arguments:

abscissa An attribute's name that is to be checked. (character)

ordinate An attribute's name that is to be checked. (character)

Returns: The test result. (logical)

Method `createModel()`: Creates a robust model of linear regression between two attributes of a dataframe. The model is stored as instance variable.

Usage:

```
pgu.regressor$createModel(
  data = "tbl_df",
  abscissa = "character",
  ordinate = "character"
)
```

Arguments:

data The data to be modeled. (tibble::tibble)

abscissa An attribute's name that equals a column name in the data. (character)

ordinate An attribute's name that equals a column name in the data. (character)

Method `createRegressionMatrix()`: Performs the actual robust linear regression routine. Iteratively runs through the attributes known to the class and creates a robust linear regression model for each valid attribute pair. The model results are stored in the instance variables: `intercept`, `pIntercept`, `slope`, `pSlope`. Here, `pX` represents the p-value of the respective parameter X. Displays the progress if shiny is loaded.

Usage:

```
pgu.regressor$createRegressionMatrix(data = "tbl_df", progress = "Progress")
```

Arguments:

data The data to be modeled. (tibble::tibble)

progress If shiny is loaded, the analysis' progress is stored within this instance of the shiny Progress class. (shiny::Progress)

Method `printModel()`: Transforms the results of the modeling procedure for a valid pair of attributes to a dataframe and returns it.

Usage:

```
pgu.regressor$printModel(abscissa = "character", ordinate = "character")
```

Arguments:

abscissa The name of the attribute which is assigned to the abscissa. (character)

ordinate The name of the attribute which is assigned to the ordinate. (character)

Returns: The analysis result as a dataframe. (tibble::tibble)

Method `printInterceptTbl()`: Transforms instance variable `intercept` to a dataframe and returns it.

Usage:

```
pgu.regressor$printInterceptTbl()
```

Returns: Dataframe of instance variable intercept. (tibble::tibble)

Method printPInterceptTbl(): Transforms instance variable pIntercept to a dataframe and returns it.

Usage:

```
pgu.regressor$printPInterceptTbl()
```

Returns: Dataframe of instance variable pIntercept. (tibble::tibble)

Method printSlopeTbl(): Transforms instance variable slope to a dataframe and returns it.

Usage:

```
pgu.regressor$printSlopeTbl()
```

Returns: Dataframe of instance variable slope. (tibble::tibble)

Method printPSlopeTbl(): Transforms instance variable pSlope to a dataframe and returns it.

Usage:

```
pgu.regressor$printPSlopeTbl()
```

Returns: Dataframe of instance variable pSlope. (tibble::tibble)

Method plotRegression(): Creates a scatter plot of the model stored within the instance variable of the class.

Usage:

```
pgu.regressor$plotRegression()
```

Returns: A scatter plot. (ggplot2::ggplot)

Method plotResidualDist(): Creates a histogram of the residual distribution of the model stored within the instance variable of the class.

Usage:

```
pgu.regressor$plotResidualDist()
```

Returns: A histogram plot. (ggplot2::ggplot)

Method plotResidualBox(): Creates a box plot of the residual distribution of the model stored within the instance variable of the class.

Usage:

```
pgu.regressor$plotResidualBox()
```

Returns: A box plot. (ggplot2::ggplot)

Method plotModel(): Creates a model of robust linear regression. Executes all graphical exploration functions of the class and creates a composite graph based on their results.

Usage:

```
pgu.regressor$plotModel(  
  data = "tbl_df",  
  abscissa = "character",  
  ordinate = "character"  
)
```

Arguments:

`data` The data to be modeled. (tibble::tibble)

`abscissa` The name of the attribute which is assigned to the abscissa. (character)

`ordinate` The name of the attribute which is assigned to the ordinate. (character)

Returns: A composite graph. (gridExtra::grid.arrange)

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
pgu.regressor$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.reporter

pgu.reporter

Description

Creates a human readable report file of the pguIMP analysis in odf format via rmarkdown and latex. This object is used by the shiny based gui and is not for use in individual R-scripts!

Format

[R6::R6Class] object.

Details

I run at the end of the analysis.

Active bindings

`filename` Returns the instance variable filename (character)

`setFilename` Sets the instance variable filename to name. (character)

Methods**Public methods:**

- `pgu.reporter$new()`
- `pgu.reporter$finalize()`
- `pgu.reporter$print()`
- `pgu.reporter$write_report()`
- `pgu.reporter$clone()`

Method new(): Creates and returns a new 'pgu.reporter' object.

Usage:

```
pgu.reporter$new(name = "character")
```

Arguments:

name Filename of the report pdf. (character)

Returns: A new 'pgu.reporter' object. (pguIMP::pgu.report)

Method finalize(): Clears the heap and indicates that instance of 'pgu.reporter' is removed from heap.

Usage:

```
pgu.reporter$finalize()
```

Method print(): Prints instance variables of a 'pgu.reporter' object.

Usage:

```
pgu.reporter$print()
```

Returns: string

Method write_report(): Writes a report of the pguIMP analysis to a pdf file.

Usage:

```
pgu.reporter$write_report(obj)
```

Arguments:

obj A list of class objects that are passed to the rmarkdown script.

Returns: t.b.a.

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.reporter$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.status

pgu.status

Description

A class that keeps track of the pguIMP analysis process.

Format

[R6::R6Class] object.

Details

pguIMP uses a defined linear analysis path. The current status therefore provides information about which analyses have already been performed and which still have to be performed. This way pguIMP knows any time during analysis, if all necessary information for the next desired analysis step are available. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

processAlphabet Returns the process alphabet of the pguIMP analysis routine. (character)

processStatus Returns the process status of the pguIMP routine. (logical)

Methods

Public methods:

- `pgu.status$new()`
- `pgu.status$finalize()`
- `pgu.status$print()`
- `pgu.status$reset()`
- `pgu.status$update()`
- `pgu.status$query()`
- `pgu.status$clone()`

Method `new()`: Creates and returns a new ‘pgu.status’ object.

Usage:

`pgu.status$new()`

Returns: A new ‘pgu.status’ object. (pguIMP::pgu.status)

Method `finalize()`: Clears the heap and indicates if instance of ‘pgu.status’ is removed from heap.

Usage:

`pgu.status$finalize()`

Method print(): Prints instance variables of a 'pgu.status' object.

Usage:

```
pgu.status#print()
```

Returns: string

Method reset(): resets the instance variables 'processAlphabet' and 'processStatus' to their initial values (FALSE).

Usage:

```
pgu.status$reset()
```

Method update(): updates the process status

Usage:

```
pgu.status$update(processName = "character", value = "logical")
```

Arguments:

processName The name of the 'pguIMP' process that has been performed. (character)

value Indicates if the process ended with success. (logical)

Method query(): Queries if a process has already been performed successfully.

Usage:

```
pgu.status$query(processName = "character")
```

Arguments:

processName Name of the process to be checked. (character)

Returns: Status of the queried process (logical)

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.status$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.transformator *pgu.transformator*

Description

Transforms the data of pguIMP.

Format

[R6::R6Class] object.

Details

Performs a data transformation in order to achieve a normally distributed version of the dataframe. This object is used by the shiny based gui and is not for use in individual R-scripts!

Active bindings

trafoAlphabet Returns the instance variable trafoAlphabte.
trafoParameter Returns the instance variable trafoParameter.

Methods

Public methods:

- `pgu.transformator$new()`
- `pgu.transformator$finalize()`
- `pgu.transformator$print()`
- `pgu.transformator$resetTrafoParameter()`
- `pgu.transformator$trafoType()`
- `pgu.transformator$setTrafoType()`
- `pgu.transformator$addConstant()`
- `pgu.transformator$mirrorLogic()`
- `pgu.transformator$setMirrorLogic()`
- `pgu.transformator$lambdaLOP()`
- `pgu.transformator$setLambdaLOP()`
- `pgu.transformator$lambdaBC()`
- `pgu.transformator$lambdaAS()`
- `pgu.transformator$featureIdx()`
- `pgu.transformator$addConstGenerator()`
- `pgu.transformator$mirrorNumeric()`
- `pgu.transformator$mirrorData()`
- `pgu.transformator$calculateAddConst()`
- `pgu.transformator$translateNumeric()`
- `pgu.transformator$translateData()`

- `pgu.transformator$backTranslateNumeric()`
- `pgu.transformator$backTranslateData()`
- `pgu.transformator$lambdaEstimator()`
- `pgu.transformator$estimateLambda_temp()`
- `pgu.transformator$estimateLambda()`
- `pgu.transformator$normalizeArcSine()`
- `pgu.transformator$optimizeTukeyLadderOfPowers()`
- `pgu.transformator$optimizeBoxCox()`
- `pgu.transformator$transformNumeric()`
- `pgu.transformator$transformData()`
- `pgu.transformator$transformLogModulus()`
- `pgu.transformator$transformSquareRoot()`
- `pgu.transformator$transformCubeRoot()`
- `pgu.transformator$transformArcsine()`
- `pgu.transformator$transformInverse()`
- `pgu.transformator$transformTukeyLadderOfPowers()`
- `pgu.transformator$transformBoxCox()`
- `pgu.transformator$inverseTransformNumeric()`
- `pgu.transformator$inverseTransformData()`
- `pgu.transformator$inverseTransformLogModulus()`
- `pgu.transformator$inverseTransformSquareRoot()`
- `pgu.transformator$inverseTransformCubeRoot()`
- `pgu.transformator$inverseTransformArcsine()`
- `pgu.transformator$inverseTransformInverse()`
- `pgu.transformator$inverseTransformTukeyLadderOfPowers()`
- `pgu.transformator$inverseTransformBoxCox()`
- `pgu.transformator$fit()`
- `pgu.transformator$mutateData()`
- `pgu.transformator$reverseMutateData()`
- `pgu.transformator$clone()`

Method `new()`: Creates and returns a new 'pgu.transformator' object.

Usage:

```
pgu.transformator$new(data_df = "tbl_df")
```

Arguments:

`data_df` The data to be analyzed. (tibble::tibble)

Returns: A new 'pgu.transformator' object. (pguIMP::pgu.transformator)

Method `finalize()`: Clears the heap and indicates that instance of 'pgu.transformator' is removed from heap.

Usage:

```
pgu.transformator$finalize()
```

Method print(): Prints instance variables of a 'pgu.transformator' object.

Usage:

```
pgu.transformator$print()
```

Returns: string

Method resetTrafoParameter(): Resets instance variable 'trafoParameter'

Usage:

```
pgu.transformator$resetTrafoParameter(data = "tbl_df")
```

Arguments:

data Dataframe to be analyzed. (tibble::tibble)

Method trafoType(): Returns entry of 'trafoType' for user defined attribute.

Usage:

```
pgu.transformator$trafoType(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Value of entry. (character)

Method setTrafoType(): Sets entry of 'trafoType' for user defined attribute.

Usage:

```
pgu.transformator$setTrafoType(feature = "character", type = "character")
```

Arguments:

feature Attribute's name. (character)

type Trafo type parameter. Valid choices are: "none", "exponential", "log2", "logNorm", "log10", "arcsine", "tukeyLOP", "boxCox". (character)

Method addConstant(): Returns entry of 'addConst' for user defined attribute.

Usage:

```
pgu.transformator$addConstant(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Value of entry. (numeric)

Method mirrorLogic(): Returns entry of 'mirrorLogic' for user defined attribute.

Usage:

```
pgu.transformator$mirrorLogic(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Value of entry. (logical)

Method setMirrorLogic(): Sets entry of 'mirrorLogic' for user defined attribute.

Usage:

```
pgu.transformator$setMirrorLogic(feature = "character", logic = "logical")
```

Arguments:

feature Attribute's name. (character)

logic Specifies whether the data should be mirrored at the coordinate origin. (logical)

Method lambdaLOP(): Returns entry of 'lambda_lop' for user defined attribute. Lambda is a specific optimization parameter that is derived from the Tukey-LOP transformation procedure.

Usage:

```
pgu.transformator$lambdaLOP(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Value of entry. (numeric)

Method setLambdaLOP(): Sets entry of 'lambda_lop' for user defined attribute.

Usage:

```
pgu.transformator$setLambdaLOP(feature = "character", lambda = "numeric")
```

Arguments:

feature Attribute's name. (character)

lambda Sets the feature specific exponential value. (numeric)

Method lambdaBC(): Returns entry of 'lambda_bc' for user defined attribute. Lambda is a specific optimization parameter that is derived from the Box-Cox transformation procedure.

Usage:

```
pgu.transformator$lambdaBC(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Value of entry. (numeric)

Method lambdaAS(): Returns entry of 'lambda_as' for user defined attribute. Lambda is a specific optimization parameter that is derived from the arcsine transformation procedure.

Usage:

```
pgu.transformator$lambdaAS(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Value of entry. (numeric)

Method featureIdx(): Returns the index of a pgu.normDist object within the instance variable 'trafoParameter'.

Usage:

```
pgu.transformator$featureIdx(feature = "character")
```

Arguments:

feature Attribute's name. (character)

Returns: Index of attribute entry in dataframe (numeric)

Method `addConstGenerator()`: Calculates and returns the `addConst`. A constant that prevents the occurrence of negative values as well as zero, if added to an attribute.

Usage:

```
pgu.transformator$addConstGenerator(value = "numeric")
```

Arguments:

`value` The smallest of the attribute's values. (numeric)

Returns: The `addConst` for the attribute (numeric)

Method `mirrorNumeric()`: Mirrors the assigned values at the coordinate origin.

Usage:

```
pgu.transformator$mirrorNumeric(value = "numeric")
```

Arguments:

`value` Value or vector of values. (numeric)

Returns: Value or vector of values. (numeric)

Method `mirrorData()`: Calls the class' `mirrorNumeric` function on all numeric attributes of a data frame.

Usage:

```
pgu.transformator$mirrorData(data = "tbl_df")
```

Arguments:

`data` A data frame. (tibble:tibble)

Returns: A data frame (tibble::tibble)

Method `calculateAddConst()`: Calculates the `addConst` value for each attribute of the assigned data frame, by calling the class' `addConstGenerator` function. The results are stored in `addConst` attribute of the `trafoParameter` instance variable.

Usage:

```
pgu.transformator$calculateAddConst(data = "tbl_df")
```

Arguments:

`data` A data frame. (tibble:tibble)

Method `translateNumeric()`: Translates the assigned values by a constant.

Usage:

```
pgu.transformator$translateNumeric(value = "numeric", const = "numeric")
```

Arguments:

`value` A numeric or a vector of numerics to be translated. (numeric)

`const` A constant value. (numeric)

Returns: A numeric or a vector of numerics. (numeric)

Method `translateData()`: Translates each attribute of the assigned data frame, by calling the class' `translateNumeric` function. The respective `addConst` values of the individual attributes of the data frame serve as `const` variables.

Usage:

```
pgu.transformator$translateData(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Returns: A data frame. (tibble:tibble)

Method backTranslateNumeric(): Back-translates the assigned values by a constant.

Usage:

```
pgu.transformator$backTranslateNumeric(value = "numeric", const = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be back-translated. (numeric)

const A constant value. (numeric)

Returns: A numeric or a vector of numerics. (numeric)

Method backTranslateData(): Back-translates each attribute of the assigned data frame, by calling the class' backTranslateNumeric function. The respective addConst values of the individual attributes of the data frame serve as const variables.

Usage:

```
pgu.transformator$backTranslateData(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Returns: A data frame. (tibble:tibble)

Method lambdaEstimator(): Estimates the lambda factor for the given values, that are assigned to a user defined attribute..

Usage:

```
pgu.transformator$lambdaEstimator(value = "numeric", feature = "character")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

feature The attribute which the given values are assigned to. (character)

Returns: The specific lambda factor. (numeric)

Method estimateLambda_temp(): Estimates the lambda factor for each attribute of the assigned data frame, by calling the class' lambdaEstimator function. The respective lambda values of the individual attributes of the data frame are stored in the lambda attribute of the instance variable trafoParameter.

Usage:

```
pgu.transformator$estimateLambda_temp(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Method estimateLambda(): Estimates the arcsine transformation lambda factor for each attribute of the assigned data frame. The respective lambda values of the individual attributes of the data frame are stored in the lambda attribute of the instance variable trafoParameter.

Usage:

```
pgu.transformator$estimateLambda(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Method `normalizeArcSine()`: Estimates the lambda factor for an arcsine transformation for the given values,

Usage:

```
pgu.transformator$normalizeArcSine(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The specific lambda factor. (numeric)

Method `optimizeTukeyLadderOfPowers()`: Estimates the lambda factor for a tukeyLOP transformation for the given values,

Usage:

```
pgu.transformator$optimizeTukeyLadderOfPowers(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The specific lambda factor. (numeric)

Method `optimizeBoxCox()`: Estimates the lambda factor for a boxcox transformation for the given values,

Usage:

```
pgu.transformator$optimizeBoxCox(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The specific lambda factor. (numeric)

Method `transformNumeric()`: Transforms the given numeric values, that are assigned to a user defined attribute.

Usage:

```
pgu.transformator$transformNumeric(value = "numeric", feature = "character")
```

Arguments:

value A numeric or a vector of numerics to be transformed. (numeric)

feature The attribute which the given values are assigned to. (character)

Returns: A transformed version of the given numeric or vector of numerics. (numeric)

Method `transformData()`: Transforms each attribute of the assigned data frame, by calling the class' transformNumeric function. The respective lambda values of the individual attributes of the data frame are read from the lambda attribute of the instance variable trafoParameter.

Usage:

```
pgu.transformator$transformData(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Method transformLogModulus(): Performes a log transformation for the given values, based on a user defined base value.

Usage:

```
pgu.transformator$transformLogModulus(value = "numeric", base = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

base Logarithmic base. (numeric)

Returns: The transformed values. (numeric)

Method transformSquareRoot(): Performes a square root transformation for the given values.

Usage:

```
pgu.transformator$transformSquareRoot(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The transformed values. (numeric)

Method transformCubeRoot(): Performes a cube root transformation for the given values.

Usage:

```
pgu.transformator$transformCubeRoot(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The transformed values. (numeric)

Method transformArcsine(): Performes an arcsine transformation for the given values.

Usage:

```
pgu.transformator$transformArcsine(value = "numeric", lambda = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

lambda Normalization factor. (numeric)

Returns: The transformed values. (numeric)

Method transformInverse(): Performes an inverse transformation for the given values.

Usage:

```
pgu.transformator$transformInverse(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The transformed values. (numeric)

Method transformTukeyLadderOfPowers(): Performes a tukeyLOP transformation for the given values.

Usage:

```
pgu.transformator$transformTukeyLadderOfPowers(
  value = "numeric",
  lambda = "numeric"
)
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

lambda Lambda factor. (numeric)

Returns: The transformed values. (numeric)

Method transformBoxCox(): Performes a boxcox transformation for the given values.

Usage:

```
pgu.transformator$transformBoxCox(value = "numeric", lambda = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

lambda Lambda factor. (numeric)

Returns: The transformed values. (numeric)

Method inverseTransformNumeric(): Inverse transforms the given numeric values, that are assigned to a user defined attribute.

Usage:

```
pgu.transformator$inverseTransformNumeric(
  value = "numeric",
  feature = "character"
)
```

Arguments:

value A numeric or a vector of numerics to be tranformed. (numeric)

feature The attribute which the given values are assigned to. (character)

Returns: An inverse transformed version of the given numeric or vector of numerics. (numeric)

Method inverseTransformData(): Inverse transforms each attribute of the assigned data frame, by calling the class' tranformNumeric function. The respective lambda values of the individual attributes of the data frame are read from the lambda attribute of the instance variable trafoParameter.

Usage:

```
pgu.transformator$inverseTransformData(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Method inverseTransformLogModulus(): Performes an inverse log transformation for the given values, based on a user defined base value.

Usage:

```
pgu.transformator$inverseTransformLogModulus(  
  value = "numeric",  
  base = "numeric"  
)
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

base Logarithmic base. (numeric)

Returns: The transformed values. (numeric)

Method `inverseTransformSquareRoot()`: Performes an inverse square root transformation for the given values.

Usage:

```
pgu.transformator$inverseTransformSquareRoot(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The transformed values. (numeric)

Method `inverseTransformCubeRoot()`: Performes an inverse cube root transformation for the given values.

Usage:

```
pgu.transformator$inverseTransformCubeRoot(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The transformed values. (numeric)

Method `inverseTransformArcsine()`: Performes an inverse arcsine transformation for the given values.

Usage:

```
pgu.transformator$inverseTransformArcsine(  
  value = "numeric",  
  lambda = "numeric"  
)
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

lambda Normalization factor. (numeric)

Returns: The transformed values. (numeric)

Method `inverseTransformInverse()`: Performes an inverse inverse-transformation for the given values.

Usage:

```
pgu.transformator$inverseTransformInverse(value = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

Returns: The transformed values. (numeric)

Method `inverseTransformTukeyLadderOfPowers()`: Performes an inverse tukeyLOP transformation for the given values.

Usage:

```
pgu.transformator$inverseTransformTukeyLadderOfPowers(
  value = "numeric",
  lambda = "numeric"
)
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

lambda Lambda factor. (numeric)

Returns: The transformed values. (numeric)

Method `inverseTransformBoxCox()`: Performes an inverse boxcox transformation for the given values.

Usage:

```
pgu.transformator$inverseTransformBoxCox(value = "numeric", lambda = "numeric")
```

Arguments:

value A numeric or a vector of numerics to be analyzed. (numeric)

lambda Lambda factor. (numeric)

Returns: The transformed values. (numeric)

Method `fit()`: Estimate all transformation parameters(lambda, addConst,...) for each attribute of a given data frame. The function calls the class' functions `calculateAddConst` and `estimateLambda`. The results are stored in the respective attributes of the instance variable `trafoParameter`.

Usage:

```
pgu.transformator$fit(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Method `mutateData()`: Mutates the values of each attribute of a given data frame. Here, mutation is defined as the cesecutive sequence of the class' functions `mirrorData`, `translateData` and `transfromData`.

Usage:

```
pgu.transformator$mutateData(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Returns: A mutated data frame. (tibble::tibble)

Method `reverseMutateData()`: Re-mutates the values of each attribute of a given data frame. Here, re-mutation is defined as the cesecutive sequence of the class' functions `inverseTransformData`, `backTranslateData`, `mirrorData`

Usage:

```
pgu.transformator$reverseMutateData(data = "tbl_df")
```

Arguments:

data A data frame. (tibble:tibble)

Returns: A mutated data frame. (tibble::tibble)

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.transformator$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pgu.validator

pgu.validator

Description

Validates that the distribution is not significantly altered by the imputation process. This object is used by the shiny based gui and is not for use in individual R-scripts!

Format

[R6::R6Class] object.

Details

Takes two distributions (before and after imputation). Performs a Wilcoxon-Mann-Whitney U test. Performs a Kolmogorow-Smirnow test.

Active bindings

testStatistics_df Returns the instance variable 'testStatistics_df'. (tibble::tibble)

centralMoments_org Returns the instance variable 'centralMoments_org' (tibble::tibble)

centralMoments_imp Returns the instance variable 'centralMoments_imp' (tibble::tibble)

centralMoments_delta Returns the instance variable 'centralMoments_delta' (tibble::tibble)

features Returns the instance variable 'features' (character)

seed Returns the instance variable seed (integer)

setSeed Sets the instance variable seed. (numeric)

Methods

Public methods:

- `pgu.validator$new()`
- `pgu.validator$finalize()`
- `pgu.validator$print()`
- `pgu.validator$resetValidator()`
- `pgu.validator$kolmogorowTestFeature()`
- `pgu.validator$wilcoxonTestFeature()`
- `pgu.validator$centralMomentsFeature()`
- `pgu.validator$validate()`
- `pgu.validator$featurePdf()`
- `pgu.validator$featureCdf()`
- `pgu.validator$featureVs()`
- `pgu.validator$featureBoxPlot()`
- `pgu.validator$featurePlot()`
- `pgu.validator$clone()`

Method `new()`: Creates and returns a new ‘pgu.validator’ object.

Usage:

```
pgu.validator$new(seed = 42)
```

Arguments:

seed Set the instance variable ‘seed’. (integer)

Returns: A new ‘pgu.validator’ object. (pguIMP::pgu.validator)

Method `finalize()`: Clears the heap and indicates that instance of ‘pgu.validator’ is removed from heap.

Usage:

```
pgu.validator$finalize()
```

Method `print()`: Prints instance variables of a ‘pgu.validator’ object.

Usage:

```
pgu.validator$print()
```

Returns: string

Method `resetValidator()`: Resets instance variables

Usage:

```
pgu.validator$resetValidator()
```

Method `kolmogorowTestFeature()`: Performs a comparison between the original and the imputed distribution of a given feature using a two-sided Kolmogorow-Smirnow test with simulated p-value distribution.

Usage:

```
pgu.validator$kolmogorowTestFeature(
  org = "numeric",
  imp = "numeric",
  feature = "character"
)
```

Arguments:

org Original data to be analyzed. (numeric)
 imp Imputed data to be analyzed. (numeric)
 feature Feature name of the analyzed distributions. (character)

Returns: One row dataframe comprising the test results. (tibble::tibble)

Method `wilcoxonTestFeature()`: Performs a comparison between the original and the imputed distribution of a given feature using a two-sided Wilcoxon/Mann-Whitney test.

Usage:

```
pgu.validator$wilcoxonTestFeature(
  org = "numeric",
  imp = "numeric",
  feature = "character"
)
```

Arguments:

org Original data to be analyzed. (numeric)
 imp Imputed data to be analyzed. (numeric)
 feature Feature name of the analyzed distributions. (character)

Returns: One row dataframe comprising the test results. (tibble::tibble)

Method `centralMomentsFeature()`: Estimates estimates the central moments of the given distribution.

Usage:

```
pgu.validator$centralMomentsFeature(values = "numeric", feature = "character")
```

Arguments:

values Data to be analyzed. (numeric)
 feature Feature name of the analyzed distributions. (character)

Returns: One row dataframe comprising the statistics. (tibble::tibble)

Method `validate()`: Validates the feature distributions of the original and the imputed dataframe using a two-sided Kolmogorow-Smirnow test and a two-sided Wilcoxon/Mann-Whitney test. The result is stored in the instance variables 'testStatistics_df' and 'distributionStatistics_df'. Displays the progress if shiny is loaded.

Usage:

```
pgu.validator$validate(
  org_df = "tbl_df",
  imp_df = "tbl_df",
  progress = "Progress"
)
```

Arguments:

`org_df` Original dataframe to be analyzed. (tibble::tibble)
`imp_df` Imputed dataframe to be analyzed. (tibble::tibble)
`progress` If shiny is loaded, the analysis' progress is stored in this instance of the shiny Progress class. (shiny::Progress)

Method `featurePdf()`: Receives a dataframe and plots the pareto density of the features 'org_pdf' and 'imp_pdf'. Returns the plot

Usage:

```
pgu.validator$featurePdf(data_df = "tbl_df")
```

Arguments:

`data_df` dataframe to be plotted (tibble::tibble)

Returns: A ggplot2 object (ggplot2::ggplot)

Method `featureCdf()`: Receives a dataframe and plost the feature 'x' against the features 'org_cdf' and 'imp_cdf'. Returns the plot

Usage:

```
pgu.validator$featureCdf(data_df = "tbl_df")
```

Arguments:

`data_df` dataframe to be plotted (tibble::tibble)

Returns: A ggplot2 object (ggplot2::ggplot)

Method `featureVs()`: Receives two numeric vectors 'org' and 'imp'. Plots the qq-plot of both vectors. Returns the plot

Usage:

```
pgu.validator$featureVs(org = "numeric", imp = "numeric")
```

Arguments:

`org` Numric vector comprising the original data. (numeric)

`imp` Numeric vector comprising the imputed data. (numeric)

Returns: A ggplot2 object (ggplot2::ggplot)

Method `featureBoxPlot()`: Receives a dataframe and information about the lloq and uloq and retuns a boxplot

Usage:

```
pgu.validator$featureBoxPlot(
  data_df = "tbl_df",
  lloq = "numeric",
  uloq = "numeric",
  feature = "character"
)
```

Arguments:

`data_df` Dataframe to be analyzed (tibble::tibble)

`lloq` lower limit of quantification (numeric)

uloq upper limit of quantification (numeric)
feature Feature name (character)

Returns: A ggplot2 object (ggplot2::ggplot)

Method featurePlot(): Receives two numeric dataframes 'org_df' and 'imp_df', and a feature name. Creates a compound plot of the validation results for the given feature.. Returns the plot

Usage:

```
pgu.validator$featurePlot(  
  org_df = "tbl_df",  
  imp_df = "tbl_df",  
  lloq = "numeric",  
  uloq = "numeric",  
  impIdx_df = "tbl_df",  
  feature = "character"  
)
```

Arguments:

org_df Dataframe comprising the original data. (tibble::tibble)
imp_df Dataframe comprising the imputed data. (tibble::tibble)
lloq lower limit of quantification (numeric)
uloq upper limit of quantification (numeric)
impIdx_df dataframe comprising information about imputation sites (tibble::tibble)
feature Feature name. (character)

Returns: A ggplot2 object (ggplot2::ggplot)

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
pgu.validator$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Author(s)

Sebastian Malkusch

pguIMP

pguIMP

Description

Reproducible cleaning of biomedical laboratory data using methods of visualization, error correction and transformation implemented as interactive R-notebooks.

Usage

pguIMP()

Details

A graphical data preprocessing toolbox, named “pguIMP”, that includes a fixed sequence of preprocessing steps to enable error-free data preprocessing interactively. By implementing contemporary data processing methods including machine learning-based imputation procedures, the creation of corrected and cleaned bioanalytical datasets is ensured, which preserve data structures such as clusters better than resulting with classical methods.

Value

shiny application object

Author(s)

Sebastian Malkusch

sLogLikelihood	<i>dLogLikelihood</i>
----------------	-----------------------

Description

Calculates bbmle snmor function.

Usage

```
sLogLikelihood(mu = "numeric", sigma = "numeric")
```

Arguments

mu	The expectation value. (numeric)
sigma	The standard deviation. (numeric)

Value

the bbmle::snorm results.

Author(s)

Sebastian Malkusch

Examples

```
y <- sLogLikelihood (mu=0.0, sigma=1.0)
```

transposeTibble	<i>transposeTibble</i>
-----------------	------------------------

Description

Transposes a tibble This object is used by the shiny based gui and is not for use in individual R-scripts!

Usage

```
transposeTibble(obj = "tbl_df")
```

Arguments

obj The data frame to be transposed. (numeric)

Value

The transposed data frame. (tibble:tibble)

Author(s)

Sebastian Malkusch

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