Package 'matman'

October 13, 2022

Type Package

Title Material Management

Version 1.1.3

Date 2021-12-13

Maintainer Leon Binder <leon.binder@th-deg.de>

Description A set of functions, classes and methods for performing ABC and ABC/XYZ analyses, identifying overperforming, underperforming and constantly performing items, and plotting, analyzing as well as predicting the temporal development of items.

License GPL-3

Depends R (>= 3.5.0), shiny

Imports methods, graphics, stats, utils, data.table, dplyr, tidyr, tidyselect, plotly, DT, shinydashboard, shinyWidgets, forecast, parsedate, lubridate

Encoding UTF-8

LazyData true

LazyLoad true

RoxygenNote 7.1.2

NeedsCompilation no

Author Leon Binder [cre, aut], Bernhard Bauer [aut], Michael Scholz [aut]

Repository CRAN

Date/Publication 2021-12-13 09:30:02 UTC

R topics documented:

`matman-package` *Material Management*

Description

A set of functions, classes and methods for performing ABC and ABC/XYZ analyses, identifying overperforming, underperforming and constantly performing items, and plotting, analyzing as well as predicting the temporal development of items.

Details

Package:	matman
Type:	Package
Version:	1.1.4
Date:	2021-11-15
License:	GPL-3
Depends:	R (>= 3.5.0), stats

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

ABCXYZComparison-class

Class ABCXYZComparison

Description

This S4 class represents the result of a comparison of two ABC/XYZ analysis results.

Slots

`data` (data.frame) The comparison result as data.frame.

`type` (character) The type of the analysis that has been performed. This is either 'abc' or 'abcxyz'.

`valueDiff` (numeric) The difference between the value of an item in ABC/XYZ analysis A and the value of the same item in ABC/XYZ analysis B that is required to consider the item in the comparison.

`xyzCoefficientDiff` (numeric) The difference between the xyz coefficient of an item in ABC/XYZ analysis A and the xyz coefficient of the same item in ABC/XYZ analysis B that is required to consider the item in the comparison.

`unequalABC` (logical) If `TRUE` only items are returned, where the ABC-Classes are different. If FALSE only items are returned, where the ABC-Classes are equal. If `NA`, no further restriction takes place based on the column ABC.

`unequalXYZ` (logical) If `TRUE` only items are returned, where the XYZ-Classes are different. If FALSE only items are returned, where the XYZ-Classes are equal. If `NA`, no further restriction takes place based on the column XYZ.

Objects from the Class

Objects can be created by calling the function `compare` function. This S4 class represents the result of a comparison of two ABC/XYZ analysis results.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

Examples

```
data("Amount")
data1 = Amount[sample(1:nrow(Amount), 1000),]
data2 = Amount[sample(1:nrow(Amount), 1000),]
abcxyzData1 = computeABCXYZAnalysis(data1, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
abcxyzData2 = computeABCXYZAnalysis(data2, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
comparison = compare(abcxyzData1, abcxyzData2)
comparison
```

ABCXYZData-class *Class* ABCXYZData

Description

This S4 class represents the result of an ABC/XYZ analysis.

Slots

`data` (data.frame) The result table of an ABC/XYZ analysis.

`type` (character) The type of the analysis that has been performed. This is either 'abc' or 'abcxyz'.

`value` (character) The name of the value column in the result table.

`item` (character) Vector of the names of the item columns in the result table.

Objects from the Class

Objects can be created by calling the function `computeABCXYZ`. This S4 class represents the result of an ABC/XYZ analysis.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

Examples

```
data("Amount")
abcResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date")
abcResult
```

aggregateData *Performs a temporal aggregation of a data frame*

Description

Aggregates a data frame based on a timestamp column to days, weeks, months, quarters, years or total.

Usage

```
aggregateData(
  data,
  value = NULL,
  item,
  timestamp,
  temporalAggregation = c("day", "week", "month", "quarter", "year", "total"),
  fiscal = 1,
  aggregationFun = sum
)
```

Arguments

data	Data frame or matrix on which the ABC analysis is performed.
value	Name(s) of the column variable(s) that contains the values for the ABC and XYZ analysis.
item	Names of the columns including the item names or identifiers (e.g., product name, EAN).
timestamp	Name of the column including the timestamp. This column should be in POSIX or Date-format.
temporalAggregation	Temporal aggregation mode for the XYZ-analysis. Possible modes are 'day', 'week', 'month', 'quarter', 'year', and 'total'. Total only aggregates by item whereas the other modes aggregate by item an temporal unit.
fiscal	consider the start of the business year. Default is set to 1 (January)
aggregationFun	Function for aggregating the value column. Default is sum.

Value

Returns a data frame with the aggregated data with the columns of item, timestamp and sum, which is the sum of the value column.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

expandData

Examples

```
data('Amount')
aggregatedData = aggregateData(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date",
    temporalAggregation = "quarter")
```

Amount *Amount data*

Description

A dataset containing 23 items and their amounts over 3 years of data.

Usage

```
Amount
```

Format

A data frame with 10,000 rows and 9 variables:

date Date in format yyyy-mm-dd

week Date in format yyyy-'W'ww

month Date in format yyyy-mm

quarter Date in format yyyy-'Q'q

year Date in format yyyy

item Item ID

itemgroup Item group ID

amount Item amount

value Item value

Source

anonymized real data

compare *Compares two S4 objects*

Description

Compares two S4 objects.

Usage

```
compare(object1, object2, ...)
```

Arguments

object1	First S4 object.
object2	Second S4 object.
...	Further comparison parameters.

Value

Comparison result.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

compare

Examples

```
data("Amount")
data1 = Amount[sample(1:nrow(Amount), 1000),]
data2 = Amount[sample(1:nrow(Amount), 1000),]
abcxyzData1 = computeABCXYZAnalysis(data1, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
abcxyzData2 = computeABCXYZAnalysis(data2, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
comparison = compare(abcxyzData1, abcxyzData2)
```

compare,ABCXYZData,ABCXYZData-method

Compares the results of two ABC/XYZ analyses

Description

Compares the class assignments of two ABC- or two ABC/XYZ analyses.

Usage

```
## S4 method for signature 'ABCXYZData,ABCXYZData'
compare(
  object1,
  object2,
  valueDiff = NA,
  xyzCoefficientDiff = NA,
  unequalABC = NA,
  unequalXYZ = NA
)
```

Arguments

object1	Object of class ABCXYZData.
object2	Object of class ABCXYZData.
valueDiff	Only items with a difference of the column value larger than valueDiff between the first and second ABC-XYZ-Analysis are returned. In the comparison data.frame a new column is added for the difference in the value columns.
xyzCoefficientDiff	Only items with a difference of the column xyzCoefficient larger than the xyzCoefficientDiff between the first and second ABC-XYZ-Analysis are returned. In the comparison data.frame a new column is added for the difference in the xyzCoefficient columns.
unequalABC	If TRUE only items are returned, where the ABC-Classes are different. If FALSE only items are returned, where the ABC-Classes are equal. If NA, no further restriction takes place based on the column ABC.
unequalXYZ	If TRUE only items are returned, where the XYZ-Classes are different. If FALSE only items are returned, where the XYZ-Classes are equal. If NA, no further restriction takes place based on the column XYZ.

Value

An ABCYXZComparison object.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

ABCXYZComparison

Examples

```
data("Amount")
data1 = Amount[sample(1:nrow(Amount), 1000),]
data2 = Amount[sample(1:nrow(Amount), 1000),]
abcxyzData1 = computeABCXYZAnalysis(data1, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
abcxyzData2 = computeABCXYZAnalysis(data2, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
comparison = compare(abcxyzData1, abcxyzData2)
```

---

computeABCXYZAnalysis *Performs an ABC/XYZ analysis*

Description

Divides a given data frame into 3 classes, A, B, C, according to the value of one column (e.g., revenue).

Usage

```
computeABCXYZAnalysis(
  data,
  value,
  item,
  timestamp,
  temporalAggregation = c("day", "week", "month", "quarter", "year"),
  AB = 80,
  BC = 95,
  XY = NA,
  YZ = NA,
  ignoreZeros = FALSE
)
```

Arguments

data	Data frame or matrix on which the ABC analysis is performed.
value	Name of the column variable that contains the value for the ABCXYZ analysis.
item	Names of the columns including the item names or identifiers (e.g., product name, EAN).
timestamp	Name of the column including the timestamp. This column should be in POSIX or date-format.
temporalAggregation	Temporal aggregation for the XYZ-analysis (i.e., "day", "week", "month", "quarter", "year").
AB	Threshold (in percent) between category A and B.
BC	Threshold (in percent) between category B and C.
XY	Threshold (in percent) between category X and Y.
YZ	Threshold (in percent) between category Y and Z.
ignoreZeros	Whether zero values should be ignored in XYZ-analysis.

Value

Returns an ABCXYZData object. Only positive values are displayed

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

ABCXYZData summary

Examples

```
# ABC Analysis
data("Amount")
abcResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date")

# ABC/XYZ Analysis
data("Amount")
abcxyzResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week",
    XY = 0.3, YZ = 0.5)
```

computeConstants *Select constant items*

Description

Selects items with a constant value for a specified time period.

Usage

```
computeConstants(
  data,
  value,
  group,
  timestamp,
  timestampFormat = c("day", "week", "month", "quater", "year"),
  currentTime,
  thresholdTime = 7,
  use_latest = FALSE
)
```

Arguments

data	Dataframe containing item stock data.
value	Name of the column variable containing the stock values.
group	Name(s) of the column(s) that are used to group stock data. These columns are usually the item ID or item name to group stock data by items.
timestamp	Name of the column including the timestamp. This column should be in Date, POSIX , YY-mm, YYYY-'W'ww, YYYY-mm, YYYY-'Q'q or YYYY format.
timestampFormat	Declares in which format the timestamp comes in (i.e., "day", "week", "month", "quarter", "year")
currentTime	Qualifying date for the value variable. Date must exist in data and have the same format as timestamp-variable.
thresholdTime	Time for which the value shouldn't exceed the threshold value. Number declares the time in the format of timestampFormat.
use_latest	boolean value. If TRUE data will expand and dates with noexisting values will be filled up with the latest known values.

Value

Returns a data frame listing all constant items, the date since when the stock is constant and the value of the stock since this time.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

computeUnderperformer computeOverperformer

Examples

```
data("Stocks")
constants = computeConstants(data=Stocks,
                             value = "stock",
                             group = "item",
                             timestamp = "date",
                             timestampFormat = "day",
                             currentTime = "2019-07-27",
                             thresholdTime = 7,
                             use_latest = FALSE)
```

---

computeOverperformer *Select overperforming items*

Description

Selects items with a value higher than a given threshold for a specified time period.

Usage

```
computeOverperformer(
  data,
  value,
  group,
  timestamp,
  timestampFormat = c("day", "week", "month", "quater", "year"),
  currentTime,
  thresholdValue = 0,
  thresholdTime = 90,
  use_latest = FALSE
)
```

Arguments

data	Dataframe containing item stock data.
value	Name of the column variable containing the stock values.
group	Name(s) of the column(s) that are used to group stock data. These columns are usually the item ID or item name to group stock data by items.
timestamp	Name of the column including the timestamp. This column should be in Date, POSIX , YY-mm, YYYY-'W'ww, YYYY-mm, YYYY-'Q'q or YYYY format.
timestampFormat	Declares in which format the timestamp comes in (i.e., "day", "week", "month", "quarter", "year")
currentTime	Qualifying date for the value variable. Date must exist in data and have the same format as timestamp-variable.
thresholdValue	Name of the colum variable containing the items' stock threshold value or the threshold value used in this analysis for all items.
thresholdTime	Time for which the value shouldn't exceed the threshold value. Number declares the time in the format of timestampFormat.
use_latest	boolean value. If TRUE data will expand and dates with noexisting values will be filled up with the latest known values.

Value

Returns a data frame listing all overperforming items, the date their stock was the last time under the threshold (lastunder), the duration in days since the stock is over the threshold (toolowindays), the average difference between the stock and the threshold (meandiff) and the count of switched between over- and underperformance (moves).

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

computeUnderperformer computeConstants

Examples

```
data("Stocks")
overperformer = computeOverperformer(data = Stocks,
                     value = "stock",
                     group = "item",
                     timestamp = "date",
                     timestampFormat = "day",
                     currentTime = "2019-07-27",
                     thresholdValue = "reorderlevel",
                     thresholdTime = 0,
                     use_latest = FALSE)
```

`computeUnderperformer` *Select underperforming items*

Description

Selects items with a value lower than a given threshold for a specified time period.

Usage

```
computeUnderperformer(
  data,
  value,
  group,
  timestamp,
  timestampFormat = c("day", "week", "month", "quater", "year"),
  currentTime,
  thresholdValue = 0,
  thresholdTime = 90,
  use_latest = FALSE
)
```

Arguments

`data`	Dataframe containing item stock data.
`value`	Name of the column variable containing the stock values.
`group`	Name(s) of the column(s) that are used to group stock data. These columns are usually the item ID or item name to group stock data by items.
`timestamp`	Name of the column including the timestamp. This column should be in Date, POSIX , YY-mm, YYYY-'W'ww, YYYY-mm, YYYY-'Q'q or YYYY format.
`timestampFormat`	Declares in which format the timestamp comes in (i.e., "day", "week", "month", "quarter", "year")
`currentTime`	Qualifying date for the value variable. Date must exist in data and have the same format as timestamp-variable.
`thresholdValue`	Name of the colum variable containing the items' stock threshold value or the threshold value used in this analysis for all items.
`thresholdTime`	Time for which the value shouldn't exceed the threshold value. Number declares the time in the format of timestampFormat
`use_latest`	boolean value. If TRUE data will expand and dates with noexisting values will be filled up with the latest known values

Value

Returns a data frame listing all underperforming items, the date their stock was the last time over the threshold (lastover), the duration in days since the stock is under the threshold (toolowindays), the average difference between the stock and the threshold (meandiff) and the count of switched between over- and underperformance (moves).

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

computeOverperformer computeConstants

Examples

```
data("Stocks")
underperformer = computeUnderperformer(data=Stocks,
                                       value = "stock",
                                       group = "item",
                                       timestamp = "date",
                                       timestampFormat = "day",
                                       currentTime = "2019-07-27",
                                       thresholdValue = "minstock",
                                       thresholdTime = 90,
                                       use_latest = FALSE)
```

---

detectTimeVariations *Detects items whose value (stock, demand, etc.) has changed over time*

Description

Detects items whose value (stock, demand, etc.) has changed over time in contrast to other items. This analysis is based on the Macnaughton-Smith et al. clustering algorithm.

Usage

```
detectTimeVariations(
  data,
  value,
  item,
  timestamp,
  temporalAggregation = c("day", "week", "month", "quarter", "year"),
  aggregationFun = sum,
  preProcess = NA,
  recentTimePeriods = 5
)
```

Arguments

data	Data frame that will be expanded.
value	Name of the column variable that contains the value for the ABC and XYZ analysis.
item	Name of the column including the item names or identifiers (e.g., product name, EAN)
timestamp	Name of the column including the timestamp. This column should be in POSIX or Date-format.
temporalAggregation	Temporal aggregation mode (i.e., "day", "week", "month", "quarter", "year").
aggregationFun	Function for aggregating the value column. Default is sum.
preProcess	A string vector that defines a pre-processing of the aggregated data before clustering. Available pre-processing methods are "center", "scale", "standardize", and "normalize". Default is NA (no pre-processing).
recentTimePeriods	Integer indicating the number of time periods that are used to define the recent item values. Default is 5.

Value

Returns a data frame showing to which cluster each item belongs based on all value and based on the recent values as well as whether the item has switched the cluster.

References

Macnaughton-Smith, P., Williams, W.T., Dale, M.B., Mockett, L.G. (1964) "Dissimilarity Analysis: a new Technique of Hierarchical Sub-division", *Nature*, **202**, 1034–1035.

Examples

```
data("Amount")
timeVariations = detectTimeVariations(data = Amount,
    value = "amount",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week")
```

---

expandData *Expands a temporal data frame*

Description

Expands a temporal data frame and fills values for missing dates.

Usage

```
expandData(
  data,
  expand,
  expandTo = c("all", "event"),
  valueColumns,
  latest_values = F,
  valueLevels = NA,
  timestamp,
  timestampFormat = c("day", "week", "month", "quarter", "year"),
  keepData = T
)
```

Arguments

data	Data frame that will be expanded.
expand	Name of the variables that will be expanded.
expandTo	Defines whether values for the variables to be expanded will be filled for all dates or only those dates included in the data.
valueColumns	Name of the columns that are filled with specific values.
latest_values	If True missing values are filled with the latest known value until the next known value comes in.
valueLevels	Specific values that are used to fill the value columns. If latest_values = TRUE only values with no known values in the past of this values are specified with this specific values.
timestamp	Name of the column including the timestamp. This column should be in Date , YY-mm, YYYY-'W'ww, YYYY-mm, YYYY-'Q'q or YYYY format.
timestampFormat	Declares in which format the timestamp comes in (i.e., "day", "week", "month", "quarter", "year").
keepData	Defines whether variables that will not be expanded should be kept.

Value

Returns the expanded data frame.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

aggregateData

Examples

```
data("Amount")
expandedItems = expandData(Amount,
    expand = c("item", "itemgroup"),
    expandTo = "all",
    valueColumns = c("amount", "value"),
    latest_values = TRUE,
    valueLevels = c(0, 0),
    timestamp = "date",
    timestampFormat = "day")
```

Forecast-class *Class* Forecast

Description

This S4 class represents the result of forecast using function `predictValue`.

Slots

`data` (data.frame) Data frame including the predicted data and optionally the training data.

`models` (list) List of fitted ARIMA models.

`value` (character) Name of the value column.

`item` (character) Name of the item column.

`items` (character) IDs or Names of the items.

Objects from the Class

Objects can be created by calling the function `predictValue`. This S4 class represents the result of a forecast.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

Examples

```
data("Amount")
prediction = predictValue(data = Amount,
    value = "amount",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week",
    timeUnitsAhead = 3)
prediction
```

matmanDemo *Launches a demo app*

Description

Launches a shiny app that demonstrates how to use the functions provides by package matman.

Usage

```
matmanDemo()
```

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

Examples

```
## Not run: matmanDemo()
```

plot,ABCXYZData,ANY-method *Plots the result of an ABC/XYZ analysis*

Description

Plots a graph that shows what percentage of items is responsible for what amount of value.

Usage

```
## S4 method for signature 'ABCXYZData,ANY'
plot(
  x,
  plot_engine = c("graphics", "plotly"),
  title = "",
  xlab = "",
  ylab = "",
  top5lab = NA,
  color = list(itemColor = "blue", top5Color = "black", aColor = "green", bColor =
    "orange", cColor = "red"),
  item = NA,
  ...
)
```

Arguments

x	Object of class ABCXYZData.
plot_engine	Name of the plot engine ("graphics", "plotly")
title	Plot title (e.g. 'ABC-Analysis').
xlab	Label of x-axis (e.g. 'Percentage of Items').
ylab	Label of y-axis (e.g. 'Percentage of cumulative Value').
top5lab	Title of the rank of the top 5 items (e.g. 'Items with the highest Value').
color	List of plot colors (i.e., itemColor, top5Color, aColor, bColor, cColor). Default is list(itemColor = "blue", top5Color = "black", aColor = "green", bColor = "orange", cColor = "red").
item	Name of a single column with an identifier, that is displayed in the top-5-ranking. Used if the ABCXYZData object has multiple item columns. If NA the first item column is displayed.
...	Further optional parameters for function graphics::plot or function plotly::plot_ly.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

computeABCXYZAnalysis ABCXYZData

Examples

```
data("Amount")
abcResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date")
plot(abcResult,
     plot_engine = "graphics",
     title = "ABC Analysis",
     xlab = "Items",
     ylab = "Demand")
```

plotValueSeries *Plots the development of the values*

Description

Plots a bar chart that shows the sum of the value column for a certain time interval.

Usage

```
plotValueSeries(
  data,
  item,
  item_id,
  value,
  timestamp,
  temporalAggregation = c("day", "week", "month", "quarter", "year"),
  expand = TRUE,
  withTrendLine = TRUE,
  windowLength = 5,
  trendLineType = "s"
)
```

Arguments

data	Data frame or matrix on which the ABC analysis is performed.
item	Name of the column including the item name or identifier (e.g., product name, EAN).
item_id	Name of the item that will be displayed.
value	Name of the column variable that contains the values.
timestamp	Name of the column including the timestamp. This column should be in POSIX or date-format.
temporalAggregation	Temporal aggregation for the XYZ-analysis (i.e., "day", "week", "month", "quarter", "year").
expand	Indicator if the data should be expanded with time intervals that have no data.
withTrendLine	Indicator if a trend line should be displayed in the bar chart.
windowLength	Backwards window length.
trendLineType	If "s" the simple and if "w" the weighted moving average is calculated.

Value

A plotly bar chart, that shows the development of the value column.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

Examples

```
data("Amount")
plotValueSeries(Amount,
                item = "item",
                item_id = "45186",
                value = "amount",
                timestamp = "date",
                temporalAggregation = "week",
                withTrendLine = TRUE,
                windowLength = 10,
                trendLineType = "w")
```

---

predictValue *Predicts the value for items*

Description

Predicts the value for items based on previous values. Previous values can be aggregated to value per day, week, month, quarter or year. An ARIMA model is estimated for each item based on the function forecast:auto.arima. The best model is selected and used for prediction. Note that only models without drift term will be considered in order to ensure consistent predictions.

Usage

```
predictValue(
  data,
  value,
  item,
  timestamp,
  temporalAggregation = c("day", "week", "month", "quarter", "year"),
  aggregationFun = sum,
  timeUnitsAhead = 1,
  digits = 3,
  expand = F,
  keepPreviousData = F,
  level = 0.95,
  ...
)
```

Arguments

data	Data frame including previous values.
value	Name of the column representing the item value.
item	Name of the column representing the item ID or the item name.
timestamp	Name of the column including the timestamp. This column should be in POSIX or date-format.
temporalAggregation	Temporal aggregation mode (i.e., "day", "week", "month", "quarter", "year").
aggregationFun	Function for aggregating the value column. Default is sum.
timeUnitsAhead	Integer indicating the number of time units (i.e., days, weeks, months, quarters or years) the should be predicted.
digits	Integer indicating the number of significant digits used for the predicted values.
expand	Logical indicating whether the data will be expanded after they are aggregated. Default is not (FALSE).
keepPreviousData	Logical indicating whether the data from the given data frame will be added to the result or not. Default is not (FALSE).
level	Numeric value representing the confidence level for the predictions. The default is 0.95 (i.e. lower level = 0.025 and upper level = 0.975).
...	Further arguments for function forecast::auto.arima.

Value

Returns a Forecast object.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

auto.arima Forecast

Examples

```
# Simple Example
data("Amount")
prediction = predictValue(data = Amount,
    value = "amount",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week",
    timeUnitsAhead = 3)
prediction
```

```
# More Sophisticated Example
data("Amount")
prediction = predictValue(data = Amount,
    value = "amount",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week",
    aggregationFun = mean,
    timeUnitsAhead = 5,
    digits = 4,
    keepPreviousData = TRUE,
    level = 0.9,
    trace = TRUE)
prediction
```

---

show,ABCXYZComparison-method

Shows an ABCXYZComparison object

Description

Shows an ABCXYZComparison object as a table consisting of the absolute and relative amount of each item, the cumulative relative amount and the ABC-class for both ABCXYZData objects. It furthermore shows the ABC comparison of the two objects. If XY and YZ parameters have been specified for computing the ABCXYZData object, the table also includes a column for the XYZ coefficient, the XYZ-class, the ABC/XYZ-class and the XYZ comparison.

Usage

```
## S4 method for signature 'ABCXYZComparison'
show(object)
```

Arguments

object	The ABCXYZComparison object

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

ABCXYZComparison compare

Examples

```
data("Amount")
data1 = Amount[sample(1:nrow(Amount), 1000),]
data2 = Amount[sample(1:nrow(Amount), 1000),]
abcxyzData1 = computeABCXYZAnalysis(data1, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
abcxyzData2 = computeABCXYZAnalysis(data2, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
comparison = compare(abcxyzData1, abcxyzData2)
comparison
```

---

show,ABCXYZData-method

Shows an ABCXYZData object

Description

Shows the ABCXYZData object as a table consisting of the absolute and relative amount of each item, the cumulative relative amount and the ABC-class. If XY and YZ parameters have been specified for computing the ABCXYZData object, the table also includes a column for the XYZ coefficient, the XYZ- class and the ABC/XYZ-class.

Usage

```
## S4 method for signature 'ABCXYZData'
show(object)
```

Arguments

object	The ABCXYZData object

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

ABCXYZData computeABCXYZAnalysis

Examples

```
data("Amount")
abcResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date")
abcResult
```

show,Forecast-method *Shows a Forecast object*

Description

Shows the predicted data of a Forecast object. If the Forecast object was created using keepPreviousData = TRUE, also the training data are shown

Usage

```
## S4 method for signature 'Forecast'
show(object)
```

Arguments

object	The Forecast object

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

Forecast

Examples

```
data("Amount")
prediction = predictValue(data = Amount,
    value = "amount",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week",
    timeUnitsAhead = 3)
prediction
```

`Stocks` *Stock data*

Description

A dataset containing 10 items and their stocks over 3 years of data.

Usage

```
Stocks
```

Format

A data frame with 1,610 rows and 5 variables:

date Date in format yyyy-mm-dd

item Item ID

stock Item stock value

minstock Minimum stock per item

reorderlevel Stock threshold for triggering item reorders

Source

anonymized real data

`summary` *Summarizes an S4 object*

Description

Summarizes an S4 object.

Usage

```
summary(object, ...)
```

Arguments

`object`	S4 object.
`...`	Optional parameters.

Value

Summary.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

summary summary summary

Examples

```
data("Amount")
abcResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date")
summary(abcResult)
```

---

summary,ABCXYZComparison-method

Prints the summary of the comparison of two ABC/XYZ analyses

Description

Summarizes the differences between two ABCXYZData objects.

Usage

```
## S4 method for signature 'ABCXYZComparison'
summary(object, withMissing = FALSE)
```

Arguments

object	Object of class ABCXYZComparison.
withMissing	Logical indicating whether missing categories will be shown. Default is FALSE.

Value

A contingency table showing the differences.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

compare ABCXYZComparison

Examples

```
data("Amount")
data1 = Amount[sample(1:nrow(Amount), 1000),]
data2 = Amount[sample(1:nrow(Amount), 1000),]
abcxyzData1 = computeABCXYZAnalysis(data1, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
abcxyzData2 = computeABCXYZAnalysis(data2, value = "value", item = "item", timestamp = "date",
                                    temporalAggregation = "day", XY = 0.5, YZ = 1)
comparison = compare(abcxyzData1, abcxyzData2)
summary(comparison)
```

---

summary,ABCXYZData-method

Prints the result summary of an ABC/XYZ analysis

Description

Summarizes the items count and value sum grouped by the different ABC- or ABC/XYZ-Classes.

Usage

```
## S4 method for signature 'ABCXYZData'
summary(object, withMissing = FALSE)
```

Arguments

object	Object of class ABCXYZData.
withMissing	Logical indicating whether missing categories will be shown. Default is FALSE.

Value

A data.table with the summarized results.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

computeABCXYZAnalysis ABCXYZData

Examples

```
# ABC Analysis
data("Amount")
abcResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date")
summary(abcResult)

# ABC/XYZ Analysis
data("Amount")
abcxyzResult = computeABCXYZAnalysis(data = Amount,
    value = "value",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week",
    XY = 0.3, YZ = 0.5)
summary(abcxyzResult)
```

`summary,Forecast-method`

Prints the summary of a Forecast object

Description

Summarizes the fitted models estimated for predicting item values (e.g., demand, stock).

Usage

```
## S4 method for signature 'Forecast'
summary(object)
```

Arguments

`object`	Object of class Forecast

Value

A data frame showing a summary of fitted models.

Author(s)

Leon Binder <leon.binder@th-deg.de>

Bernhard Bauer <bernhard.bauer@th-deg.de>

Michael Scholz <michael.scholz@th-deg.de>

See Also

`predictValue` `Forecast`

Examples

```
data("Amount")
prediction = predictValue(data = Amount,
    value = "amount",
    item = "item",
    timestamp = "date",
    temporalAggregation = "week",
    timeUnitsAhead = 3)
summary(prediction)
```

Index