Package ‘fakeR’

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Type Package

Title Simulates Data from a Data Frame of Different Variable Types

Version 1.0

Date 2016-05-25

Description Generates fake data from a dataset of different variable types.
   The package contains the functions simulate_dataset and simulate_dataset_ts to simulate time-independent and time-dependent data. It randomly samples character and factor variables from contingency tables and numeric and ordered factors from a multivariate normal distribution. It currently supports the simulation of stationary and zero-inflated count time series.

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Imports mvtnorm, polycor, pscl, VGAM, stats

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

NeedsCompilation no

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R topics documented:

fakeR-package .............................................................. 2
simulate_dataset .......................................................... 3
simulate_dataset_ts ....................................................... 5

Index 8
fakeR-package

Simulates Data from a Data Frame of Different Variable Types

Description

Generates fake data from a dataset of different variable types. The package contains the functions `simulate_dataset` and `simulate_dataset_ts` to simulate time-independent and time-dependent data. It randomly samples character and factor variables from contingency tables and numeric and ordered factors from a multivariate normal distribution. It currently supports the simulation of stationary and zero-inflated count time series.

Details

The DESCRIPTION file:

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Title: Simulates Data from a Data Frame of Different Variable Types
Version: 1.0
Date: 2016-05-25
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Suggests: knitr, rmarkdown, testthat
VignetteBuilder: knitr
Author: Lily Zhang [aut, cre], Dustin Tingley [aut]
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Index of help topics:

fakeR-package Simulates Data from a Data Frame of Different Variable Types
simulate_dataset Simulate from a data frame of time-independent data.
simulate_dataset_ts Simulate a dataframe of time series data

This package is used to simulate datasets of different variable types. The package contains the functions `simulate_dataset` and `simulate_dataset_ts` to simulate time-independent and time-dependent data.

Author(s)

NA
Maintainer: NA
simulate_dataset

Simulate from a data frame of time-independent data.

Description

This function takes as argument an existing dataset in the form of a data frame and outputs a randomized version of all its columns. The function accepts the following types: character variables, numeric variables, and ordered and unordered factor variables.
Usage

simulate_dataset(dataset, digits=2, n=NA,
                 use.levels=TRUE, use.miss=TRUE,
                 mvt.method="eigen", het.ML=FALSE,
                 het.suppress=TRUE, stealth.level=1,
                 level3.noise=FALSE, ignore=NA)

Arguments

dataset the data frame from which to generate a randomized version
digits the number of digits after the decimal point to include in the new values
n number of rows in the new data frame. Equal to the number of rows in the
   original if set to NA, the default.
use.levels when set to true, gives the simulated factor variables the same number of levels
         as the original.
use.miss when set to TRUE, inserts the missing data like is present in the original (i.e.
          based on the distribution of missingness in the original data).
mvt.method specifies the matrix decomposition to be used in sampling from the multivariate
       normal.
het.ML as per the hetcor function, if TRUE, compute maximum-likelihood estimates;if
        FALSE, compute quick two-step estimates in computing the heterogeneous correla-
        tion matrix.
het.suppress when set to TRUE, suppresses stops from the het.corr function.
stealth.level when set to 1 (default), takes into account the covariances between all the
            unordered factors and the covariances between the numeric and ordered factors.
            When set to 2, simulates each variable independently. When set to 3, does not
            take into account any covariances and instead randomly samples from a uniform
            distribution ranging from the min to the max of the data for each variable.
level3.noise when set to TRUE, add Gaussian noise to the min and max parameter for the
            uniform distribution in stealth.level 3. The noise term has a variance of one
            fourth of the range of the data for any particular variable.
ignore specifies which columns to ignore (i.e. to leave as is instead of simulate). Takes
       in a list of column names as input.

Details

This function does not account for clustered time series data (see simulate_dataset_ts).

This function randomly samples each each character and factor variable from the population distribu-
   tion given in the original dataset. It simulates numeric and ordered factors from a multivariate
   normal distribution. When both numeric and ordered factors are included, a heterogeneous correla-
   tion matrix is used, coercing the means of the ordered factor variables to be 0.

The function only accounts for between-column correlations for numeric and ordered factor vari-
   ables. Each unordered factor and character column is treated as independent.

The order of the columns in the simulated dataset may differ from the order of the original dataset
since the function puts the numeric and ordered factor data in the front and the character and un-
ordered factor data afterwards. The column names stay consistent, however.
simulate_dataset_ts

Value

Returns a data frame with the same number of columns and same type for each.

Author(s)

Lily Zhang Dustin Tingley

References

Inspired by the fakeR function originally created by Ryne Estabrook.

Examples

# single column of an unordered, string factor
state_df <- data.frame(division=state.division)
# character variable
state_df$division <- as.character(state_df$division)
# numeric variable
state_df$area <- state.area
# factor variable
state_df$region <- state.region
state_sim <- simulate_dataset(state_df)

simulate_dataset_ts  Simulate a dataframe of time series data

Description

This function simulates clustered numeric time series data from an ARIMA model fit or, if specified, a zero-inflated Poission regression model fit, with each column variable regressed on the first lag.

Usage

simulate_dataset_ts(dataset, digits=2, n=NA, cluster=NA, time.variable=NA, date.index=FALSE, complete.panel=FALSE, zero.inflate=FALSE, stealth.level=2, level3.noise=FALSE, use.miss=TRUE, ignore=NA)

Arguments

dataset the data frame from which to generate a randomized version
digits the number of digits after the decimal point to include in the new values
n number of rows in the new data frame. Equal to the number of rows in the original if set to NA, the default.
cluster the column names of the time series variables. Argument should be in the form of a list if multiple values.
simulate_dataset_ts

time.variable: the column name(s) of the time variables corresponding to each time series variable. Should be the same length as cluster, even if that means including the same time variable multiple times.
date.index: whether the time variable is a date and should be treated as a Date object.
complete.panel: when set to TRUE, indicates a preprocessing step needed to complete the time series columns. Specifically, inserts all missing dates and zero values at each of those time points.
zero.inflate: when set to TRUE, indicates that time series variables require a zero-inflated Poisson regression model fit. When set to FALSE (default), series all fit to an ARIMA model to simulate from.
stealth.level: when set to 2 (default), simulates independent time series observations. When set to 3, does not take into account any covariances between time points and instead randomly samples from a uniform distribution ranging from the min to the max of the data for each variable. No option 1.
level3.noise: when set to TRUE, add Gaussian noise to the min and max parameter for the uniform distribution in stealth.level 3. The noise term has a variance of one fourth of the range of the data for any particular variable.
use.miss: when set to TRUE, inserts the missing data like is present in the original.
ignore: specifies which columns to ignore (i.e. to leave as is instead of simulate). Takes in a list of column names as input.

Details

Note that this function is specific to two types of numeric time series, stationary ones and zero-inflated count ones. For modeling clustered numeric data assuming a multivariate normal distribution, look at simulate_dataset. Note that this function only accepts numeric observation types.

The function assumes each time series process is independent of the others, and allows for a different time variable to be associated with each series. Thus, there is no stealth level of 1 for simulate_dataset_ts(), as this function does not simulate multivariate time series. Columns not part of time series values or time indices are ignored and not simulated.

Value

A data frame. Columns alternating time variable and cluster variable, with the cluster/time variable pairs in the order inputted into the function arguments.

Author(s)

Lily Zhang Dustin Tingley

Examples

# An example using the treering dataset from the R datasets package
tree_ring <- data.frame(treering)
tree_ring$year <- c(1L: nrow(tree_ring))
sim_tree_ring <- simulate_dataset_ts(tree_ring,
cluster="treering",

time_variable="year"
par(mfrow = c(2, 1), mar = c(3, 3, 4, 2), mgp = 0.9 * 2:0)
plot(tree_ring$year, tree_ring$tree$ring, type='1',
     main=paste("Original","Normalized ring width"),
     ylab="Ring width", xlab="Year index")
plot(tree_ring$year, tree_ring$tree$ring, type='1',
     main=paste("Simulated","Normalized ring width"),
     ylab="Ring width", xlab="Year index")
Index

*Topic **datagen**
  simulate_dataset, 3
  simulate_dataset_ts, 5

*Topic **manip**
  simulate_dataset, 3
  simulate_dataset_ts, 5

*Topic **package**
  fakeR-package, 2

fakeR (fakeR-package), 2
fakeR-package, 2

simulate_dataset, 3
simulate_dataset_ts, 5