Package ‘distrTeach’

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Version 2.8.0

Date 2019-03-11

Title Extensions of Package ‘distr’ for Teaching
Stochastics/Statistics in Secondary School

Description Provides flexible examples of LLN and CLT for teaching purposes in secondary
school.

Depends R(>= 2.2.0), methods, distr(>= 2.2), distrEx(>= 2.2)

Suggests tcltk

Imports startupmsg, grDevices, graphics, stats

ByteCompile yes

License LGPL-3

Encoding latin1

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**distrTeach-package**

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### Description

**distrTeach** provides some illustrations based on package distr for teaching Stochastics / Statistics in secondary school; so far the following has been implemented

- **illustrateLLT**: function for the generation of LLN - visualizations
- **illustrateCLT**: function for the generation of CLT - visualizations
- **plotCLT**: Generic function for the plotting of CLT-approximations

as well as a Tcl/Tk based demo for illustrateCLT

### Details

- **Package**: distrTeach
- **Version**: 2.8.0
- **Date**: 2019-03-11
- **Depends**: R(>= 2.2.0), methods, distr(>= 2.2), distrEx(>= 2.2)
- **Suggests**: tcltk
- **Imports**: startupmsg, grDevices, graphics, stats
- **LazyLoad**: yes
- **License**: LGPL-3
- **URL**: http://distr.r-forge.r-project.org/
- **VCS/SVNRevision**: 1314

### Classes

**Teaching Classes**

### Methods
illustration:
illustrateLLT function for the generation of LLN - visualizations
illustrateCLT function for the generation of CLT - visualizations
plotCLT Generic function for the plotting of CLT-approximations

Demos

Demos are available — see demo(package="distrTeach").

Start-up-Banner

You may suppress the start-up banner/message completely by setting options("StartupBanner"="off") somewhere before loading this package by library or require in your R-code / R-session.

If option "StartupBanner" is not defined (default) or setting options("StartupBanner"=NULL) or options("StartupBanner"="complete") the complete start-up banner is displayed.

For any other value of option "StartupBanner" (i.e., not in c(NULL,"off","complete")) only the version information is displayed.

The same can be achieved by wrapping the library or require call into either suppressStartupMessages() or onlyTypeStartupMessages(.atypes="version").

As for general packageStartupMessage's, you may also suppress all the start-up banner by wrapping the library or require call into suppressPackageStartupMessages() from startupmsg-version 0.5 on.

Package versions

Note: The first two numbers of package versions do not necessarily reflect package-individual development, but rather are chosen for the distrXXX family as a whole in order to ease updating "depends" information.

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References


a vignette for packages distr, distrSim, distrTEst, and distrTeach is included into the mere documentation package distrDoc and may be called by require("distrDoc");vignette("distr")
a homepage to this package is available under
http://distr.r-forge.r-project.org/ and the pages ...
illustrateCLT


See Also
distr-package distrEx-package

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### illustrateCLT

*Functions for Illustrating the CLT*

#### Description

Functions for generating a sequence of plots of the density and cdf of the consecutive standardized and centered sums of iid r.v. distributed according to a prescribed discrete or absolutely continuous distribution compared to the standard normal — uses the generic function plotCLT.

#### Usage

```r
illustrateCLT(Distr, len, sleep = 0)
illustrateCLT.tcl(Distr, k, Distrname)
```

#### Arguments

- **Distr**: object of class "AbscontDistribution", "LatticeDistribution" or "DiscreteDistribution": distribution of the summands
- **len**: integer: up to which number of summands plots are generated
- **k**: integer: number of summands for which a plot is to be generated
- **Distrname**: character: name of the summand distribution to be used as title in the plot
- **sleep**: numeric: pause in seconds between subsequent plots

#### Details

*illustrateCLT* generates a sequence of plots, while *illustrateCLT.tcl* may be used with Tcl/Tk-widgets as in demo *illustrCLT.tcl.R*.

#### Value

void

#### Author(s)

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illustrateLLN

Functions for Illustrating the LLN

Description

Functions for generating a sequence of plots of randomly generated replicates of \( \bar{X}_n = \frac{1}{n} \sum_{i=1}^{n} X_i \) for sums of iid r.v. distributed according to a prescribed discrete or absolutely continuous distribution. A line for the expectation and CLT based (pointwise) 95%-confidence bands are also plotted and the empirical coverage of this band by the replicated plotted so far is indicated.

Usage

illustrateLLN(Distr = Norm(), n = c(1,3,5,10,25,50,100,500,1000,10000),
  m = 50, step = 1, sleep = 0, withConf = TRUE,
  withCover = (length(n)<12), withEline = TRUE, withLegend = TRUE,
  CLTorCheb = "CLT", coverage = 0.95, ...,
  col.Eline = "blue", lwd.Eline = par("lwd"), lty.Eline = par("lty"), col.Conf = "red",
  lwd.Conf = par("lwd"), lty.Conf = 2, cex.Cover = 0.7,
  cex.legend = 0.8)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distr</td>
<td>object of class &quot;UnivariateDistribution&quot;: distribution of the summands</td>
</tr>
<tr>
<td>n</td>
<td>vector of integers: sample sizes to be considered</td>
</tr>
<tr>
<td>m</td>
<td>integer: (total) number of replicates to be plotted subsequently</td>
</tr>
<tr>
<td>step</td>
<td>integer: number of replicates to be drawn at once</td>
</tr>
<tr>
<td>sleep</td>
<td>numeric: pause in seconds between subsequent plots</td>
</tr>
</tbody>
</table>

References

withEline logical: shall a line for the limiting expectation (in case of class Cauchy instead: median) be drawn?

withConf logical: shall (CLT-based) confidence bands be plotted?

withCover logical: shall empirical coverage of (CLT-based) confidence bands be printed?

withLegend logical: shall a legend be included?

CLTOrCheb character: type of confidence interval — “CLT” or “Chebyshev”; partial matching is used; if this fails “CLT” is used.

coverage numerical: nominal coverage of the confidence bands — to be in (0,1)

col.Eline character or integer code; color for confidence bands

lwd.Eline integer code (see par); line width of the confidence bands

lty.Eline integer code (see par); line type of the confidence bands

col.Conf character or integer code; color for confidence bands

lwd.Conf integer code (see par); line width of the confidence bands

lty.Conf integer code (see par); line type of the confidence bands

cex.Cover magnification w.r.t. the current setting of cex to be used for empirical coverages; as in par

cex.legend magnification w.r.t. the current setting of cex to be used for the legend as in par

... further arguments to be passed to matplot, matlines, abline

Details

illustrateLLN generates a sequence of plots. Any parameters of plot.default may be passed on to this particular plot method.

There are default main titles as well as xlab and ylab annotations.

In all title arguments, the following patterns are substituted:

"%c" class of argument x

"%p" parameters of x in form of a comma-separated list of <value>'s coerced to character

"%q" parameters of x in form of a comma-separated list of <value>'s coerced to character and in parenthesis — unless empty; then ""

"%n" parameters of x in form of a comma-separated list <name> = <value> coerced to character

"%a" deparsed argument x

"%d" time/date-string when the plot was generated

"%x" the expression \( \bar{X}_n = \sum_{i=1}^{n} X_i/n \)

If not explicitly set, col.Eline, col.Conf are set to col if this arg is given and else to their default values as given above. Similarly for cex, lwd and lty.

Value

void
Author(s)
Peter Ruckdeschel <peter.ruckdeschel@uni-oldenburg.de>

Examples

\begin{verbatim}
illustrateLLN(Distr = Unif())
illustrateLLN(Distr = Pois(lambda = 2))
illustrateLLN(Distr = Pois(lambda = 2) + Unif())
illustrateLLN(Td(3), m = 50, col.Eline = "green", lwd = 2, cex = 0.6, main =
    "My LLN %C%Q", sub = "generated %D")
illustrateLLN(Td(3), m = 50, CLTorCheb = "Chebyshev")
illustrateLLN(Td(3), m = 50, CLTorCheb = "Chebyshev", coverage = 0.75)
\end{verbatim}
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