Package ‘distfree.cr’

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Type Package
Title Distribution-Free Confidence Region
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Description Constructs confidence regions without the need to know the sampling distribution of bivariate data. The method was proposed by Zhiqiu Hu & Rong-cai Yang (2013) <doi:10.1371/journal.pone.0081179.g001>.
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Description

The disfree.cr package was developed to implement a novel geometry-based method introduced by Zhiqiu Hu and Rong-cai Yang for constructing confidence regions without the need to know the sampling distribution of estimated parameters for two or more variables.

Details

Package: disfree.cr
Type: Package
Version: 1.0
Date: 2012-11-23
License: GPL (>2.0)

Author(s)

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Description

Constructs empirical confidence regions for bivariate data based on the method proposed by Zhiqiu Hu and Rong-cai Yang(2013) <doi:10.1371/journal.pone.0081179.g001>.

Usage

```r
disfree.cr(x, y, alpha = 0.05, alpha.min.diff = 0.5/NROW(x), nknots = 40, xlab = deparse(substitute(x)), ylab = deparse(substitute(y)), col = c("red", "black", "gray"), draw = T)
```

Arguments

- `x`: numeric vector, of dimensions `nobs` * 1. If a data frame or a two-column numeric matrix of `x` and `y` is supplied here, the second option `y` of the function needs to be ignored.
numeric vector, of dimensions \( nobs \times 1 \). This option needs to be ignored if users provided both \( x \) and \( y \) in the first option of the function.

\( \alpha \) Significant level. By default \( \alpha \) is set to be 0.05.

\( \alpha_{\text{min.diff}} \) minimum difference is allowed for calculating confidence region. This option is not suggested for most users. The default value is set to be \( \alpha/10 \).

\( nknots \) number of knots that will be used to enclose the confidence region. The default value \( nknots=40 \) is recommended for all users.

\( xlab \) define the label of \( x \) axis of the plot.

\( ylab \) define the label of \( y \) axis of the plot.

\( col \) define colors of the scatter points and lines of the plot. The default setting \( col=\{"red", "black", "gray"\} \) are the colors for the lines enclosed the region, the points within the region and the points outside of the region, respectively.

\( \text{draw} \) a logical indicator. Users may disable plotting by setting the option to \( \text{FALSE} \).

**Details**

This function constructs a distribution-free confidence region based on the method proposed by Zhiqiu Hu and Rong-cai Yang.

**Value**

\( \alpha_{\text{realized}} \) Realized-alpha, which is defined as the proportion of the total points outside the confidence region.

\( \text{polygon} \) 'data.frame' of \( x,y \) providing the apexes of the lines.

\( \text{polygon.smooth1} \) 'data.frame' of \( x,y \) providing the apexes of the smoothed polygon 1.

\( \text{polygon.smooth2} \) 'data.frame' of \( x,y \) providing the apexes of the smoothed polygon 2.

\( \text{data} \) 'data.frame', of dimension \( nobs \times 3 \), the first two columns are input data of \( x \) and \( y \) values and the third column \( \text{data}\$\text{pip} \) are indicators of whether the points are within (1) or outside (0) the confidence region.

\( \alpha, xlab, ylab, col \) values assigned by users.

**Note**

A smooth confidence region can be achieved by setting up a big number for input variable \( nknots \), and this in turn requires large sample sizes.

**Author(s)**

Zhiqiu Hu and Rong-cai Yang
Examples

```r
library(distfree.cr)

dat=data.frame(x=c(rnorm(3000), rnorm(3000, mean=1, sd=2.5)),
               y=c(rnorm(3000), rnorm(3000, mean=1, sd=2.5)))

pt=distfree.cr(dat, draw=TRUE, alpha=0.05)
pt=distfree.cr(x=dat$x, y=dat$y, draw=FALSE)
plot(pt)
```

Description

Plot an object that is returned by the distfree.cr function.

Usage

```r
## S3 method for class 'distfree.cr'
plot(x, show.points = T, ...)
```

Arguments

- `x` An object returned by the distfree.cr function.
- `show.points` A logical indicator of whether or not the original data are plotted.
- `...` Other parameters that can be passed to the `plot` function.
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