Package 'svplots'

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Type Package

Title Sample Variance Plots (Sv-Plots)

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Description

Two versions of sample variance plots, Sv-plot1 and Sv-plot2, will be provided illustrating the squared deviations from sample variance. Besides indicating the contribution of squared deviations for the sample variability, these plots are capable of detecting characteristics of the distribution such as symmetry, skewness and outliers. A remarkable graphical method based on Sv-plot2 can determine the decision on testing hypotheses over one or two population means. In sum, Sv-plots will be appealing visualization tools. Complete description of this methodology can be found in the article, Wijesuriya (2020) <doi:10.1080/03610918.2020.1851716>.

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Depends R (>= 3.0.2)

Imports ggplot2

Suggests testthat (>= 3.0.0), knitr, rmarkdown, stats

Config/testthat/edition 3

VignetteBuilder knitr

NeedsCompilation no

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R topics documented:

`svplot1` *Creates Sv-plot1, the first version of the sample variance plots.*

Description

Sv-plot1 identifies the characteristics of the distribution illustrating squared deviations in the sample variance by squares for each data value.

Usage

```
svplot1(X,title="Sv-plot1",xlab="x",lbcol="grey5",lscol="grey60",
              rbcol="grey45",rscol="grey75",...)
```

Arguments

`X`	an n by 1 matrix, equivalently, a column vector of length n, where n is number of observations.
`title`	title of the plot, *Sv-plot1* by default.
`xlab`	x-axis label, x by default.
`lbcol`	left bound color, *grey5* by default.
`lscol`	left square color, *grey60* by default.
`rbcol`	right bound color, *grey45* by default.
`rscol`	right square color, *grey75* by default.
`...`	other graphical parameters.

Value

Sv-plot1

References

Wijesuriya, U. A. (2020). Sv-plots for identifying characteristics of the distribution and testing hypotheses. *Communications in Statistics-Simulation and Computation*, doi: 10.1080/03610918.2020.1851716.

Examples

```
set.seed(0)
X1 <- matrix(rnorm(50,mean=2,sd=5))
svplot1(X1)

X2 <- matrix(rf(50,df1=10,df2=5))
svplot1(X2)

X3 <- matrix(rbeta(50,shape1=10,shape2=2))
svplot1(X3,title="",lbcol="blue",lscol="blue",rbcol="red",rscol="grey75")
```

`svplot2` *Creates Sv-plot2, the second version of the sample variance plots.*

Description

Sv-plot2 identifies the characteristics of the distribution illustrating squared deviation values in the sample variance against each data value.

Usage

```
svplot2(X,title="Sv-plot2",xlab="x",lbcol="grey5", lsdcol="grey60",
             rbcol="grey45",rsdcol="grey75",...)
```

Arguments

`X`	an n by 1 matrix, equivalently, a column vector of length n, where n is number of observations.
`title`	title of the plot, *Sv-plot2* by default.
`xlab`	x-axis label, x by default.
`lbcol`	left bound color, *grey5* by default.
`lsdcol`	left squared deviation color, *grey60* by default.
`rbcol`	right bound color, *grey45* by default.
`rsdcol`	right squared deviation color, *grey75* by default.
`...`	other graphical parameters.

Value

Sv-plot2

References

Wijesuriya, U. A. (2020). Sv-plots for identifying characteristics of the distribution and testing hypotheses. *Communications in Statistics-Simulation and Computation*, doi: 10.1080/03610918.2020.1851716.

Examples

```
set.seed(0)
X1 <- matrix(rnorm(50,mean=2,sd=5))
svplot2(X1)

X2 <- matrix(rf(50,df1=10,df2=5))
svplot2(X2)

X3 <- matrix(rbeta(50,shape1=10,shape2=2))
svplot2(X3,lbcol="blue",lsdcol="blue",rbcol="red",rsdcol="red")
```

`test1mu` *Tests the hypothesis over population mean based on one sample by Sv-plot2.*

Description

Decision on hypothesis testing over single mean is made by graphing sample and population Sv-plot2s along with the threshold line. If the intersection point of two Sv-plot2s locates on or above the threshold line, the null hypothesis is rejected at specified significance level, otherwise, failed to reject.

Usage

```
test1mu(X,mu0=3.5,alpha=0.05,unkwnsigma=TRUE,sigma=NULL,xlab="x",
              title="Single mean: Hypothesis testing by Sv-plot2",
              samcol="grey5",popcol="grey45",thrcol="black",...)
```

Arguments

`X`	an n by 1 matrix, equivalently, a column vector of length n, where n is number of observations.
`mu0`	hypothesized population mean, *mu0=3.5* by default.
`alpha`	significance level, *alpha=0.05* by default.
`unkwnsigma`	population standard deviation is unknown, *TRUE* by default.
`sigma`	population standard deviation, *NULL* by default.
`xlab`	x-axis label, x by default.
`title`	title of the plot, *Single mean: Hypothesis testing by Sv-plot2* by default.
`samcol`	sample Sv-plot2 color, *grey5* by default.
`popcol`	sample Sv-plot2 color, *grey45* by default.
`thrcol`	threshold color, *black* by default.
`...`	other graphical parameters.

Value

Decision on testing hypotheses over single population mean by Sv-plot2.

References

Wijesuriya, U. A. (2020). Sv-plots for identifying characteristics of the distribution and testing hypotheses. *Communications in Statistics-Simulation and Computation*, doi: 10.1080/03610918.2020.1851716.

Examples

```
set.seed(5)
X=matrix(rnorm(20,mean=3,sd=2))
test1mu(X,mu0=3.5,alpha=0.05,unkwnsigma=TRUE,sigma=NULL,xlab="x",
        title="Single mean: Hypothesis testing by Sv-plot2",
        samcol="grey5",popcol="grey45",thrcol="black")
```

`test1musm` *Tests the hypothesis over population mean based on one sample summary statistics by Sv-plot2.*

Description

Decision on hypothesis testing over single mean is made by graphing sample and population Sv-plot2s along with the threshold line. Intersecting Sv-plots on or above the horizontal line concludes the alternative hypothesis.

Usage

```
test1musm(n=20,xbar=3,s=2,mu0=4.5,alpha=0.05,
                  unkwnsigma=TRUE,sigma=NULL,xlab="x",
                  title="Single mean summary: Hypothesis testing by Sv-plot2",
                  samcol="grey5",popcol="grey45",thrcol="black",...)
```

Arguments

`n`	sample size, *n=20* by default.
`xbar`	sample average, *xbar=3* by default.
`s`	sample standard deviation, *s=2* by default.
`mu0`	hypothesized population mean, *mu0=4.5* by default.
`alpha`	significance level, *alpha=0.05* by default.
`unkwnsigma`	population standard deviation is unknown, *TRUE* by default.
`sigma`	population standard deviation, *NULL* by default.
`xlab`	x-axis label, x by default.
`title`	title of the plot, *Single mean: Hypothesis testing by Sv-plot2 by default* by default.

samcol	sample Sv-plot2 color, *grey5* by default.
popcol	sample Sv-plot2 color, *grey45* by default.
thrcol	threshold color, *black*.
...	other graphical parameters.

Value

Decision on testing hypotheses over single population mean by Sv-plot2.

References

Wijesuriya, U. A. (2020). Sv-plots for identifying characteristics of the distribution and testing hypotheses. *Communications in Statistics-Simulation and Computation*, doi: 10.1080/03610918.2020.1851716.

Examples

```
## For summary data
   test1musm(n=20,xbar=3,s=2,mu0=4.5,alpha=0.05, unkwnsigma=TRUE,sigma=NULL,xlab="x",
   title="Single mean summary: Hypothesis testing by Sv-plot2",
   samcol="grey5",popcol="grey45",thrcol="black")
```

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test2mu *Tests the hypothesis over two population means based on two samples by Sv-plot2.*

Description

Decision on hypothesis testing over two means is made by graphing two sample Sv-plot2s along with the threshold line. If the intersection point of two Sv-plot2s locates on or above the threshold line, the null hypothesis is rejected at specified significance level, otherwise, failed to reject.

Usage

```
test2mu(X1,X2,paired=FALSE,eqlvar=FALSE,unkwnsigmas=TRUE,
               sigma1=NULL,sigma2=NULL,alpha=0.05,xlab="x",
               title="Two means: Hypothesis testing by Sv-plot2",
               sam1col="grey5",sam2col="grey45",thrcol="black",...)
```

Arguments

X1	an $n1$ by 1 matrix, equivalently, a column vector of length $n1$, where $n1$ is number of observations.
X2	an $n2$ by 1 matrix, equivalently, a column vector of length $n2$, where $n2$ is number of observations.
paired	for dependent samples TRUE, *FALSE* by default.
eqlvar	population variances are equal, *FALSE* by default.

unkwnsigmas	population standard deviations are unknown, *TRUE* by default.
sigma1	population1 standard deviation, *NULL* by default.
sigma2	population2 standard deviation, *NULL* by default.
alpha	significance level, *alpha=0.05* by default.
xlab	x-axis label, x by default.
title	title of the plot, *Two means: Hypothesis testing by Sv-plot2* by default.
sam1col	sample1 Sv-plot2 color, *grey5* by default.
sam2col	sample2 Sv-plot2 color, *grey45* by default.
thrcol	threshold color, *black* by default.
...	other graphical parameters.

Value

Decision on testing hypotheses over two population means by Sv-plot2.

References

Wijesuriya, U. A. (2020). Sv-plots for identifying characteristics of the distribution and testing hypotheses. *Communications in Statistics-Simulation and Computation*, doi: 10.1080/03610918.2020.1851716.

Examples

```
set.seed(5)
test2mu(X1=matrix(rnorm(10,mean=3,sd=2)),X2=matrix(rnorm(20,mean=4,sd=2.5)),
       paired=FALSE,eqlvar=FALSE,unkwnsigmas=TRUE,
       sigma1=NULL,sigma2=NULL,alpha=0.05,
       sam1col="grey5",sam2col="grey45",thrcol="black")

test2mu(X1=matrix(rnorm(10,mean=3,sd=2)),X2=matrix(rnorm(20,mean=4,sd=2.5)),
       paired=FALSE,eqlvar=TRUE,unkwnsigmas=TRUE,
       sigma1=NULL,sigma2=NULL,alpha=0.05,
       sam1col="grey5",sam2col="grey45",thrcol="black")

test2mu(X1=matrix(rnorm(50,mean=3,sd=2)),X2=matrix(rnorm(30,mean=4,sd=2.5)),
       xlab="x",title="Two means: Hypothesis testing by Sv-plot2",
       paired=FALSE,eqlvar=FALSE,unkwnsigmas=TRUE,
       sigma1=NULL,sigma2=NULL,alpha=0.05,
       sam1col="grey5",sam2col="grey45",thrcol="black")

test2mu(X1=matrix(rnorm(50,mean=3,sd=2)),X2=matrix(rnorm(30,mean=4,sd=2.5)),
       paired=FALSE,eqlvar=FALSE,unkwnsigmas=FALSE,
       sigma1=2,sigma2=4.920782,alpha=0.05,
       sam1col="grey5",sam2col="grey45",thrcol="black")

X1=matrix(rnorm(10,mean=3,sd=2))
X2=2*X1
test2mu(X1,X2,
       paired=TRUE,eqlvar=FALSE,unkwnsigmas=TRUE,
       sigma1=NULL,sigma2=NULL,alpha=0.05,
       sam1col="blue",sam2col="red",thrcol="black")
```

`test2musm` *Tests the hypothesis over two population means based on two samples summary statistics by Sv-plot2.*

Description

Decision on hypothesis testing over two means is made by graphing two sample Sv-plot2s along with the threshold line. Intersecting Sv-plots on or above the horizontal line concludes the alternative hypothesis.

Usage

```
test2musm(n1=20,n2=25,xbar1=3,xbar2=4,s1=1,s2=1.5,
                paired=FALSE,eqlvar=FALSE,unkwnsigmas=TRUE,
                sigma1=NULL,sigma2=NULL,sdevdif=NULL,alpha=0.05,
            xlab="x",title="Two means summary: Hypothesis testing by Sv-plot2",
                sam1col="grey5",sam2col="grey45",thrcol="black",...)
```

Arguments

`n1`	sample1 size, *n1=20* by default.
`n2`	sample2 size, *n2=25* by default.
`xbar1`	sample1 average, *xbar1=3* by default.
`xbar2`	sample2 average, *xbar2=4* by default.
`s1`	sample1 standard deviation, *s1=1* by default.
`s2`	sample2 standard deviation, *s2=1.5* by default.
`paired`	for dependent samples TRUE, *FALSE* by default.
`eqlvar`	population variances are equal, *FALSE* by default.
`unkwnsigmas`	population standard deviations are unknown, *TRUE* by default.
`sigma1`	population1 standard deviation, *NULL* by default.
`sigma2`	population2 standard deviation, *NULL* by default.
`sdevdif`	standard deviation of the differences, *NULL* by default.
`alpha`	significance level, *alpha=0.05* by default.
`xlab`	x-axis label, x by default.
`title`	title of the plot, *Two means: Hypothesis testing by Sv-plot2* by default.
`sam1col`	sample1 Sv-plot2 color, *grey5* by default.
`sam2col`	sample2 Sv-plot2 color, *grey45* by default.
`thrcol`	threshold color, *black* by default.
`...`	other graphical parameter.

Value

Decision on testing hypotheses over two population means by Sv-plot2.

References

Wijesuriya, U. A. (2020). Sv-plots for identifying characteristics of the distribution and testing hypotheses. *Communications in Statistics-Simulation and Computation*, doi: 10.1080/03610918.2020.1851716.

Examples

```
 ## For summary data
test2musm(n1=20,n2=25,xbar1=3,xbar2=4,s1=1,s2=1.5,
         paired=FALSE,eqlvar=FALSE,unkwnsigmas=TRUE,
         sigma1=NULL,sigma2=NULL,sdevdif=NULL,alpha=0.05,
         xlab="x",title="Two means summary: Hypothesis testing by Sv-plot2",
         sam1col="grey5",sam2col="grey45",thrcol="black")

test2musm(n1=20,n2=25,xbar1=3,xbar2=4,s1=1.5,s2=1.5,
        paired=FALSE,eqlvar=TRUE,unkwnsigmas=TRUE,
        sigma1=NULL,sigma2=NULL,sdevdif=NULL,alpha=0.05,
        xlab="x",title="Two means summary: Hypothesis testing by Sv-plot2",
        sam1col="grey5",sam2col="grey45",thrcol="black")

test2musm(n1=50,n2=35,xbar1=3,xbar2=4,s1=1,s2=1.5,
         paired=FALSE,eqlvar=FALSE,unkwnsigmas=TRUE,
         sigma1=NULL,sigma2=NULL,sdevdif=NULL,alpha=0.05,
         xlab="x",title="Two means summary: Hypothesis testing by Sv-plot2",
         sam1col="grey5",sam2col="grey45",thrcol="black")

test2musm(n1=50,n2=35,xbar1=3,xbar2=4,s1=1,s2=1.5,
         paired=FALSE,eqlvar=FALSE,unkwnsigmas=FALSE,
         sigma1=2,sigma2=3,sdevdif=NULL,alpha=0.05,
         xlab="x",title="Two means summary: Hypothesis testing by Sv-plot2",
         sam1col="grey5",sam2col="grey45",thrcol="black")

test2musm(n1=20,n2=20,xbar1=3,xbar2=4,s1=1,s2=1.5,
         paired=TRUE,eqlvar=FALSE,unkwnsigmas=TRUE,
         sigma1=NULL,sigma2=NULL,sdevdif=2,alpha=0.05,
         xlab="x",title="Two means summary: Hypothesis testing by Sv-plot2",
         sam1col="grey45",sam2col="grey5",thrcol="black")
```

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