

# Package ‘svplots’

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**Type** Package

**Title** Sample Variance Plots (Sv-Plots)

**Version** 0.1.0

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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>.

**License** GPL-3

**Encoding** UTF-8

**RoxygenNote** 7.1.1

**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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svplot1	<i>Creates Sv-plot1, the first version of the sample variance plots.</i>
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### 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", lbc="grey5", lsc="grey60",
        rbc="grey45", rsc="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, <i>Sv-plot1</i> by default.
xlab	$x$ -axis label, $x$ by default.
lbc	left bound color, <i>grey5</i> by default.
lsc	left square color, <i>grey60</i> by default.
rbc	right bound color, <i>grey45</i> by default.
rsc	right square color, <i>grey75</i> 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](https://doi.org/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**

<code>X</code>	an $n$ by 1 matrix, equivalently, a column vector of length $n$ , where $n$ is number of observations.
<code>title</code>	title of the plot, <i>Sv-plot2</i> by default.
<code>xlab</code>	$x$ -axis label, $x$ by default.
<code>lbcol</code>	left bound color, <i>grey5</i> by default.
<code>lsdcol</code>	left squared deviation color, <i>grey60</i> by default.
<code>rbcol</code>	right bound color, <i>grey45</i> by default.
<code>rsdcol</code>	right squared deviation color, <i>grey75</i> by default.
<code>...</code>	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](https://doi.org/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,lbc="blue",lsdcol="blue",rbc="red",rsdcol="red")

```

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test1mu	<i>Tests the hypothesis over population mean based on one sample by Sv-plot2.</i>
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**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, <i>TRUE</i> by default.
sigma	population standard deviation, <i>NULL</i> by default.
xlab	$x$ -axis label, $x$ by default.
title	title of the plot, <i>Single mean: Hypothesis testing by Sv-plot2</i> by default.
samcol	sample Sv-plot2 color, <i>grey5</i> by default.
popcol	sample Sv-plot2 color, <i>grey45</i> by default.
thrcol	threshold color, <i>black</i> 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](https://doi.org/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")
```

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test1musm	<i>Tests the hypothesis over population mean based on one sample summary statistics by Sv-plot2.</i>
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**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, <i>TRUE</i> by default.
sigma	population standard deviation, <i>NULL</i> by default.
xlab	$x$ -axis label, $x$ by default.
title	title of the plot, <i>Single mean: Hypothesis testing by Sv-plot2 by default</i> 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](https://doi.org/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	<i>Tests the hypothesis over two population means based on two samples by Sv-plot2.</i>
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### 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  $n_1$  by 1 matrix, equivalently, a column vector of length  $n_1$ , where  $n_1$  is number of observations.  
 X2                an  $n_2$  by 1 matrix, equivalently, a column vector of length  $n_2$ , where  $n_2$  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, <i>TRUE</i> by default.
sigma1	population1 standard deviation, <i>NULL</i> by default.
sigma2	population2 standard deviation, <i>NULL</i> by default.
alpha	significance level, <i>alpha=0.05</i> by default.
xlab	<i>x</i> -axis label, <i>x</i> by default.
title	title of the plot, <i>Two means: Hypothesis testing by Sv-plot2</i> by default.
sam1col	sample1 Sv-plot2 color, <i>grey5</i> by default.
sam2col	sample2 Sv-plot2 color, <i>grey45</i> by default.
thrcol	threshold color, <i>black</i> 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](https://doi.org/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")
```

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test2musm	<i>Tests the hypothesis over two population means based on two samples summary statistics by Sv-plot2.</i>
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### 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 <i>TRUE</i> , <i>FALSE</i> by default.
eqlvar	population variances are equal, <i>FALSE</i> by default.
unkwnsigmas	population standard deviations are unknown, <i>TRUE</i> by default.
sigma1	population1 standard deviation, <i>NULL</i> by default.
sigma2	population2 standard deviation, <i>NULL</i> by default.
sdevdif	standard deviation of the differences, <i>NULL</i> by default.
alpha	significance level, $alpha=0.05$ by default.
xlab	$x$ -axis label, $x$ by default.
title	title of the plot, <i>Two means: Hypothesis testing by Sv-plot2</i> by default.
sam1col	sample1 Sv-plot2 color, <i>grey5</i> by default.
sam2col	sample2 Sv-plot2 color, <i>grey45</i> by default.
thrcol	threshold color, <i>black</i> 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](https://doi.org/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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