

# Package ‘vioplot’

November 29, 2019

**Title** Violin Plot

**Version** 0.3.4

**Date** 2019-11-30

**Description** A violin plot is a combination of a box plot and a kernel density plot. This package allows extensive customisation of violin plots.

**Depends** sm, zoo

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**URL** <https://github.com/TomKellyGenetics/vioplot>

**BugReports** <https://github.com/TomKellyGenetics/vioplot/issues>

**LazyData** true

**RoxygenNote** 7.0.1

**Suggests** ggplot2, RColorBrewer, knitr, rmarkdown, testthat

**Language** en-GB

**VignetteBuilder** knitr

**Encoding** UTF-8

**NeedsCompilation** no

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**Repository** CRAN

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`vioplot`*violin plot*

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### Description

Produce violin plot(s) of the given (grouped) values with enhanced annotation and colour per group. Includes customisation of colours for each aspect of the violin, boxplot, and separate violins. This supports input of data as a list or formula, being backwards compatible with `vioplot` (0.2) and taking input in a formula as used for `boxplot`.

### Usage

```
## S3 method for class 'formula'
vioplot(
  formula,
  data = NULL,
  ...,
  subset,
  na.action = NULL,
  add = FALSE,
  ann = !add,
  horizontal = FALSE,
  xlab = mklab(y_var = horizontal),
  ylab = mklab(y_var = !horizontal),
  names = NULL,
  drop = FALSE,
  sep = ".",
  lex.order = FALSE
)
```

```
## Default S3 method:
vioplot(
  x,
  ...,
  data = NULL,
  range = 1.5,
  h = NULL,
  ylim = NULL,
  names = NULL,
  horizontal = FALSE,
  col = "grey50",
  border = par()$fg,
  lty = 1,
  lwd = 1,
  rectCol = par()$fg,
  lineCol = par()$fg,
  pchMed = 19,
```

```
colMed = "white",
colMed2 = "grey 75",
at,
add = FALSE,
wex = 1,
drawRect = TRUE,
areaEqual = FALSE,
axes = TRUE,
frame.plot = axes,
panel.first = NULL,
panel.last = NULL,
asp = NA,
main = "",
sub = "",
xlab = NA,
ylab = NA,
line = NA,
outer = FALSE,
xlog = NA,
ylog = NA,
adj = NA,
ann = NA,
ask = NA,
bg = NA,
bty = NA,
cex = NA,
cex.axis = NA,
cex.lab = NA,
cex.main = NA,
cex.names = NULL,
cex.sub = NA,
cin = NA,
col.axis = NA,
col.lab = NA,
col.main = NA,
col.sub = NA,
cra = NA,
crt = NA,
csi = NA,
cxy = NA,
din = NA,
err = NA,
family = NA,
fg = NA,
fig = NA,
fin = NA,
font = NA,
font.axis = NA,
```

```
font.lab = NA,  
font.main = NA,  
font.sub = NA,  
lab = NA,  
las = NA,  
lend = NA,  
lheight = NA,  
ljoin = NA,  
lmitre = NA,  
mai = NA,  
mar = NA,  
mex = NA,  
mfcol = NA,  
mfg = NA,  
mfrow = NA,  
mgp = NA,  
mkh = NA,  
new = NA,  
oma = NA,  
omd = NA,  
omi = NA,  
page = NA,  
pch = NA,  
pin = NA,  
plt = NA,  
ps = NA,  
pty = NA,  
smo = NA,  
srt = NA,  
tck = NA,  
tcl = NA,  
usr = NA,  
xaxp = NA,  
xaxs = NA,  
xaxt = NA,  
xpd = NA,  
yaxp = NA,  
yaxs = NA,  
yaxt = NA,  
ylbias = NA,  
log = "",  
logLab = c(1, 2, 5),  
na.action = NULL,  
na.rm = T,  
side = "both",  
plotCentre = "point"  
)
```

**Arguments**

x	for specifying data from which the boxplots are to be produced. Either a numeric vector, or a single list containing such vectors. Additional unnamed arguments specify further data as separate vectors (each corresponding to a component boxplot). NAs are allowed in the data.
...	additional data vectors or formula parameters. For the formula method, named arguments to be passed to the default method.
formula	a formula, such as $y \sim \text{grp}$ , where $y$ is a numeric vector of data values to be split into groups according to the grouping variable $\text{grp}$ (usually a factor).
data	a data.frame (or list) from which the variables in formula should be taken.
subset	an optional vector specifying a subset of observations to be used for plotting.
na.action	a function which indicates what should happen when the data contain NAs. The default is to ignore missing values in either the response or the group.
add	logical. if FALSE (default) a new plot is created
horizontal	logical. horizontal or vertical violins
names	one label, or a vector of labels for the data must match the number of data given
drop, sep, lex.order	defines groups to plot from formula, passed to <code>split.default</code> , see there.
range	a factor to calculate the upper/lower adjacent values
h	the height for the density estimator, if omit as explained in <code>sm.density</code> , $h$ will be set to an optimum
ylim	y limits
col	Graphical parameter for fill colour of the violin(s) polygon. NA for no fill colour. If <code>col</code> is a vector, it specifies the colour per violin, and colours are reused if necessary.
border	Graphical parameters for the colour of the violin border passed to lines. NA for no border. If <code>border</code> is a vector, it specifies the colour per violin, and colours are reused if necessary.
lty, lwd	Graphical parameters for the violin passed to lines and polygon
rectCol	Graphical parameters to control fill colour of the box. NA for no fill colour. If <code>col</code> is a vector, it specifies the colour per violin, and colours are reused if necessary.
lineCol	Graphical parameters to control colour of the box outline and whiskers. NA for no border. If <code>lineCol</code> is a vector, it specifies the colour per violin, and colours are reused if necessary.
pchMed	Graphical parameters to control shape of the median point. If <code>pchMed</code> is a vector, it specifies the shape per violin.
colMed, colMed2	Graphical parameters to control colour of the median point. If <code>colMed</code> is a vector, it specifies the colour per violin. <code>colMed</code> specifies the fill colour in all cases unless <code>pchMed</code> is 21:25 in which case <code>colMed</code> is the border colour and <code>colMed2</code> is the fill colour.

<code>at</code>	position of each violin. Default to 1:n
<code>wex</code>	relative expansion of the violin. If <code>wex</code> is a vector, it specifies the area/width size per violin and sizes are reused if necessary.
<code>drawRect</code>	logical. The box is drawn if TRUE.
<code>areaEqual</code>	logical. Density plots checked for equal area if TRUE. <code>wex</code> must be scalar, relative widths of violins depend on area.
<code>axes</code> , <code>frame.plot</code> , <code>panel.first</code> , <code>panel.last</code> , <code>asp</code> , <code>line</code> , <code>outer</code> , <code>adj</code> , <code>ann</code> , <code>ask</code> , <code>bg</code> , <code>bty</code> , <code>cin</code> , <code>col.axis</code> , <code>col.lab</code>	Arguments to be passed to methods, such as graphical parameters (see <a href="#">par</a> ).
<code>main</code> , <code>sub</code> , <code>xlab</code> , <code>ylab</code>	graphical parameters passed to plot.
<code>ylog</code>	A logical value (see <code>log</code> in <a href="#">plot.default</a> ). If TRUE, a logarithmic scale is in use (e.g., after <code>plot(*, log = "y")</code> ). For a new device, it defaults to FALSE, i.e., linear scale.
<code>cex</code>	A numerical value giving the amount by which plotting text should be magnified relative to the default.
<code>cex.axis</code>	The magnification to be used for y axis annotation relative to the current setting of <code>cex</code> .
<code>cex.lab</code>	The magnification to be used for x and y labels relative to the current setting of <code>cex</code> .
<code>cex.main</code>	The magnification to be used for main titles relative to the current setting of <code>cex</code> .
<code>cex.names</code>	The magnification to be used for x axis annotation relative to the current setting of <code>cex</code> . Takes the value of <code>cex.axis</code> if not given.
<code>cex.sub</code>	The magnification to be used for sub-titles relative to the current setting of <code>cex</code> .
<code>yaxt</code>	A character which specifies the y axis type. Specifying "n" suppresses plotting.
<code>log</code>	Logarithmic scale if <code>log = "y"</code> or TRUE. Invokes <code>ylog = TRUE</code> .
<code>logLab</code>	Increments for labelling y-axis on log-scale, defaults to numbers starting with 1, 2, 5, and 10.
<code>na.rm</code>	logical value indicating whether NA values should be stripped before the computation proceeds. Defaults to TRUE.
<code>side</code>	defaults to "both". Assigning "left" or "right" enables one sided plotting of violins. May be applied as a scalar across all groups.
<code>plotCentre</code>	defaults to "points", plotting a central point at the median. If "line" is given a median line is plotted (subject to <code>side</code> ) alternatively.

## Examples

```
# box- vs violin-plot
par(mfrow=c(2,1))
mu<-2
si<-0.6
bimodal<-c(rnorm(1000,-mu,si),rnorm(1000,mu,si))
uniform<-runif(2000,-4,4)
normal<-rnorm(2000,0,3)
```

```

vioplot(bimodal,uniform,normal)
boxplot(bimodal,uniform,normal)

# add to an existing plot
x <- rnorm(100)
y <- rnorm(100)
plot(x, y, xlim=c(-5,5), ylim=c(-5,5))
vioplot(x, col="tomato", horizontal=TRUE, at=-4, add=TRUE,lty=2, rectCol="gray")
vioplot(y, col="cyan", horizontal=FALSE, at=-4, add=TRUE,lty=2)

# formula input
data("iris")
vioplot(Sepal.Length~Species, data = iris, main = "Sepal Length",
        col=c("lightgreen", "lightblue", "palevioletred"))
legend("topleft", legend=c("setosa", "versicolor", "virginica"),
      fill=c("lightgreen", "lightblue", "palevioletred"), cex = 0.5)

data("diamonds", package = "ggplot2")
palette <- RColorBrewer::brewer.pal(9, "Pastel1")
par(mfrow=c(3, 1))
vioplot(price ~ cut, data = diamonds, las = 1, col = palette)
vioplot(price ~ clarity, data = diamonds, las = 2, col = palette)
vioplot(price ~ color, data = diamonds, las = 2, col = palette)
par(mfrow=c(3, 1))

#generate example data
data_one <- rnorm(100)
data_two <- rnorm(50, 1, 2)

#generate violin plot with similar functionality to vioplot
vioplot(data_one, data_two, col="magenta")

#note vioplot defaults to a greyscale plot
vioplot(data_one, data_two)

#colours can be customised separately, with axis labels, legends, and titles
vioplot(data_one, data_two, col=c("red","blue"), names=c("data one", "data two"),
        main="data violin", xlab="data class", ylab="data read")
legend("topleft", fill=c("red","blue"), legend=c("data one", "data two"))

#colours can be customised for the violin fill and border separately
vioplot(data_one, data_two, col="grey85", border="purple", names=c("data one", "data two"),
        main="data violin", xlab="data class", ylab="data read")

#colours can also be customised for the boxplot rectangle and lines (border and whiskers)
vioplot(data_one, data_two, col="grey85", rectCol="lightblue", lineCol="blue",
        border="purple", names=c("data one", "data two"),
        main="data violin", xlab="data class", ylab="data read")

#these colours can also be customised separately for each violin
vioplot(data_one, data_two, col=c("skyblue", "plum"), rectCol=c("lightblue", "palevioletred"),
        lineCol="blue", border=c("royalblue", "purple"), names=c("data one", "data two"),
        main="data violin", xlab="data class", ylab="data read")

```

```

#this applies to any number of violins, given that colours are provided for each
vioplot(data_one, data_two, rnorm(200, 3, 0.5), rpois(200, 2.5), rbinom(100, 10, 0.4),
  col=c("red", "orange", "green", "blue", "violet"),
  rectCol=c("palevioletred", "peachpuff", "lightgreen", "lightblue", "plum"),
  lineCol=c("red4", "orangered", "forestgreen", "royalblue", "mediumorchid"),
  border=c("red4", "orangered", "forestgreen", "royalblue", "mediumorchid"),
  names=c("data one", "data two", "data three", "data four", "data five"),
  main="data violin", xlab="data class", ylab="data read")

#The areaEqual parameter scales with width of violins
#Violins will have equal density area (including missing tails) rather than equal maximum width
vioplot(data_one, data_two, areaEqual=TRUE)

vioplot(data_one, data_two, areaEqual=TRUE,
  col=c("skyblue", "plum"), rectCol=c("lightblue", "palevioletred"),
  lineCol="blue", border=c("royalblue", "purple"), names=c("data one", "data two"),
  main="data violin", xlab="data class", ylab="data read")

vioplot(data_one, data_two, rnorm(200, 3, 0.5), rpois(200, 2.5), rbinom(100, 10, 0.4),
  areaEqual=TRUE, col=c("red", "orange", "green", "blue", "violet"),
  rectCol=c("palevioletred", "peachpuff", "lightgreen", "lightblue", "plum"),
  lineCol=c("red4", "orangered", "forestgreen", "royalblue", "mediumorchid"),
  border=c("red4", "orangered", "forestgreen", "royalblue", "mediumorchid"),
  names=c("data one", "data two", "data three", "data four", "data five"),
  main="data violin", xlab="data class", ylab="data read")

```



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