

# Package ‘Glimma’

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**Type** Package

**Title** Interactive HTML graphics

**Version** 1.12.0

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**Description** This package generates interactive visualisations for analysis of RNA-sequencing data using output from limma, edgeR or DESeq2 packages in an HTML page. The interactions are built on top of the popular static representations of analysis results in order to provide additional information.

**biocViews** ImmunoOncology, DifferentialExpression, GeneExpression, Microarray, ReportWriting, RNASeq, Sequencing, Visualization

**Depends** R (>= 3.4.0)

**Imports** edgeR, grDevices, jsonlite, methods, stats, S4Vectors, utils

**Suggests** BiocStyle, IRanges, GenomicRanges, SummarizedExperiment, DESeq2, limma, testthat, knitr, rmarkdown, pryr

**License** GPL-3 | file LICENSE

**URL** <https://github.com/Shians/Glimma>

**BugReports** <https://github.com/Shians/Glimma/issues>

**RoxygenNote** 6.0.1

**NeedsCompilation** no

**LazyData** true

**VignetteBuilder** knitr

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arraydata

*Example microarray for the study of Ezh2.***Description**

Example microarray for the study of Ezh2.

**Author(s)**

Bhupinder Pal, Toula Bouras, Wei Shi, Francois Vaillant, Julie M. Sheridan, Naiyang Fu, Kelsey Breslin, Kun Jiang, Matthew E. Ritchie, Matthew Young, Geoffrey J. Lindeman, Gordon K. Smyth, Jane E. Visvader

**References**

[http://www.cell.com/cell-reports/abstract/S2211-1247\(13\)00007-7](http://www.cell.com/cell-reports/abstract/S2211-1247(13)00007-7)

---

`as.hexcol`*Numeric to hex colour converter*

---

**Description**

Convert numbers and R colour strings into corresponding hex codes for colours

**Usage**

```
as.hexcol(x)
```

**Arguments**

`x` the colour value(s) to be converted to hex values.

**Value**

hex codes for colours

**Examples**

```
as.hexcol(c(1, 2, 3))  
as.hexcol(c("red", "black", "green"))
```

---

`glBar`*Glimma MD Plot*

---

**Description**

Create an interactive bar plot object.

**Usage**

```
glBar(x, ...)
```

**Arguments**

`x` the data.frame containing data to plot.  
`...` additional arguments depending on input object type.

**Value**

A chart object containing the information to create an interactive bar plot.

**Author(s)**

Shian Su

**See Also**[glBar.default](#)**Examples**

```

data(mtcars)
counts <- table(mtcars$gear)
data <- data.frame(nGears=as.numeric(names(counts)), Count=as.numeric(counts))

plot1 <- glBar(data, "Count", "nGears", ylab="Number of Gears")
glimma(plot1, layout=c(1,1), launch=TRUE)

```

---

`glBar.default`*Glimma MD Plot*

---

**Description**

Default method for interactive bar plot.

**Usage**

```

## Default S3 method:
glBar(x, yval, names.arg = rownames(x), ndigits = NULL,
      signif = 6, xlab = NULL, ylab = yval, main = NULL, height = 400,
      width = 500, colval = NULL, annot = yval, flag = NULL, info = NULL,
      ...)

```

**Arguments**

<code>x</code>	the data.frame containing data to plot.
<code>yval</code>	the column name for the x-axis values.
<code>names.arg</code>	the column name for the label on each bar.
<code>ndigits</code>	the number of digits after the decimal to round to in the tooltip (overrides <code>signif</code> ).
<code>signif</code>	the number of significant figures to display in the tooltip.
<code>xlab</code>	the label on the x-axis.
<code>ylab</code>	the label on the y-axis.
<code>main</code>	the title for the plot.
<code>height</code>	the height of the plot (in pixels).
<code>width</code>	the width of the plot (in pixels).
<code>colval</code>	the colours for each data point.
<code>annot</code>	the columns to display in the tooltip.
<code>flag</code>	the special flag to indicate special plot.
<code>info</code>	additional information for plotting.
<code>...</code>	additional arguments.

**Value**

A chart object containing the information to create an interactive bar plot.

**Author(s)**

Shian Su

**Examples**

```
data(mtcars)
counts <- table(mtcars$gear)
data <- data.frame(nGears=as.numeric(names(counts)), Count=as.numeric(counts))

plot1 <- glBar(data, "Count", "nGears", ylab="Number of Gears")
glimma(plot1, layout=c(1,1), launch=TRUE)
```

---

glimma

*Glimma plot manager*


---

**Description**

Core glimma plot manager. Generates environment for glimma plots.

**Usage**

```
glimma(..., layout = c(1, 1), path = getwd(), folder = "glimma-plots",
  html = "index", overwrite = TRUE, launch = TRUE)
```

**Arguments**

...	the jschart or jslink objects for processing.
layout	the numeric vector representing the number of rows and columns in plot window.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
overwrite	the option to overwrite existing folder if it already exists.
launch	TRUE to launch plot after call.

**Value**

Generates interactive plots based on filling layout row by row from left to right.

**Examples**

```
data(iris)

plot1 <- glScatter(iris, xval="Sepal.Length", yval="Sepal.Width", colval="Species")
glimma(plot1, c(1,1))
```

---

gllink

*Plot linkages*


---

### Description

Helper function for writing the link properties in interactive Glimma plots

### Usage

```
gllink(from, to, src = "none", dest = "none", flag = "none",
       both = FALSE, info = "none")
```

### Arguments

from	the index of the plot from which the event is dispatched.
to	the index of the plot which receives the event and performs an action.
src	the action that is performed in the "from" plot.
dest	the action that is performed in the "to" plot.
flag	indicates special links for particular chart types.
both	creates symmetric links whereby the "dest" action in "to" also triggers the "src" action in "from".
info	additional info for creating the link.

### Value

a link object containing the plot linking information.

### Examples

```
data(iris)
data <- data.frame(Name=paste("Flower", 1:nrow(iris), sep="-"), iris)

plot1 <- glScatter(data, xval="Sepal.Length", yval="Sepal.Width", colval="Species")
plot2 <- glScatter(data, xval="Species", yval="Petal.Length", colval="Species")
link1 <- gllink(1, 2, src="hover", dest="hover", both=TRUE)
glimma(plot1, plot2, link1, layout=c(1,2))
```

---

glMDPlot

*Glimma MD Plot*


---

### Description

Draw an interactive MD plot

### Usage

```
glMDPlot(x, ...)
```

**Arguments**

`x` the DE object to plot.  
`...` additional arguments affecting the plots produced. See specific methods for detailed arguments.

**Value**

Draws a two-panel interactive MD plot in an html page. The left plot shows the log-fold-change vs average expression. The right plot shows the expression levels of a particular gene of each sample. Hovering over points on left plot will plot expression level for corresponding gene, clicking on points will fix the expression plot to gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot.

**Author(s)**

Shian Su

**See Also**

[glMDPlot.default](#), [glMDPlot.DGELRT](#), [glMDPlot.DGEEexact](#), [glMDPlot.MArrayLM](#), [glMDPlot.DESeqDataSet](#)

**Examples**

```
library(limma)
library(edgeR)

data(LymphomaRNAseq)
x <- LymphomaRNAseq

sel <- rowSums(cpm(x$counts)>0.5)>=3
x <- x[sel,]

genotype <- relevel(x$samples$group, "Smchd1-null")
x <- calcNormFactors(x, method="TMM")
des <- model.matrix(~genotype)

## Apply voom with sample quality weights and fit linear model
v <- voomWithQualityWeights(x, design=des, normalization="none", plot=FALSE)
vfit <- lmFit(v,des)

## Apply treat relative to a fold-change of 1.5
vtfits <- treat(vfit,lfc=log2(1.5))
vfit <- eBayes(vfits)
results <- decideTests(vfit,p.value=0.01)

glMDPlot(vfit, counts=x$counts, anno=x$genes, groups=genotype, samples=1:7,
          status=results[,2], main="MD plot: Wild-type vs Smchd1",
          display.columns=c("Symbols", "GeneID", "GeneName"),
          folder="Smchd1-Lymphoma")
```

---

glMDPlot.default      *Glimma MD Plot*

---

## Description

Draw an interactive MD plot from a data.frame

## Usage

```
## Default S3 method:
glMDPlot(x, xval, yval, counts = NULL, anno = NULL,
  groups = NULL, samples = NULL, status = rep(0, nrow(x)),
  transform = FALSE, main = "", xlab = xval, ylab = yval,
  side.main = "GeneID", side.xlab = "Group", side.ylab = "Expression",
  side.log = FALSE, side.gridstep = ifelse(!transform || side.log, FALSE,
  0.5), jitter = 30, display.columns = side.main, cols = c("#00bfff",
  "#858585", "#ff3030"), sample.cols = rep("#1f77b4", ncol(counts)),
  path = getwd(), folder = "glimma-plots", html = "MD-Plot",
  launch = TRUE, ...)
```

## Arguments

x	the data.frame object containing expression and fold change values.
xval	the column to plot on x axis of left plot.
yval	the column to plot on y axis of left plot.
counts	the matrix of expression values, with samples in columns.
anno	the data.frame containing gene annotations.
groups	the factor containing experimental groups of the samples.
samples	the names of the samples.
status	vector giving the control status of data point, of same length as the number of rows of object. If NULL, then all points are plotted in the default colour.
transform	TRUE if counts should be log-cpm transformed.
main	the title for the left plot.
xlab	the label on the x axis for the left plot.
ylab	the label on the y axis for the left plot.
side.main	the column containing mains for right plot.
side.xlab	label for x axis on right plot.
side.ylab	label for y axis on right plot.
side.log	TRUE to plot expression on the right plot on log scale.
side.gridstep	intervals along which to place grid lines on y axis. Currently only available for linear scale.
jitter	the amount of jitter to apply to the samples in the expressions plot.
display.columns	character vector containing names of columns to display in mouseover tooltips and table.



cols	vector of strings denoting colours corresponding to control status -1, 0 and 1. (may be R named colours or Hex values)
sample.cols	vector of strings denoting colours for each sample point on the expression plot.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
launch	TRUE to launch plot after call.
...	additional arguments to be passed onto the MD plot. (main, xlab, ylab can be set for the left plot)

**Value**

Draws a two-panel interactive MD plot in an html page. The left plot shows the log-fold-change vs average expression. The right plot shows the expression levels of a particular gene of each sample. Hovering over points on left plot will plot expression level for corresponding gene, clicking on points will fix the expression plot to gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot.

**Author(s)**

Shian Su

---

glMDPlot.DESeqDataSet *Glimma MD Plot*

---

**Description**

Draw an interactive MD plot from a DESeqDataSet object

**Usage**

```
## S3 method for class 'DESeqDataSet'
glMDPlot(x, counts = NULL, anno, groups,
  samples = NULL, status = rep(0, nrow(x)), transform = FALSE,
  main = "", xlab = "Mean Expression", ylab = "log-fold-change",
  side.xlab = "Group", side.ylab = "logMean", side.log = FALSE,
  side.gridstep = ifelse(!transform || side.log, FALSE, 0.5), jitter = 30,
  side.main = "GeneID", display.columns = NULL, cols = c("#00bfff",
  "#858585", "#ff3030"), sample.cols = rep("#1f77b4", ncol(x)),
  path = getwd(), folder = "glimma-plots", html = "MD-Plot",
  launch = TRUE, ...)
```

**Arguments**

x	the DESeqDataSet object.
counts	the matrix of expression values, with samples in columns.
anno	the data.frame containing gene annotations.
groups	the factor containing experimental groups of the samples.
samples	the names of the samples.

<code>status</code>	vector giving the control status of data point, of same length as the number of rows of object. If NULL, then all points are plotted in the default colour.
<code>transform</code>	TRUE if counts should be log-cpm transformed.
<code>main</code>	the title for the left plot.
<code>xlab</code>	label for x axis on left plot.
<code>ylab</code>	label for y axis on left plot.
<code>side.xlab</code>	label for x axis on right plot.
<code>side.ylab</code>	label for y axis on right plot.
<code>side.log</code>	TRUE to plot expression on the right plot on log scale.
<code>side.gridstep</code>	intervals along which to place grid lines on y axis. Currently only available for linear scale.
<code>jitter</code>	the amount of jitter to apply to the samples in the expressions plot.
<code>side.main</code>	the column containing mains for right plot.
<code>display.columns</code>	character vector containing names of columns to display in mouseover tooltips and table.
<code>cols</code>	vector of strings denoting colours corresponding to control status -1, 0 and 1. (may be R named colours or Hex values)
<code>sample.cols</code>	vector of strings denoting colours for each sample point on the expression plot.
<code>path</code>	the path in which the folder will be created.
<code>folder</code>	the name of the fold to save html file to.
<code>html</code>	the name of the html file to save plots to.
<code>launch</code>	TRUE to launch plot after call.
<code>...</code>	additional arguments to be passed onto the MD plot. ( <code>main</code> , <code>xlab</code> , <code>ylab</code> can be set for the left plot)

**Value**

Draws a two-panel interactive MD plot in an html page. The left plot shows the log-fold-change vs average expression. The right plot shows the expression levels of a particular gene of each sample. Hovering over points on left plot will plot expression level for corresponding gene, clicking on points will fix the expression plot to gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot.

**Author(s)**

Shian Su

---

glMDPlot.DESeqResults *Glimma MD Plot*


---

## Description

Draw an interactive MD plot from a DESeqResults object

## Usage

```
## S3 method for class 'DESeqResults'
glMDPlot(x, counts = NULL, anno, groups,
  samples = NULL, status = rep(0, nrow(x)), transform = FALSE,
  main = "", xlab = "Mean Expression", ylab = "log-fold-change",
  side.xlab = "Group", side.ylab = "Expression", side.log = FALSE,
  side.gridstep = ifelse(!transform || side.log, FALSE, 0.5), jitter = 30,
  side.main = "GeneID", display.columns = NULL, cols = c("#00bfff",
  "#858585", "#ff3030"), sample.cols = rep("#1f77b4", ncol(counts)),
  path = getwd(), folder = "glimma-plots", html = "MD-Plot",
  launch = TRUE, ...)
```

## Arguments

x	the DESeqResults object.
counts	the matrix of expression values, with samples in columns.
anno	the data.frame containing gene annotations.
groups	the factor containing experimental groups of the samples.
samples	the names of the samples.
status	vector giving the control status of data point, of same length as the number of rows of object. If NULL, then all points are plotted in the default colour.
transform	TRUE if counts should be log-cpm transformed.
main	the title for the left plot.
xlab	label for x axis on left plot.
ylab	label for y axis on left plot.
side.xlab	label for x axis on right plot.
side.ylab	label for y axis on right plot.
side.log	TRUE to plot expression on the right plot on log scale.
side.gridstep	intervals along which to place grid lines on y axis. Currently only available for linear scale.
jitter	the amount of jitter to apply to the samples in the expressions plot.
side.main	the column containing mains for right plot.
display.columns	character vector containing names of columns to display in mouseover tooltips and table.
cols	vector of strings denoting colours corresponding to control status -1, 0 and 1. (may be R named colours or Hex values)

sample.cols	vector of strings denoting colours for each sample point on the expression plot.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
launch	TRUE to launch plot after call.
...	additional arguments to be passed onto the MD plot. (main, xlab, ylab can be set for the left plot)

**Value**

Draws a two-panel interactive MD plot in an html page. The left plot shows the log-fold-change vs average expression. The right plot shows the expression levels of a particular gene of each sample. Hovering over points on left plot will plot expression level for corresponding gene, clicking on points will fix the expression plot to gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot.

**Author(s)**

Shian Su

---

glMDPlot.DGEEexact	<i>Glimma MD Plot</i>
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---

**Description**

Draw an interactive MD plot from a DGELRT object

**Usage**

```
## S3 method for class 'DGEEexact'
glMDPlot(x, counts = NULL, anno = NULL, groups = NULL,
  samples = NULL, status = rep(0, nrow(x)), transform = FALSE,
  main = "", xlab = "Average log CPM", ylab = "log-fold-change",
  side.xlab = "Group", side.ylab = "Expression", side.log = FALSE,
  side.gridstep = ifelse(!transform || side.log, FALSE, 0.5),
  p.adj.method = "BH", jitter = 30, side.main = "GeneID",
  display.columns = NULL, cols = c("#00bfff", "#858585", "#ff3030"),
  sample.cols = rep("#1f77b4", ncol(counts)), path = getwd(),
  folder = "glimma-plots", html = "MD-Plot", launch = TRUE, ...)
```

**Arguments**

x	the DGEEexact object.
counts	the matrix of expression values, with samples in columns.
anno	the data.frame containing gene annotations.
groups	the factor containing experimental groups of the samples.
samples	the names of the samples.
status	vector giving the control status of data point, of same length as the number of rows of object. If NULL, then all points are plotted in the default colour.

transform	TRUE if counts should be log-cpm transformed.
main	the title for the left plot.
xlab	label for x axis on left plot.
ylab	label for y axis on left plot.
side.xlab	label for x axis on right plot.
side.ylab	label for y axis on right plot.
side.log	TRUE to plot expression on the right plot on log scale.
side.gridstep	intervals along which to place grid lines on y axis. Currently only available for linear scale.
p.adj.method	character vector indicating multiple testing correction method. See <a href="#">p.adjust</a> for available methods. (defaults to "BH")
jitter	the amount of jitter to apply to the samples in the expressions plot.
side.main	the column containing mains for right plot.
display.columns	character vector containing names of columns to display in mouseover tooltips and table.
cols	vector of strings denoting colours corresponding to control status -1, 0 and 1. (may be R named colours or Hex values)
sample.cols	vector of strings denoting colours for each sample point on the expression plot.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
launch	TRUE to launch plot after call.
...	additional arguments to be passed onto the MD plot. (main, xlab, ylab can be set for the left plot)

**Value**

Draws a two-panel interactive MD plot in an html page. The left plot shows the log-fold-change vs average expression. The right plot shows the expression levels of a particular gene of each sample. Hovering over points on left plot will plot expression level for corresponding gene, clicking on points will fix the expression plot to gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot.

**Author(s)**

Shian Su

glMDPlot.DGELRT

*Glimma MD Plot***Description**

Draw an interactive MD plot from a DGELRT object

**Usage**

```
## S3 method for class 'DGELRT'
glMDPlot(x, counts = NULL, anno = NULL, groups = NULL,
  samples = NULL, status = rep(0, nrow(x)), transform = FALSE,
  main = "", xlab = "Average log CPM", ylab = "log-fold-change",
  side.xlab = "Group", side.ylab = "Expression", side.log = FALSE,
  side.gridstep = ifelse(!transform || side.log, FALSE, 0.5),
  p.adj.method = "BH", jitter = 30, side.main = "GeneID",
  display.columns = NULL, cols = c("#00bfff", "#858585", "#ff3030"),
  sample.cols = rep("#1f77b4", ncol(counts)), path = getwd(),
  folder = "glimma-plots", html = "MD-Plot", launch = TRUE, ...)
```

**Arguments**

x	the DGELRT object.
counts	the matrix of expression values, with samples in columns.
anno	the data.frame containing gene annotations.
groups	the factor containing experimental groups of the samples.
samples	the names of the samples.
status	vector giving the control status of data point, of same length as the number of rows of object. If NULL, then all points are plotted in the default colour.
transform	TRUE if counts should be log-cpm transformed.
main	the title for the left plot.
xlab	label for x axis on left plot.
ylab	label for y axis on left plot.
side.xlab	label for x axis on right plot.
side.ylab	label for y axis on right plot.
side.log	TRUE to plot expression on the right plot on log scale.
side.gridstep	intervals along which to place grid lines on y axis. Currently only available for linear scale.
p.adj.method	character vector indicating multiple testing correction method. See <a href="#">p.adjust</a> for available methods. (defaults to "BH")
jitter	the amount of jitter to apply to the samples in the expressions plot.
side.main	the column containing mains for right plot.
display.columns	character vector containing names of columns to display in mouseover tooltips and table.

cols	vector of strings denoting colours corresponding to control status -1, 0 and 1. (may be R named colours or Hex values)
sample.cols	vector of strings denoting colours for each sample point on the expression plot.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
launch	TRUE to launch plot after call.
...	additional arguments to be passed onto the MD plot. (main, xlab, ylab can be set for the left plot)

**Value**

Draws a two-panel interactive MD plot in an html page. The left plot shows the log-fold-change vs average expression. The right plot shows the expression levels of a particular gene of each sample. Hovering over points on left plot will plot expression level for corresponding gene, clicking on points will fix the expression plot to gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot.

**Author(s)**

Shian Su

---

glMDPlot.MArrayLM      *Glimma MD Plot*

---

**Description**

Draw an interactive MD plot from a MArrayLM object

**Usage**

```
## S3 method for class 'MArrayLM'
glMDPlot(x, counts = NULL, anno = NULL, groups = NULL,
  samples = NULL, status = rep(0, nrow(x)), transform = FALSE,
  main = "", xlab = "Average log CPM", ylab = "log-fold-change",
  side.main = "GeneID", side.xlab = "Group", side.ylab = "Expression",
  side.log = FALSE, side.gridstep = ifelse(!transform || side.log, FALSE,
  0.5), coef = ncol(x$coefficients), p.adj.method = "BH", jitter = 30,
  display.columns = NULL, cols = c("#00bfff", "#858585", "#ff3030"),
  sample.cols = rep("#1f77b4", ncol(counts)), path = getwd(),
  folder = "glimma-plots", html = "MD-Plot", launch = TRUE, ...)
```

**Arguments**

x	the MArrayLM object.
counts	the matrix of expression values, with samples in columns.
anno	the data.frame containing gene annotations.
groups	the factor containing experimental groups of the samples.
samples	the names of the samples.

<code>status</code>	vector giving the control status of data point, of same length as the number of rows of object. If NULL, then all points are plotted in the default colour.
<code>transform</code>	TRUE if counts should be log-cpm transformed.
<code>main</code>	the title for the left plot.
<code>xlab</code>	label for x axis on left plot.
<code>ylab</code>	label for y axis on left plot.
<code>side.main</code>	the column containing mains for right plot.
<code>side.xlab</code>	label for x axis on right plot.
<code>side.ylab</code>	label for y axis on right plot.
<code>side.log</code>	TRUE to plot expression on the right plot on log scale.
<code>side.gridstep</code>	intervals along which to place grid lines on y axis. Currently only available for linear scale.
<code>coef</code>	integer or character index vector indicating which column of object to plot.
<code>p.adj.method</code>	character vector indicating multiple testing correction method. See <a href="#">p.adjust</a> for available methods. (defaults to "BH")
<code>jitter</code>	the amount of jitter to apply to the samples in the expressions plot.
<code>display.columns</code>	character vector containing names of columns to display in mouseover tooltips and table.
<code>cols</code>	vector of strings denoting colours corresponding to control status -1, 0 and 1. (may be R named colours or Hex values)
<code>sample.cols</code>	vector of strings denoting colours for each sample point on the expression plot.
<code>path</code>	the path in which the folder will be created.
<code>folder</code>	the name of the fold to save html file to.
<code>html</code>	the name of the html file to save plots to.
<code>launch</code>	TRUE to launch plot after call.
<code>...</code>	additional arguments to be passed onto the MD plot. (main, xlab, ylab can be set for the left plot)

**Value**

Draws a two-panel interactive MD plot in an html page. The left plot shows the log-fold-change vs average expression. The right plot shows the expression levels of a particular gene of each sample. Hovering over points on left plot will plot expression level for corresponding gene, clicking on points will fix the expression plot to gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot.

**Author(s)**

Shian Su

**Examples**

```
library(limma)
library(edgeR)
```



```
data(lymphomaRNAseq)
x <- lymphomaRNAseq

sel <- rowSums(cpm(x$counts)>0.5)>=3
x <- x[sel,]

genotype <- relevel(x$samples$group, "Smchd1-null")
x <- calcNormFactors(x, method="TMM")
des <- model.matrix(~genotype)

## Apply voom with sample quality weights and fit linear model
v <- voomWithQualityWeights(x, design=des, normalization="none", plot=FALSE)
vfit <- lmFit(v,des)

## Apply treat relative to a fold-change of 1.5
vtfits <- treat(vfit,lfc=log2(1.5))
vfit <- eBayes(vfits)
results <- decideTests(vfit,p.value=0.01)

glMDPlot(vfit, counts=x$counts, anno=x$genes, groups=genotype, samples=1:7,
          status=results[,2], main="MD plot: Wild-type vs Smchd1",
          display.columns=c("Symbols", "GeneID", "GeneName"),
          folder="Smchd1-Lymphoma")
```

---

glMDRmd

*glMDPlot Rmarkdown link and instructions*

---

## Description

When run inside of a text-block of Rmarkdown document using ‘r ...’ this produces a link and instructions about the usage of the interactive plots.

## Usage

```
glMDRmd(html = "MD-Plot")
```

## Arguments

html                    name of the HTML page containing plots from glMDPlot.

## Value

None

## See Also

[glMDPlot](#)

## Examples

```
glMDRmd()
```

---

`glMDSPlot`*Glimma MDS Plot*

---

**Description**

Glimma MDS Plot

Draw an interactive MD plot from a DGEList object with distances calculated from most variable genes.

**Usage**

```
glMDSPlot(x, ...)
```

**Arguments**

<code>x</code>	the matrix containing the gene expressions.
<code>...</code>	additional arguments.

**Value**

Draws a two-panel interactive MDS plot in an html page. The left panel contains the plot between two MDS dimensions, with annotations displayed on hover. The right panel contains a bar plot of the eigenvalues of each dimension, clicking on any of the bars will plot the corresponding dimension against the next dimension.

**Author(s)**

Shian Su, Gordon Smyth

**See Also**

[glMDSPlot.default](#), [glMDSPlot.DGEList](#)

**Examples**

```
data(lymphomaRNAseq)
genotype <- relevel(lymphomaRNAseq$samples$group, "Smchd1-null")

glMDSPlot(lymphomaRNAseq, labels=1:7, groups=genotype)
```

---

glMDSPlot.default      *Glimma MDS Plot*

---

## Description

Glimma MDS Plot

Draw an interactive MD plot from a DGEList object with distances calculated from most variable genes.

## Usage

```
## Default S3 method:
glMDSPlot(x, top = 500, labels = seq_cols(x),
  groups = rep(1, ncol(x)), gene.selection = c("pairwise", "common"),
  main = "MDS Plot", path = getwd(), folder = "glimma-plots",
  html = "MDS-Plot", launch = TRUE, ...)
```

## Arguments

x	the matrix containing the gene expressions.
top	the number of top most variable genes to use.
labels	the labels for each sample.
groups	the experimental group to which samples belong.
gene.selection	"pairwise" if most variable genes are to be chosen for each pair of samples or "common" to select the same genes for all comparisons.
main	the title of the plot.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
launch	TRUE to launch plot after call.
...	additional arguments.

## Value

Draws a two-panel interactive MDS plot in an html page. The left panel contains the plot between two MDS dimensions, with annotations displayed on hover. The right panel contains a bar plot of the eigenvalues of each dimension, clicking on any of the bars will plot the corresponding dimension against the next dimension.

## Author(s)

Shian Su, Gordon Smyth

---

gIMDSPlot.DESeqDataSet

*Glimma MDS Plot*


---

## Description

Glimma MDS Plot

Draw an interactive MD plot from a DGEList object with distances calculated from most variable genes.

## Usage

```
## S3 method for class 'DESeqDataSet'
gIMDSPlot(x, top = 500, labels = NULL,
  groups = NULL, gene.selection = c("pairwise", "common"),
  prior.count = 0.25, main = "MDS Plot", path = getwd(),
  folder = "glimma-plots", html = "MDS-Plot", launch = TRUE, ...)
```

## Arguments

x	the DESeqDataSet containing the gene expressions.
top	the number of top most variable genes to use.
labels	the labels for each sample.
groups	the experimental group to which samples belong.
gene.selection	"pairwise" if most variable genes are to be chosen for each pair of samples or "common" to select the same genes for all comparisons.
prior.count	average count to be added to each observation to avoid taking log of zero. Used only if log=TRUE.
main	the title of the plot.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
launch	TRUE to launch plot after call.
...	additional arguments.

## Value

Draws a two-panel interactive MDS plot in an html page. The left panel contains the plot between two MDS dimensions, with annotations displayed on hover. The right panel contains a bar plot of the eigenvalues of each dimension, clicking on any of the bars will plot the corresponding dimension against the next dimension.

## Author(s)

Shian Su, Gordon Smyth

---

glMDSPlot.DGEList      *Glimma MDS Plot*

---

### Description

Glimma MDS Plot

Draw an interactive MD plot from a DGEList object with distances calculated from most variable genes.

### Usage

```
## S3 method for class 'DGEList'
glMDSPlot(x, top = 500, labels = NULL, groups = rep(1,
  ncol(x)), gene.selection = c("pairwise", "common"), prior.count = 0.25,
  main = "MDS Plot", path = getwd(), folder = "glimma-plots",
  html = "MDS-Plot", launch = TRUE, ...)
```

### Arguments

x	the DGEList containing the gene expressions.
top	the number of top most variable genes to use.
labels	the labels for each sample.
groups	the experimental group to which samples belong.
gene.selection	"pairwise" if most variable genes are to be chosen for each pair of samples or "common" to select the same genes for all comparisons.
prior.count	average count to be added to each observation to avoid taking log of zero. Used only if log=TRUE.
main	the title of the plot.
path	the path in which the folder will be created.
folder	the name of the fold to save html file to.
html	the name of the html file to save plots to.
launch	TRUE to launch plot after call.
...	additional arguments.

### Value

Draws a two-panel interactive MDS plot in an html page. The left panel contains the plot between two MDS dimensions, with annotations displayed on hover. The right panel contains a bar plot of the eigenvalues of each dimension, clicking on any of the bars will plot the corresponding dimension against the next dimension.

### Author(s)

Shian Su, Gordon Smyth

---

glScatter

*Glimma Scatter Plot*


---

**Description**

Create an interactive scatter plot object

**Usage**

```
glScatter(x, ...)
```

**Arguments**

x                    the data.frame containing data to plot.  
...                    additional arguments depending on input object type.

**Value**

A chart object containing the information to create an interactive scatter plot.

**Author(s)**

Shian Su

**Examples**

```
data(iris)

plot1 <- glScatter(iris, xval="Sepal.Length", yval="Sepal.Width", colval="Species")
glimma(plot1, c(1,1))
```

---

glScatter.default

*Glimma Scatter Plot*


---

**Description**

Default method for creating an interactive scatter plot

**Usage**

```
## Default S3 method:
glScatter(x, xval = "x", yval = "y", idval = NULL,
  point.size = 2, x.jitter = 0, y.jitter = 0, ndigits = NULL,
  signif = 6, log = "", xgrid = FALSE, ygrid = FALSE, xstep = FALSE,
  ystep = FALSE, xlab = xval, ylab = yval, main = NULL, height = 400,
  width = 500, colval = NULL, annot = c(xval, yval), annot.lab = NULL,
  flag = NULL, info = NULL, hide = FALSE, disable = NULL, ...)
```

**Arguments**

<code>x</code>	the data.frame containing data to plot.
<code>xval</code>	the column name for the x-axis values.
<code>yval</code>	the column name for the y-axis values.
<code>idval</code>	the column name for unique identifiers.
<code>point.size</code>	the size of the data points.
<code>x.jitter</code>	the amount of jittering to add to values along the x axis.
<code>y.jitter</code>	the amount of jittering to add to values along the y axis.
<code>ndigits</code>	the number of digits after the decimal to round to in the tooltip (overrides <code>signif</code> ).
<code>signif</code>	the number of significant figures to display in the tooltip.
<code>log</code>	a character string which contains "x" if the x axis is to be logarithmic, "y" if the y axis is to be logarithmic and "xy" or "yx" if both axes are to be logarithmic.
<code>xgrid</code>	TRUE if grid lines should be placed along x axis.
<code>ygrid</code>	TRUE if grid lines should be placed y axis.
<code>xstep</code>	the interval at which to set grid lines along the x axis.
<code>ystep</code>	the interval at which to set grid lines along the y axis.
<code>xlab</code>	the label on the x-axis.
<code>ylab</code>	the label on the y-axis.
<code>main</code>	the title for the plot.
<code>height</code>	the height of the plot (in pixels).
<code>width</code>	the width of the plot (in pixels).
<code>colval</code>	the colours for each data point.
<code>annot</code>	the columns to display in the tooltip.
<code>annot.lab</code>	alternative labels for the values displayed in the tooltip.
<code>flag</code>	the special flag to indicate special plot.
<code>info</code>	additional information for plotting.
<code>hide</code>	TRUE to hide the plot when page starts.
<code>disable</code>	the events to disable, options are "click", "hover", "zoom".
<code>...</code>	additional arguments.

**Value**

A chart object containing the information to create an interactive scatter plot.

**Author(s)**

Shian Su

**Examples**

```
data(iris)

plot1 <- glScatter(iris, xval="Sepal.Length", yval="Sepal.Width", colval="Species")
glimma(plot1, c(1,1))
```

g1Table

*Glimma Table*

---

**Description**

Create a table using the data from a chart.

**Usage**

```
g1Table(target, columns)
```

**Arguments**

target	the index of the plot from which data is drawn.
columns	the columns of data to plot.

**Value**

a input object containing the input field information.

---

gltablink

*Plot linkages*

---

**Description**

Helper function for writing the link properties in interactive Glimma plots

**Usage**

```
gltablink(from, to, action = "none", info = "none")
```

**Arguments**

from	the index of the source table.
to	the index of the plot which receives the event and performs an action.
action	the action that is performed in the plot.
info	additional info for creating the link.

**Value**

a link object containing the plot linking information.



glXYPlot

*Glimma XY Plot***Description**

Draw an interactive XY plot with multiple panels

**Usage**

```
glXYPlot(x, y, counts = NULL, groups = NULL, samples = NULL,
  status = rep(0, nrow(data)), anno = NULL, display.columns = NULL,
  xlab = "x", ylab = "y", side.main = "GeneID", side.xlab = "Group",
  side.ylab = "Expression", sample.cols = rep("#1f77b4", length(groups)),
  cols = c("#00bfff", "#858585", "#ff3030"), jitter = 30, path = getwd(),
  folder = "glimma-plots", html = "XY-Plot", launch = TRUE, ...)
```

**Arguments**

<code>x</code>	a numeric vector of values to plot on the x-axis of the summary plot.
<code>y</code>	a numeric vector of values to plot on the y-axis of the summary plot.
<code>counts</code>	the matrix containing all counts, the column order should correspond to the order of the x and y vectors.
<code>groups</code>	the factor containing experimental groups of the samples.
<code>samples</code>	the names of the samples.
<code>status</code>	vector giving the control status of data point, of same length as the number of rows of object. If NULL, then all points are plotted in the default colour
<code>anno</code>	the data.frame containing gene annotations.
<code>display.columns</code>	character vector containing names of columns to display in mouseover tooltips and table.
<code>xlab</code>	the label on the x axis for the left plot.
<code>ylab</code>	the label on the y axis for the left plot.
<code>side.main</code>	the column containing mains for right plot.
<code>side.xlab</code>	the label on the x axis for the right plot.
<code>side.ylab</code>	the label on the y axis for the right plot.
<code>sample.cols</code>	vector of strings denoting colours for each sample point on the expression plot.
<code>cols</code>	vector of strings denoting colours corresponding to control status -1, 0 and 1. (may be R named colours or Hex values)
<code>jitter</code>	the amount of jitter to apply to the samples in the expressions plot.
<code>path</code>	the path in which the folder will be created.
<code>folder</code>	the name of the fold to save html file to.
<code>html</code>	the name of the html file to save plots to.
<code>launch</code>	TRUE to launch plot after call.
<code>...</code>	additional arguments to be passed onto the MD plot. (main, etc. can be set for the left plot)

**Value**

Draws a two-panel interactive XY scatter plot in an html page. The left plot shows the x and y values specified. The right plot shows the expression levels of a particular gene in each sample. Hovering over points on left plot will plot expression level for the corresponding gene, clicking on points will fix the expression plot to that gene. Clicking on rows on the table has the same effect as clicking on the corresponding gene in the plot. This function generates a display that is similar in style to glMDPlot, except that it provides more flexibility in what the user can provide.

**Author(s)**

Charity Law and Shian Su

**Examples**

```
data(iris)

glXYPlot(iris$Sepal.Width, iris$Sepal.Length,
         xlab="Sepal.Width", ylab="Sepal.Length", side.main="PlantID")
```

---

is.hex

*Hexcode colours*

---

**Description**

Check if string(s) are valid hex colour representation

**Usage**

```
is.hex(x)
```

**Arguments**

x                    the colour value(s) to check.

**Value**

Logical vector indicating if strings(s) are valid hex representations

---

lymphomaRNAseq	<i>Mouse based RNAseq data for study of smchd1 gene.</i>
----------------	--

---

**Description**

Mouse based RNAseq data for study of smchd1 gene.

**Author(s)**

Ruijie Liu, Kelan Chen, Natasha Jansz, Marnie E. Blewitt, Matthew E. Ritchie

**References**

<http://www.sciencedirect.com/science/article/pii/S2213596015301306>

---

makeJson	<i>JSON converter for R objects</i>
----------	-------------------------------------

---

**Description**

Function to generate json strings from

**Usage**

```
makeJson(x, ...)
```

**Arguments**

x	the object to be converted into JSON
...	additional arguments

**Value**

a stringified JSON object.

---

makeJson.data.frame     *JSON converter for data frames*

---

### Description

Function to create a JSON from a data.frame

### Usage

```
## S3 method for class 'data.frame'  
makeJson(df, convert.logical = TRUE,  
  dataframe = c("rows", "columns"))
```

### Arguments

df                    the data.frame to be converted into JSON  
convert.logical        whether to convert logicals into strings "TRUE" and "FALSE"  
dataframe            how to encode data.frame objects: must be one of 'rows', 'columns'

### Value

a stringified JSON, the data.frame is encoded as a vector of objects, with each column being one object with keys corresponding to column names.

---

makeJson.jschart        *JSON converter for chart objects*

---

### Description

Function to make json object from a chart, ignoring the json property

### Usage

```
## S3 method for class 'jschart'  
makeJson(chart)
```

### Arguments

chart                the chart object to be converted into JSON

### Value

a stringified JSON object containing the chart data.

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