

Package ‘gg4way’

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Title 4way Plots of Differential Expression

Version 1.4.0

Description 4way plots enable a comparison of the logFC values from two contrasts of differential gene expression. The gg4way package creates 4way plots using the ggplot2 framework and supports popular Bioconductor objects. The package also provides information about the correlation between contrasts and significant genes of interest.

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URL <https://github.com/ben-laufer/gg4way>

BugReports <https://github.com/ben-laufer/gg4way/issues>

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| | |
|----------------|---------------------------------|
| .checkFeatures | <i>Missing features warning</i> |
|----------------|---------------------------------|

Description

Warn about features not shared between x and y

Usage

```
.checkFeatures(DGEdata = DGEdata, x = x, y = y, ID = ID)
```

Arguments

| | |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DGEdata | The object to plot from: <ul style="list-style-type: none"> • <code>limma</code>: A <code>MArrayLM</code> object from <code>eBayes</code> or <code>treat</code> • <code>edgeR</code>: A list of <code>DGELRT</code> objects from <code>glmQLFTest</code>, <code>glmTreat</code>, or <code>glmLRT</code> • <code>DESeq2</code>: a <code>DESeqDataSet</code> from <code>DESeq</code> or a list of <code>DESeqResults</code> from <code>results</code> • Other packages: A list of data.frames, see details section for more information |
| x | Character specifying the name of DGE results within the object for the x-axis |
| y | Character specifying the name of DGE results within the object for the y-axis |
| ID | Column name for gene IDs |

Value

A character

.checkNames *Missing names check*

Description

Check for missing names in the DGEdata object

Usage

```
.checkNames(  
  DGEdata = DGEdata,  
  x = x,  
  y = y,  
  ID = ID,  
  symbol = symbol,  
  logFC = logFC,  
  FDR = FDR  
)
```

Arguments

| | |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DGEdata | The object to plot from: <ul style="list-style-type: none">• <code>limma</code>: A <code>MArrayLM</code> object from <code>eBayes</code> or <code>treat</code>• <code>edgeR</code>: A list of <code>DGELRT</code> objects from <code>glmQLFTest</code>, <code>glmTreat</code>, or <code>glmLRT</code>• <code>DESeq2</code>: a <code>DESeqDataSet</code> from <code>DESeq</code> or a list of <code>DESeqResults</code> from <code>results</code>• <code>Other packages</code>: A list of <code>data.frames</code>, see details section for more information |
| x | Character specifying the name of DGE results within the object for the x-axis |
| y | Character specifying the name of DGE results within the object for the y-axis |
| ID | Column name for gene IDs |
| symbol | Column name for gene symbols, which can be the same as the value for the ID column if not present in the object |
| logFC | Column name for logFC values |
| FDR | Column name for FDR values |

Value

A character

`.plot4way``gg4way plot`

Description

Creates a 4way plot

Usage

```
.plot4way(  
  DGEtibble = DGEtibble,  
  x = x,  
  y = y,  
  sep = sep,  
  logFCcutoff = logFCcutoff,  
  lineColor = lineColor,  
  colorKey = colorKey,  
  corRes = corRes,  
  textKey = textKey,  
  hjust = hjust,  
  vjust = vjust,  
  textSize = textSize,  
  label = label  
)
```

Arguments

| | |
|--------------------------|---------------------------------------------------------------------------------------------------------------|
| <code>x</code> | Character specifying the name of DGE results within the object for the x-axis |
| <code>y</code> | Character specifying the name of DGE results within the object for the y-axis |
| <code>sep</code> | Character specifying the separator between conditions for the contrast name provided to the x and y arguments |
| <code>logFCcutoff</code> | Numeric for the absolute logFC cut-off for DEGs (default is 1) |
| <code>lineColor</code> | Color of lines |
| <code>textSize</code> | Numeric specifying size of text with gene overlap category totals, where 0 will remove the text |
| <code>label</code> | Character vector specifying the symbols of genes to label (FALSE for none, TRUE for all blue) |

Value

A [ggplot](#)

.prepareAnnotations *Prepare annotations*

Description

Prepare text annotations of sums for plotting

Usage

```
.prepareAnnotations(  
  totalTibble = totalTibble,  
  colorKey = colorKey,  
  textNudge = textNudge  
)
```

Arguments

totalTibble A [tibble](#) of summarized counts
textNudge Numeric specifying nudge of text with gene overlap category totals

Value

A [tibble](#)

.prepareData *Prepare data*

Description

Prepare data for a 4way plot

Usage

```
.prepareData(  
  DGEdata = DGEdata,  
  x = x,  
  y = y,  
  ID = ID,  
  symbol = symbol,  
  logFC = logFC,  
  FDR = FDR,  
  logFCcutoff = logFCcutoff,  
  FDRcutoff = FDRcutoff  
)
```

Arguments

| | |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DGEdata | The object to plot from: <ul style="list-style-type: none"> • <code>limma</code>: A <code>MArrayLM</code> object from <code>eBayes</code> or <code>treat</code> • <code>edgeR</code>: A list of <code>DGELRT</code> objects from <code>glmQLFTest</code>, <code>glmTreat</code>, or <code>glmLRT</code> • <code>DESeq2</code>: a <code>DESeqDataSet</code> from <code>DESeq</code> or a list of <code>DESeqResults</code> from <code>results</code> • Other packages: A list of <code>data.frames</code>, see details section for more information |
| x | Character specifying the name of DGE results within the object for the x-axis |
| y | Character specifying the name of DGE results within the object for the y-axis |
| ID | Column name for gene IDs |
| symbol | Column name for gene symbols, which can be the same as the value for the ID column if not present in the object |
| logFC | Column name for logFC values |
| FDR | Column name for FDR values |
| logFCcutoff | Numeric for the absolute logFC cut-off for DEGs (default is 1) |
| FDRcutoff | Numeric for the FDR cut-off for DEGs (default is 0.05) |

Value

A [tibble](#)

| | |
|----------|-------------------------|
| .testCor | <i>Correlation test</i> |
|----------|-------------------------|

Description

Test the correlation between DGE contrasts

Usage

```
.testCor(DGEtibble = DGEtibble)
```

Arguments

DGEtibble A [tibble](#) of DGE results

Value

A numeric of the Pearson correlation

| | |
|-------------------------|-------------------------|
| <code>.tidyLabel</code> | <i>Tidy axis labels</i> |
|-------------------------|-------------------------|

Description

Process axis labels from contrast names

Usage

```
.tidyLabel(label = NULL, sep = " vs ", labelType = c("x", "y"))
```

Arguments

| | |
|--------------------|---------------------------------------------------------------------------------------------------------------|
| <code>label</code> | Character vector specifying the symbols of genes to label (FALSE for none, TRUE for all blue) |
| <code>sep</code> | Character specifying the separator between conditions for the contrast name provided to the x and y arguments |

Value

A [call](#)

| | |
|---------------------------|-------------------------|
| <code>.totalCounts</code> | <i>Summarize counts</i> |
|---------------------------|-------------------------|

Description

Create a summary table counts for DGE contrast overlaps for shared (quadrants) and non-shared (lines) DEGs

Usage

```
.totalCounts(DGETibble = DGETibble, x = x, y = y, logFCcutoff = logFCcutoff)
```

Arguments

| | |
|--------------------------|-------------------------------------------------------------------------------|
| <code>DGETibble</code> | A tibble of DGE results |
| <code>x</code> | Character specifying the name of DGE results within the object for the x-axis |
| <code>y</code> | Character specifying the name of DGE results within the object for the y-axis |
| <code>logFCcutoff</code> | Numeric for the absolute logFC cut-off for DEGs (default is 1) |

Value

A [tibble](#)

`airwayFit`*airwayFit data*

Description

Generate example data from the [airway](#) data package using [eBayes](#)

Usage

```
data(airwayFit)
```

Format

An object of class `MArrayLM` with 14516 rows and 2 columns.

Value

A `MArrayLM`

Source

[airway](#)

`extractors`*Helper Functions for gg4way*

Description

These helper functions provide data used in the plot:

| | |
|------------------------|----------------------------------------------------|
| <code>getCor</code> | Get the correlation of the logFC of all genes |
| <code>getShared</code> | Get only the shared genes that pass the thresholds |
| <code>getTotals</code> | Get the totals of overlap categories |

Usage

```
getCor(p1)
```

```
getShared(p1)
```

```
getTotals(p1)
```

Arguments

`p1` The plot from [gg4way](#)

Value

Each function returns a different result:

| | |
|-----------|--------------------------|
| getCor | A numeric |
| getShared | A tibble |
| getTotals | A tibble |

Examples

```
data("airwayFit")
p1 <- airwayFit |>
  gg4way(x = "N61311 vs N052611",
        y = "N061011 vs N052611")

## Correlation
getCor(p1)

## Shared
getShared(p1)

## Totals
getTotals(p1)
```

gg4way

Create a 4way plot

Description

Create a 4way plot to compare the logFC values from two contrasts of differential gene expression.

Usage

```
## Default S3 method:
gg4way(
  DGEdata,
  x = NULL,
  y = NULL,
  ID = "ID",
  symbol = "symbol",
  logFC = "logFC",
  FDR = "adj.P.Val",
  sep = " vs ",
  FDRcutoff = 0.05,
  logFCcutoff = 1,
  label = FALSE,
  colorVector = c("grey80", "firebrick", "forestgreen", "mediumblue"),
  lineColor = "grey60",
  textSize = 4,
```

```

    textNudge = 0.25,
    ...
)

```

Arguments

| | |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DGEdata | The object to plot from: <ul style="list-style-type: none"> • <code>limma</code>: A <code>MArrayLM</code> object from <code>eBayes</code> or <code>treat</code> • <code>edgeR</code>: A list of <code>DGELRT</code> objects from <code>glmQLFTest</code>, <code>glmTreat</code>, or <code>glmLRT</code> • <code>DESeq2</code>: a <code>DESeqDataSet</code> from <code>DESeq</code> or a list of <code>DESeqResults</code> from <code>results</code> • Other packages: A list of <code>data.frames</code>, see details section for more information |
| x | Character specifying the name of DGE results within the object for the x-axis |
| y | Character specifying the name of DGE results within the object for the y-axis |
| ID | Column name for gene IDs |
| symbol | Column name for gene symbols, which can be the same as the value for the ID column if not present in the object |
| logFC | Column name for logFC values |
| FDR | Column name for FDR values |
| sep | Character specifying the separator between conditions for the contrast name provided to the x and y arguments |
| FDRcutoff | Numeric for the FDR cut-off for DEGs (default is 0.05) |
| logFCcutoff | Numeric for the absolute logFC cut-off for DEGs (default is 1) |
| label | Character vector specifying the symbols of genes to label (FALSE for none, TRUE for all blue) |
| colorVector | Character vector of colors in the following order: "not significant", "significant in x", "significant in y", "significant in both" |
| lineColor | Color of lines |
| textSize | Numeric specifying size of text with gene overlap category totals, where 0 will remove the text |
| textNudge | Numeric specifying nudge of text with gene overlap category totals |
| ... | Support for additional arguments used internally by <code>gg4way.MArrayLM</code> , <code>gg4way.list</code> , and <code>gg4way.DESeqDataSet</code> |

Details

When a named list of `data.frames` is provided to the `DGEdata` argument, each `data.frame` can follow the defaults and have the following columns or specify alternate names for the following to the `ID`, `symbol`, `logFC`, and `FDR` arguments:

| | |
|---------------------|---------------------------------------------------------------------|
| <code>ID</code> | Character vector with the feature ID (i.e. <code>EnsemblID</code>) |
| <code>symbol</code> | Optional character vector with gene symbol for labels |
| <code>logFC</code> | Numeric with the logFC |

adj.P.Val Numeric with the FDR

The correlation coefficient is useful for comparing across multiple plots. However, it is important to consider whether there are any common factors when comparing values, since that can result in a larger value. Some examples are contrasts with covariates that are shared between groups or contrasts with the same control group.

Value

A [ggplot](#)

Examples

```
data("airwayFit")
airwayFit |>
  gg4way(x = "N61311 vs N052611",
        y = "N061011 vs N052611")
```

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