

Package ‘gggenes’

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Title Draw Gene Arrow Maps in 'ggplot2'

Version 0.4.1

Description Provides a 'ggplot2' geom and helper functions for drawing gene arrow maps.

Depends R (>= 3.6)

Imports grid (>= 3.3.0), ggplot2 (>= 2.2.1), ggfittext (>= 0.8.0), rlang (>= 0.2.0)

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example_genes	<i>A set of example genes.</i>
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Description

Genes for example purposes only.

Usage

example_genes

example_subgenes

Format

A data frame with 72 rows and six variables:

molecule the genome

gene the name of the gene

start the start position of the gene

end the end position of the gene

strand the strand of the gene

orientation the orientation of the gene

example_subgenes (143 rows) also contains:

subgene the name of the subgene

from the start position of the subgene segment

to the end position of the subgene segment

An object of class `data.frame` with 143 rows and 9 columns.

geom_gene_arrow	A 'ggplot2' geom to draw genes as arrows
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Description

geom_gene_arrow() draws genes as arrows, allowing gene maps to be drawn.

Usage

```
geom_gene_arrow(  
  mapping = NULL,  
  data = NULL,  
  stat = "identity",  
  position = "identity",  
  na.rm = FALSE,  
  show.legend = NA,  
  inherit.aes = TRUE,  
  arrowhead_width = grid::unit(4, "mm"),  
  arrowhead_height = grid::unit(4, "mm"),  
  arrow_body_height = grid::unit(3, "mm"),  
  ...  
)
```

Arguments

mapping, data, stat, position, na.rm, show.legend, inherit.aes, ...

As standard for ggplot2.

arrowhead_width

grid::unit() object giving the width of the arrowhead. Defaults to 4 mm. If the gene is drawn smaller than this width, only the arrowhead will be drawn, compressed to the length of the gene.

arrowhead_height

grid::unit() object giving the height of the arrowhead. Defaults to 4 mm.

arrow_body_height

grid::unit() object giving the height of the body of the arrow. Defaults to 3 mm.

Details

This geom draws genes as arrows along a horizontal line representing the molecule. The start and end locations of the gene are expressed with the `xmin` and `xmax` aesthetics, while the molecule can be specified with the `y` aesthetic. Optionally, an additional forward aesthetic can be used to reverse the orientation of some or all genes from that implied by `xmin` and `xmax`.

Unless the plot is faceted with a free x scale, all the molecules will share a common x axis. This means that if the locations are very different across different molecules, the genes might appear very small and squished together with a lot of unnecessary empty space. To get around this, either

facet the plot with `scales = "free_x"`, or normalise the gene locations if their exact locations are not important.

See `make_alignment_dummies()` for a method to align genes between molecules.

Aesthetics

- `xmin,xmax` (start and end of the gene; will be used to determine gene orientation)
- `y` (molecule)
- `forward` (if any value that is not TRUE, or coercible to TRUE, the gene arrow will be drawn in the opposite direction to that determined by `xmin` and `xmax`)
- `alpha`
- `colour`
- `fill`
- `linetype`
- `size`

See Also

[theme_genes\(\)](#), [make_alignment_dummies\(\)](#), [geom_gene_label\(\)](#)

Examples

```
ggplot2::ggplot(example_genes, ggplot2::aes(xmin = start, xmax = end,
                                             y = molecule, fill = gene)) +
  geom_gene_arrow() +
  ggplot2::facet_wrap(~ molecule, scales = "free")
```

`geom_gene_label` A 'ggplot2' geom to add text labels to gene arrows

Description

`geom_gene_label()` can be used to add a text label to genes drawn with `geom_gene_arrow()`.

Usage

```
geom_gene_label(
  mapping = NULL,
  data = NULL,
  stat = "identity",
  position = "identity",
  na.rm = FALSE,
  show.legend = FALSE,
  inherit.aes = TRUE,
```

```
padding.x = grid::unit(1, "mm"),
padding.y = grid::unit(0.1, "lines"),
align = "centre",
min.size = 4,
grow = F,
reflow = F,
height = grid::unit(3, "mm"),
...
)
```

Arguments

mapping, data, stat, position, na.rm, show.legend, inherit.aes, ...
Standard geom arguments as for `ggplot2::geom_text()`.

padding.x, padding.y
`grid::unit()` object, giving horizontal or vertical padding around the text. Defaults to 1 mm and 0.1 lines respectively.

align
Where inside the gene to place the text label. Default is 'centre'; other options are 'left' and 'right'.

min.size
Minimum font size, in points. If provided, text that would need to be shrunk below this size to fit inside the gene arrow will not be drawn. Defaults to 4 pt.

grow
If TRUE, text will be grown as well as shrunk to fill the arrow.

reflow
If TRUE, text will be reflowed (wrapped) to better fit the arrow.

height
`grid::unit()` object giving the maximum height of the text. Defaults to 3 mm, which is the default height of gene arrows drawn with `geom_gene_arrow()`.

Details

`geom_gene_label()` uses the 'ggfittext' package to fit text to genes. All text drawing options available in `ggfittext::geom_fit_text()` (growing, reflowing, etc.) are also available here. For full details on how these options work, see the documentation for `ggfittext::geom_fit_text()`.

Standard 'ggplot2' aesthetics for text are supported (see Aesthetics).

Aesthetics

- xmin,xmax (start and end of the gene; required)
- y (molecule; required)
- colour
- size
- alpha
- family
- fontface
- angle

See Also

geom_gene_arrow

Examples

```
ggplot2::ggplot(example_genes, ggplot2::aes(xmin = start, xmax = end,
  y = molecule, fill = gene, label = gene)) +
  geom_gene_arrow() +
  geom_gene_label() +
  ggplot2::facet_wrap(~ molecule, ncol = 1, scales = "free") +
  theme_genes()
```

geom_subgene_arrow *A 'ggplot2' geom to draw subgene segments of gene arrows*

Description

geom_subgene_arrow() draws subgenes segments within gene arrows drawn with geom_gene_arrow().

Usage

```
geom_subgene_arrow(
  mapping = NULL,
  data = NULL,
  stat = "identity",
  position = "identity",
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE,
  arrowhead_width = grid::unit(4, "mm"),
  arrowhead_height = grid::unit(4, "mm"),
  arrow_body_height = grid::unit(3, "mm"),
  ...
)
```

Arguments

mapping, data, stat, position, na.rm, show.legend, inherit.aes, ...

As standard for 'ggplot2'.

arrowhead_width

grid::unit() object giving the width of the arrowhead. Defaults to 4 mm. If the gene is drawn smaller than this width, only the arrowhead will be drawn, compressed to the length of the gene.

arrowhead_height

grid::unit() object giving the height of the arrowhead. Defaults to 4 mm.

arrow_body_height

grid::unit() object giving the height of the body of the arrow. Defaults to 3 mm.

Details

The start and end locations of the subgene are given with the `xsubmin` and `xsubmax` aesthetics. `geom_subgene_arrow()` requires some information about the 'parent' gene, provided with the same aesthetics used for `geom_gene_arrow()`: start and end locations of the 'parent' gene with the `xmin` and `xmax` aesthetics, the molecule with the `y` aesthetic, and optionally the direction with the `forward` aesthetic. If the geometry of the parent gene has been changed with `arrowhead_width`, `arrowhead_height` or `arrow_body_height`, identical parameters should be given to `geom_subgene_arrow()`.

Aesthetics

- `xmin,xmax` (start and end of the gene; will be used to determine gene orientation)
- `xsubmin,xsubmax` (start and end of subgene segment). Should be consistent with `xmin/xmax`
- `y` (molecule)
- `forward` (if any value that is not `TRUE`, or coercible to `TRUE`, the gene arrow will be drawn in the opposite direction to that determined by `xmin` and `xmax`)
- `alpha`
- `colour`
- `fill`
- `linetype`
- `size`

See Also

[geom_gene_arrow\(\)](#), [geom_subgene_label\(\)](#)

Examples

```
ggplot2::ggplot(example_genes, ggplot2::aes(xmin = start, xmax = end,
                                             y = molecule)) +
  geom_gene_arrow() +
  geom_subgene_arrow(data = example_subgenes,
                    ggplot2::aes(xmin = start, xmax = end, xsubmin = from, xsubmax = to,
                                   y = molecule, fill = gene)) +
  ggplot2::facet_wrap(~ molecule, scales = "free")
```

`geom_subgene_label` *A 'ggplot2' geom to add text labels to subgenes*

Description

`geom_subgene_label()` can be used to add a text label to subgenes drawn with `geom_subgene_arrow()`.

Usage

```
geom_subgene_label(
  mapping = NULL,
  data = NULL,
  stat = "identity",
  position = "identity",
  na.rm = FALSE,
  show.legend = FALSE,
  inherit.aes = TRUE,
  padding.x = grid::unit(1, "mm"),
  padding.y = grid::unit(0.1, "lines"),
  align = "centre",
  min.size = 4,
  grow = F,
  reflow = F,
  height = grid::unit(3, "mm"),
  ...
)
```

Arguments

mapping, data, stat, position, na.rm, show.legend, inherit.aes, ...
Standard geom arguments as for `ggplot2::geom_text()`.

padding.x, padding.y
grid::unit() object, giving horizontal or vertical padding around the text. Defaults to 1 mm and 0.1 lines respectively.

align
Where inside the subgene to place the text label. Default is 'centre'; other options are 'left' and 'right'.

min.size
Minimum font size, in points. If provided, text that would need to be shrunk below this size to fit inside the subgene will not be drawn. Defaults to 4 pt.

grow
If TRUE, text will be grown as well as shrunk to fill the subgene.

reflow
If TRUE, text will be reflowed (wrapped) to better fit the subgene.

height
grid::unit() object giving the maximum height of the text. Defaults to 3 mm, which is the default height of gene arrows (and therefore of subgenes) drawn with `geom_gene_arrow()`.

Details

`geom_subgene_label()` uses the 'ggfittext' package to fit text to genes. All text drawing options available in `ggfittext::geom_fit_text()` (growing, reflowing, etc.) are also available here. For full details on how these options work, see the documentation for `ggfittext::geom_fit_text()`.

Standard 'ggplot2' aesthetics for text are supported (see Aesthetics.)

Aesthetics

- xsubmin,xsubmax (start and end of the subgene; required)

- y (molecule; required)
- colour
- size
- alpha
- family
- fontface
- angle

gggenes	<i>'gggenes': provides a 'ggplot2' geom and helper functions for drawing gene arrow maps.</i>
---------	---

Description

This package provides a 'ggplot2' geom, `geom_gene_arrow` a theme, `theme_genes`, and a helper function for visually aligning genes, `make_alignment_dummies`.

<code>make_alignment_dummies</code>	<i>Prepare dummy data to visually align a single gene across faceted molecules</i>
-------------------------------------	--

Description

`make_alignment_dummies()` helps you to visually align genes across molecules that have been faceted with a free x scale. The output of this function is a data frame of dummy genes. If these dummy genes are added to a 'ggplot2' plot with `ggplot2::geom_blank()`, they will extend the x axis range in such a way that the start or end of a selected gene is visually aligned across the facets.

Usage

```
make_alignment_dummies(data, mapping, on, side = "left")
```

Arguments

<code>data</code>	Data frame of genes. This is almost certainly the same data frame that will later be passed to <code>ggplot2::ggplot()</code> .
<code>mapping</code>	Aesthetic mapping, created with <code>ggplot2::aes()</code> . Must contain the following aesthetics: <code>xmin</code> , <code>xmax</code> , <code>y</code> , and <code>id</code> (a unique identifier for each gene).
<code>on</code>	Name of gene to be visually aligned across facets. This gene must be present in 'data', in the column mapped to the <code>id</code> aesthetic.
<code>side</code>	Should the visual alignment be of the 'left' (default) or 'right' side of the gene?

Examples

```
dummies <- make_alignment_dummies(example_genes, ggplot2::aes(xmin = start,
  xmax = end, y = molecule, id = gene), on = "genE")

ggplot2::ggplot(example_genes, ggplot2::aes(xmin = start, xmax = end,
  y = molecule, fill = gene)) +
  geom_gene_arrow() +
  ggplot2::geom_blank(data = dummies) +
  ggplot2::facet_wrap(~ molecule, scales = "free", ncol = 1)
```

theme_genes

A 'ggplot2' theme for drawing gene maps

Description

This theme removes extraneous plot elements for drawing an 'arrows-on-a-string' style gene map in 'ggplot2'.

Usage

```
theme_genes()
```

Details

This theme removes strip text (the text that labels facets when you use `ggplot2::facet_wrap()` or `ggplot2::facet_grid()`). This makes it easier to draw molecules on different x scales by setting the y aesthetic to the molecule, then faceting with `facet_wrap(~ molecule, scales = "free")`.

See Also

[geom_gene_arrow\(\)](#)

Examples

```
ggplot2::ggplot(example_genes, ggplot2::aes(xmin = start, xmax = end,
  y = molecule, fill = gene)) +
  geom_gene_arrow() +
  ggplot2::facet_wrap(~ molecule, scales = "free") +
  theme_genes()
```

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