Package ‘ggformula’

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Title Formula Interface to the Grammar of Graphics

Description Provides a formula interface to 'ggplot2' graphics.

Type Package

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LazyLoad TRUE

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R topics documented:

`discrete_breaks` *Discrete Breaks*

Description

Creates a function that can be passed to scales for creating discrete breaks at multilples of `resolution`.

Usage

```
discrete_breaks(resolution = 1)
```

Arguments

`resolution`	Resolution of the breaks

Value

A function that can be passed to scales functions as the `breaks` argument.

Examples

```
x <- rbinom(100, 100, 0.4)
p <- gf_bar( ~ x)
p %>% gf_refine(scale_x_continuous(breaks = discrete_breaks()))
p %>% gf_refine(scale_x_continuous(breaks = discrete_breaks(5)))
p %>% gf_refine(scale_x_continuous(breaks = discrete_breaks(2)))
```

gf_abline *Reference lines – horizontal, vertical, and diagonal.*

Description

These functions create layers that display lines described i various ways. Unlike most of the plotting functions in `ggformula`, these functions do not take a formula as input for describing positional attributes of the plot.

Usage

```
gf_abline(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  slope,
  intercept,
  color,
  size,
  linetype,
  alpha,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  show.legend = NA,
  show.help = NULL,
  inherit = FALSE,
  environment = parent.frame()
)

gf_hline(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  yintercept,
  color,
  size,
  linetype,
  alpha,
  xlab,
  ylab,
  title,
  subtitle,
```

```
  caption,
  show.legend = NA,
  show.help = NULL,
  inherit = FALSE,
  environment = parent.frame()
)

gf_vline(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  xintercept,
  color,
  size,
  linetype,
  alpha,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  show.legend = NA,
  show.help = NULL,
  inherit = FALSE,
  environment = parent.frame()
)

gf_coefline(object = NULL, coef = NULL, model = NULL, ...)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	Must be `NULL`.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.

slope	Parameters that control the position of the line. If these are set, data, mapping and show.legend are overridden.
intercept	Parameters that control the position of the line. If these are set, data, mapping and show.legend are overridden.
color	A color or a formula used for mapping color.
size	A numeric size or a formula used for mapping size.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
alpha	Opacity (0 = invisible, 1 = opaque).
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.
yintercept	Parameters that control the position of the line. If these are set, data, mapping and show.legend are overridden.
xintercept	Parameters that control the position of the line. If these are set, data, mapping and show.legend are overridden.
coef	A numeric vector of coefficients.
model	A model from which to extract coefficients.

See Also

ggplot2::geom_abline(), ggplot2::geom_vline(), ggplot2::geom_hline()

Examples

```
mtcars2 <- df_stats(wt ~ cyl, data = mtcars, median_wt = median)
gf_point(wt ~ hp, size = ~wt, color = ~cyl, data = mtcars) %>%
  gf_abline(slope = ~0, intercept = ~median_wt, color = ~cyl, data = mtcars2)

gf_point(wt ~ hp, size = ~wt, color = ~cyl, data = mtcars) %>%
  gf_abline(slope = 0, intercept = 3, color = "green")

# avoid warnings by using formulas:

gf_point(wt ~ hp, size = ~wt, color = ~cyl, data = mtcars) %>%
  gf_abline(slope = ~0, intercept = ~3, color = "green")
```

```
gf_point(wt ~ hp, size = ~wt, color = ~cyl, data = mtcars) %>%
  gf_hline(yintercept = ~median_wt, color = ~cyl, data = mtcars2)

gf_point(mpg ~ hp, color = ~cyl, size = ~wt, data = mtcars) %>%
  gf_abline(color = "red", slope = ~ - 0.10, intercept = ~ 35)

gf_point(mpg ~ hp, color = ~cyl, size = ~wt, data = mtcars) %>%
  gf_abline(
    color = "red", slope = ~slope, intercept = ~intercept,
    data = data.frame(slope = -0.10, intercept = 33:35)
  )

# We can set the color of the guidelines while mapping color in other layers
gf_point(mpg ~ hp, color = ~cyl, size = ~ wt, data = mtcars) %>%
  gf_hline(color = "navy", yintercept = ~ c(20, 25), data = NA) %>%
  gf_vline(color = "brown", xintercept = ~ c(200, 300), data = NA)

# If we want to map the color of the guidelines, it must work with the
# scale of the other colors in the plot.
gf_point(mpg ~ hp, size = ~wt, data = mtcars, alpha = 0.3) %>%
  gf_hline(color = ~"horizontal", yintercept = ~ c(20, 25), data = NA) %>%
  gf_vline(color = ~"vertical", xintercept = ~ c(100, 200, 300), data = NA)

gf_point(mpg ~ hp, size = ~wt, color = ~ factor(cyl), data = mtcars, alpha = 0.3) %>%
  gf_hline(color = "orange", yintercept = ~ 20) %>%
  gf_vline(color = ~ c("4", "6", "8"), xintercept = ~ c(80, 120, 250), data = NA)

gf_point(mpg ~ hp, size = ~wt, color = ~ factor(cyl), data = mtcars, alpha = 0.3) %>%
  gf_hline(color = "orange", yintercept = ~ 20) %>%
  gf_vline(color = c("green", "red", "blue"), xintercept = ~ c(80, 120, 250),
    data = NA)

# reversing the layers requires using inherit = FALSE
gf_hline(color = "orange", yintercept = ~ 20) %>%
  gf_vline(color = ~ c("4", "6", "8"), xintercept = ~ c(80, 120, 250), data = NA) %>%
  gf_point(mpg ~ hp,
    size = ~wt, color = ~ factor(cyl), data = mtcars, alpha = 0.3,
    inherit = FALSE
  )
```

gf_area *Formula interface to geom_area()*

Description

For each x value, `geom_ribbon()` displays a y interval defined by `ymin` and `ymax`. `geom_area()` is a special case of `geom_ribbon`, where the `ymin` is fixed to 0 and `y` is used instead of `ymax`.

Usage

```
gf_area(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "area",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).

color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	The statistical transformation to use on the data for this layer, as a string.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

See Also

ggplot2::geom_area()

Examples

```
if (require(dplyr) && require(mosaicData)) {
  Temps <- Weather %>%
    filter(city == "Chicago", year == 2016, month <= 4)
  gf_linerange(low_temp + high_temp ~ date, color = ~high_temp, data = Temps)
  gf_ribbon(low_temp + high_temp ~ date, data = Temps, color = "navy", alpha = 0.3)
  gf_area(high_temp ~ date, data = Temps, color = "navy", alpha = 0.3)

  gf_ribbon(low_temp + high_temp ~ date, data = Weather, alpha = 0.3) %>%
    gf_facet_grid(city ~ .)

  gf_linerange(low_temp + high_temp ~ date, color = ~high_temp, data = Weather) %>%
    gf_facet_grid(city ~ .) %>%
    gf_refine(scale_colour_gradientn(colors = rev(rainbow(5))))
}
```

gf_ash *Average Shifted Histograms*

Description

An ASH plot is the average over all histograms of a fixed bin width. `geom_ash()` and `gf_ash()` provide ways to create ASH plots using **ggplot2** or **ggformula**.

Usage

```
gf_ash(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "line",
  stat = "ash",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

stat_ash(
  mapping = NULL,
  data = NULL,
  geom = "line",
  position = "identity",
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE,
  binwidth = NULL,
  adjust = 1,
  ...
)
```

```
geom_ash(
  mapping = NULL,
  data = NULL,
  stat = "ash",
  position = "identity",
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE,
  binwidth = NULL,
  adjust = 1,
  ...
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape ~x or y ~ x. y may be stat(density) or stat(count) or stat(ndensity) or stat(ncount). Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. NA, the default, includes layer in the legends if any of the attributes of the layer are mapped.

show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.
mapping	set of aesthetic mappings created by aes() or aes_().
na.rm	If FALSE (the default), removes missing values with a warning. If TRUE silently removes missing values.
inherit.aes	A logical indicating whether default aesthetics are inherited.
binwidth	the width of the histogram bins. If NULL (the default) the binwidth will be chosen so that approximately 10 bins cover the data. adjust can be used to to increase or decrease binwidth.
adjust	a numeric adjustment to binwidth. Primarily useful when binwidth is not specified. Increasing adjust makes the plot smoother.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

geom_histogram(), link{gf_histogram}().

Examples

```
gf_ash(~Sepal.Length, color = ~Species, data = iris)
gf_ash(~Sepal.Length, color = ~Species, data = iris, binwidth = 0.3)
gf_ash(~Sepal.Length, color = ~Species, data = iris, adjust = 2)
ggplot(faithful, aes(x = eruptions)) +
  geom_histogram(aes(y = stat(density)),
    fill = "lightskyblue", colour = "gray50", alpha = 0.2
  ) +
  geom_ash(colour = "red") +
  geom_ash(colour = "forestgreen", adjust = 2) +
```

```
geom_ash(colour = "navy", adjust = 1 / 2) +
theme_minimal()
```

gf_bar *Formula interface to geom_bar()*

Description

There are two types of bar charts: `geom_bar()` and `geom_col()`. `geom_bar()` makes the height of the bar proportional to the number of cases in each group (or if the `weight` aesthetic is supplied, the sum of the weights). If you want the heights of the bars to represent values in the data, use `geom_col()` instead. `geom_bar()` uses `stat_count()` by default: it counts the number of cases at each x position. `geom_col()` uses `stat_identity()`: it leaves the data as is.

Usage

```
gf_bar(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  width = NULL,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "bar",
  stat = "count",
  position = "stack",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_counts(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
```

```
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  width = NULL,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "bar",
  stat = "count",
  position = "stack",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_props(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab = "proportion",
  title,
  subtitle,
  caption,
  geom = "bar",
  stat = "count",
  position = "stack",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_percents(
  object = NULL,
```

```
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab = "percent",
  title,
  subtitle,
  caption,
  geom = "bar",
  stat = "count",
  position = "stack",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_countsh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  width = NULL,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "barh",
  stat = "counth",
  position = "stackv",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

```
gf_colh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  width = NULL,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "colh",
  stat = "identity",
  position = "stackv",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_propsh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab = "proportion",
  ylab,
  title,
  subtitle,
  caption,
  geom = "barh",
  stat = "counth",
  position = "stackv",
  show.legend = NA,
  show.help = NULL,
```

```
    inherit = TRUE,
    environment = parent.frame()
  )

  gf_percentsh(
    object = NULL,
    gformula = NULL,
    data = NULL,
    ...,
    alpha,
    color,
    fill,
    group,
    linetype,
    size,
    xlab = "percent",
    ylab,
    title,
    subtitle,
    caption,
    geom = "barh",
    stat = "counth",
    position = "stackv",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )
```

Arguments

`object` When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.

`gformula` A formula, typically with shape ~ x. (y ~ x is also possible, but typically using one of `gf_col()`, `gf_props()`, or `gf_percents()` is preferable to using this formula shape.) Faceting can be achieved by including `|` in the formula.

`data` The data to be displayed in this layer. There are three options:

If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`.

A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created.

A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).

`...` Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute =`

	~ `expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`width`	Width of the bars.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	Override the default connection between `geom_bar()` and `stat_count()`.
`stat`	Override the default connection between `geom_bar()` and `stat_count()`.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_bar()

Examples

```
gf_bar(~substance, data = mosaicData::HELPrct)
gf_bar(~substance, data = mosaicData::HELPrct, fill = ~sex)
gf_bar(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge()
)
# gf_counts() is another name for gf_bar()
gf_counts(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge()
)
# gf_props() and gf_percents() use proportions or percentages instead of counts
gf_props(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge()
)
gf_percents(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge()
)
if (require(scales)) {
  gf_props(~substance,
    data = mosaicData::HELPrct, fill = ~sex,
    position = position_dodge()
  ) %>%
    gf_refine(scale_y_continuous(labels = scales::percent))
}
```

gf_barh *Formula interface to geom_barh()*

Description

Horizontal version of geom_bar().

Usage

```
gf_barh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
```

```
  fill,
  group,
  linetype,
  size,
  width = NULL,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "barh",
  stat = "counth",
  position = "stackv",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula, typically with shape ~ x. (y ~ x is also possible, but typically using one of `gf_col()`, `gf_props()`, or `gf_percents()` is preferable to using this formula shape.) Faceting can be achieved by including | in the formula.
data	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. ~ `head(.x,10)`).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.

`width`	Width of the bars.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	Override the default connection between `geom_bar()` and `stat_count()`.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggstance::geom_barh()`

Examples

```
gf_barh(~Diet, data = ChickWeight)
gf_barh(~substance, data = mosaicData::HELPrct, fill = ~sex)
gf_barh(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodgev()
)
# gf_counts() is another name for gf_bar()
gf_counts(~substance, data = mosaicData::HELPrct, fill = ~sex)
# gf_props() and gf_percents() use proportions or percentages instead of counts
gf_props(~substance, data = mosaicData::HELPrct, fill = ~sex, position = position_dodge())
gf_percents(~substance, data = mosaicData::HELPrct, fill = ~sex, position = position_dodge())

if (require(scales)) {
 gf_props(~substance, data = mosaicData::HELPrct, fill = ~sex, position = position_dodge()) %>%
    gf_refine(scale_y_continuous(labels = scales::percent))
}
```

---

gf_bin2d *Formula interface to geom_bin2d()*

Description

`geom_bin2d()` uses `ggplot2::stat_bin2d()` to bin the data before using `gf_tile()` to display the results.

Usage

```
gf_bin2d(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "tile",
  stat = "bin2d",
  position = "identity",
  show.legend = NA,
```

```
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	A data frame with the variables to be plotted.
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	A character string naming the stat used to make the layer.
`position`	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
`show.legend`	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_bin2d()`, `gf_tile()`

Examples

```
gf_bin2d(eruptions ~ waiting, data = faithful, bins = 15) %>%
  gf_refine(scale_fill_viridis_c(begin = 0.1, end = 0.9))
```

---

gf_blank *Formula interface to geom_blank()*

Description

The blank geom draws nothing, but can be a useful way of ensuring common scales between different plots. See `expand_limits()` for more details.

Usage

```
gf_blank(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "blank",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_frame(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "blank",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute =`

	~ `expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	A character string naming the stat used to make the layer.
`position`	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
`show.legend`	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_blank()`

Examples

```
gf_point((c(0, 1)) ~ (c(0, 5)))
gf_frame((c(0, 1)) ~ (c(0, 5)))
gf_blank((c(0, 1)) ~ (c(0, 5)))
# gf_blank() can be used to expand the view
gf_point((c(0, 1)) ~ (c(0, 5))) %>%
  gf_blank((c(0, 3)) ~ (c(-2, 7)))
```

`gf_boxplot` *Formula interface to geom_boxplot()*

Description

The boxplot compactly displays the distribution of a continuous variable. It visualises five summary statistics (the median, two hinges and two whiskers), and all "outlying" points individually.

Usage

```
gf_boxplot(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  coef,
  outlier.color = NULL,
  outlier.fill = NULL,
  outlier.shape = 19,
  outlier.size = 1.5,
  outlier.stroke = 0.5,
  outlier.alpha = NULL,
  notch = FALSE,
  notchwidth = 0.5,
  varwidth = FALSE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "boxplot",
  stat = "boxplot",
```

```
  position = "dodge",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
data	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
coef	Length of the whiskers as multiple of IQR. Defaults to 1.5.
outlier.color	Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box. In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence. Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.

`outlier.fill` Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box.

In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.

Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.

`outlier.shape` Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box.

In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.

Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.

`outlier.size` Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box.

In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.

Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.

`outlier.stroke` Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box.

In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.

Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.

`outlier.alpha` Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box.

In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.

Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.

`notch`	If `FALSE` (default) make a standard box plot. If `TRUE`, make a notched box plot. Notches are used to compare groups; if the notches of two boxes do not overlap, this suggests that the medians are significantly different.
`notchwidth`	For a notched box plot, width of the notch relative to the body (defaults to `notchwidth = 0.5`).
`varwidth`	If `FALSE` (default) make a standard box plot. If `TRUE`, boxes are drawn with widths proportional to the square-roots of the number of observations in the groups (possibly weighted, using the `weight` aesthetic).
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	Use to override the default connection between `geom_boxplot` and `stat_boxplot`.
`stat`	Use to override the default connection between `geom_boxplot` and `stat_boxplot`.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

References

McGill, R., Tukey, J. W. and Larsen, W. A. (1978) Variations of box plots. The American Statistician 32, 12-16.

See Also

ggplot2::geom_boxplot(), fivenum(), df_stats()

Examples

```
gf_boxplot(age ~ substance, data = mosaicData::HELPrct)
gf_boxplot(age ~ substance, data = mosaicData::HELPrct, varwidth = TRUE)
gf_boxplot(age ~ substance, data = mosaicData::HELPrct, color = ~sex)
gf_boxplot(age ~ substance,
  data = mosaicData::HELPrct,
  color = ~sex, outlier.color = "gray50"
)
# longer whiskers
gf_boxplot(age ~ substance,
  data = mosaicData::HELPrct,
  color = ~sex, coef = 2
)

# Note: width for boxplots is full width of box.
#       For jittering, it is the half-width.
gf_boxplot(age ~ substance | sex,
  data = mosaicData::HELPrct,
  coef = 5, width = 0.4
) %>%
  gf_jitter(width = 0.2, alpha = 0.3)
# move boxplots away a bit by adjusting dodge
gf_boxplot(age ~ substance,
  data = mosaicData::HELPrct,
  color = ~sex, position = position_dodge(width = 0.9)
)
```

`gf_boxploth` *Formula interface to geom_boxploth()*

Description

Horizontal version of geom_boxplot().

Usage

```
gf_boxploth(
  object = NULL,
  gformula = NULL,
  data = NULL,
```

```
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  coef,
  outlier.color = NULL,
  outlier.fill = NULL,
  outlier.shape = 19,
  outlier.size = 1.5,
  outlier.stroke = 0.5,
  outlier.alpha = NULL,
  notch = FALSE,
  notchwidth = 0.5,
  varwidth = FALSE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "boxploth",
  stat = "boxploth",
  position = "dodgev",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute =`

	~ `expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`coef`	Length of the whiskers as multiple of IQR. Defaults to 1.5.
`outlier.color`	Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box. In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.
`outlier.fill`	Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box. In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence. Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.
`outlier.shape`	Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box. In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.
`outlier.size`	Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box. In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.
`outlier.stroke`	Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box. In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence.
`outlier.alpha`	Default aesthetics for outliers. Set to `NULL` to inherit from the aesthetics used for the box. In the unlikely event you specify both US and UK spellings of colour, the US spelling will take precedence. Sometimes it can be useful to hide the outliers, for example when overlaying the raw data points on top of the boxplot. Hiding the outliers can be achieved by setting `outlier.shape = NA`. Importantly, this does not remove the outliers, it only hides them, so the range calculated for the y-axis will be the same with outliers shown and outliers hidden.

notch	If FALSE (default) make a standard box plot. If TRUE, make a notched box plot. Notches are used to compare groups; if the notches of two boxes do not overlap, this suggests that the medians are significantly different.
notchwidth	For a notched box plot, width of the notch relative to the body (defaults to notchwidth = 0.5).
varwidth	If FALSE (default) make a standard box plot. If TRUE, boxes are drawn with widths proportional to the square-roots of the number of observations in the groups (possibly weighted, using the weight aesthetic).
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	Use to override the default connection between geom_boxplot and stat_boxplot.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggstance::geom_boxploth(), fivenum(), df_stats()

Examples

```
gf_boxploth(sex ~ age, data = mosaicData::HELPrct, varwidth = TRUE)
gf_boxploth(substance ~ age, data = mosaicData::HELPrct, color = ~sex)
# move boxplots away a bit by adjusting dodge
gf_boxploth(substance ~ age,
  data = mosaicData::HELPrct, color = ~sex,
  position = position_dodgev(height = 0.9)
)
gf_boxploth(substance ~ age, data = mosaicData::HELPrct, color = ~sex, outlier.color = "gray50")
# longer whiskers
gf_boxploth(substance ~ age, data = mosaicData::HELPrct, color = ~sex, coef = 2)
# Note: height for boxplots is full width of box.
#   For jittering, it is the half-height.
gf_boxploth(substance ~ age | sex, data = mosaicData::HELPrct, coef = 5, height = 0.4) %>%
  gf_jitter(height = 0.2, alpha = 0.3)

# combining boxplots and histograms
gf_histogram(~eruptions, data = faithful) %>%
  gf_boxploth(0 ~ eruptions, alpha = 0, width = 2)
gf_histogram(~eruptions, data = faithful) %>%
  gf_boxploth(-2 ~ eruptions, alpha = 0, width = 2)
gf_histogram(~eruptions, data = faithful) %>%
  gf_boxploth(32 ~ eruptions, alpha = 0, width = 2)
```

---

gf_col *Formula interface to geom_col()*

Description

There are two types of bar charts: `geom_bar()` and `geom_col()`. `geom_bar()` makes the height of the bar proportional to the number of cases in each group (or if the `weight` aesthetic is supplied, the sum of the weights). If you want the heights of the bars to represent values in the data, use `geom_col()` instead. `geom_bar()` uses `stat_count()` by default: it counts the number of cases at each x position. `geom_col()` uses `stat_identity()`: it leaves the data as is.

Usage

```
gf_col(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
```

```
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "col",
  stat = "identity",
  position = "stack",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape y ~ x. Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.

position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. NA, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_col()

Examples

```
SomeData <- data.frame(
  group = LETTERS[1:3],
  count = c(20, 25, 18)
)
gf_col(count ~ group, data = SomeData)

# A Pareto chart

if (require(dplyr) && require(mosaicData)) {
  HELPrct %>%
    group_by(substance) %>%
    summarise(count = n()) %>%
    ungroup() %>%
    dplyr::arrange(-count) %>%
```

```
    mutate(
      cumcount = cumsum(count),
      substance = reorder(substance, -count)
    ) %>%
    gf_col(count ~ substance, fill = "skyblue") %>%
    gf_point(cumcount ~ substance) %>%
    gf_line(cumcount ~ substance, group = 1) %>%
    gf_refine(
      scale_y_continuous(sec.axis = sec_axis(~ . / nrow(HELPrct)))
    )
}
```

`gf_contour` *Formula interface to geom_contour()*

Description

ggplot2 can not draw true 3d surfaces, but you can use `geom_contour` and `geom_tile()` to visualise 3d surfaces in 2d. To be a valid surface, the data must contain only a single row for each unique combination of the variables mapped to the `x` and `y` aesthetics. Contouring tends to work best when `x` and `y` form a (roughly) evenly spaced grid. If your data is not evenly spaced, you may want to interpolate to a grid before visualising.

Usage

```
gf_contour(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "contour",
  stat = "contour",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.

`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	The geometric object to use display the data
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_contour()`, `gf_density_2d()`

Examples

```
gf_density_2d(eruptions ~ waiting, data = faithful, alpha = 0.5, color = "navy") %>%
  gf_contour(density ~ waiting + eruptions, data = faithfuld, bins = 10, color = "red")
```

---

gf_count — *Formula interface to geom_count()*

Description

This is a variant `geom_point()` that counts the number of observations at each location, then maps the count to point area. It useful when you have discrete data and overplotting.

Usage

```
gf_count(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  shape,
  size,
  stroke,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "point",
  stat = "sum",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
```

```
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	A data frame with the variables to be plotted.
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`shape`	An integer or letter shape or a formula used for mapping shape.
`size`	A numeric size or a formula used for mapping size.
`stroke`	A numeric size of the border or a formula used to map stroke.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	A character string naming the stat used to make the layer.
`position`	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
`show.legend`	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_count()

Examples

```
# Best used in conjunction with scale_size_area which ensures that
# counts of zero would be given size 0. Doesn't make much difference
# here because the smallest count is already close to 0.

gf_count(hwy ~ cty, data = mpg, alpha = 0.5) %>%
  gf_refine(scale_size_area())
```

---

gf_crossbar *Formula interface to geom_crossbar()*

Description

Various ways of representing a vertical interval defined by x, ymin and ymax. Each case draws a single graphical object.

Usage

```
gf_crossbar(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
```

```
  size,
  fatten = 2.5,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "crossbar",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_crossbarh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  fatten = 2.5,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "crossbarh",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y + ymin + ymax ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options:

	If NULL, the default, the data is inherited from the plot data as specified in the call to ggplot().
	A data.frame, or other object, will override the plot data. All objects will be fortified to produce a data frame. See fortify() for which variables will be created.
	A function will be called with a single argument, the plot data. The return value must be a data.frame, and will be used as the layer data. A function can be created from a formula (e.g. ~ head(.x,10)).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
fatten	A multiplicative factor used to increase the size of the middle bar in geom_crossbar() and the middle point in geom_pointrange().
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	The statistical transformation to use on the data for this layer, as a string.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_crossbar()`

Examples

```
if (require(mosaicData) && require(dplyr)) {
  HELP2 <- HELPrct %>%
    group_by(substance, sex) %>%
    summarise(
      mean.age   = mean(age),
      median.age = median(age),
      max.age    = max(age),
      min.age    = min(age),
      sd.age     = sd(age),
      lo         = mean.age - sd.age,
      hi         = mean.age + sd.age
    )

  gf_jitter(age ~ substance, data = HELPrct,
      alpha = 0.7, width = 0.2, height = 0, color = "skyblue") %>%
    gf_pointrange(mean.age + lo + hi ~ substance, data = HELP2) %>%
    gf_facet_grid(~sex)

  gf_jitter(age ~ substance, data = HELPrct,
      alpha = 0.7, width = 0.2, height = 0, color = "skyblue")  %>%
    gf_errorbar(lo + hi ~ substance, data = HELP2, inherit = FALSE) %>%
    gf_facet_grid(~sex)

  gf_jitter(age ~ substance, data = HELPrct,
      alpha = 0.7, width = 0.2, height = 0, color = "skyblue") %>%
    gf_crossbar(mean.age + lo + hi ~ substance, data = HELP2,
      fill = "transparent") %>%
    gf_facet_grid(~sex)

  gf_jitter(substance ~ age, data = HELPrct,
```

```
    alpha = 0.7, height = 0.2, width = 0, color = "skyblue") %>%
  gf_crossbarh(substance ~ mean.age + lo + hi, data = HELP2,
    fill = "transparent", color = "red") %>%
  gf_facet_grid(~sex)
}
```

---

gf_curve *Formula interface to geom_curve()*

Description

geom_segment draws a straight line between points (x, y) and (xend, yend). geom_curve draws a curved line. See the underlying drawing function grid::curveGrob() for the parameters that control the curve.

Usage

```
gf_curve(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  curvature = 0.5,
  angle = 90,
  ncp = 5,
  arrow = NULL,
  lineend = "butt",
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "curve",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y + yend ~ x + xend`.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`curvature`	A numeric value giving the amount of curvature. Negative values produce left-hand curves, positive values produce right-hand curves, and zero produces a straight line.
`angle`	A numeric value between 0 and 180, giving an amount to skew the control points of the curve. Values less than 90 skew the curve towards the start point and values greater than 90 skew the curve towards the end point.
`ncp`	The number of control points used to draw the curve. More control points creates a smoother curve.
`arrow`	specification for arrow heads, as created by arrow().
`lineend`	Line end style (round, butt, square).
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.

show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_curve()

Examples

```
D <- data.frame(x1 = 2.62, x2 = 3.57, y1 = 21.0, y2 = 15.0)
gf_point(mpg ~ wt, data = mtcars) %>%
  gf_curve(y1 + y2 ~ x1 + x2, data = D, color = "navy") %>%
  gf_segment(y1 + y2 ~ x1 + x2, data = D, color = "red")
```

---

gf_density *Formula interface to stat_density()*

Description

Computes and draws a kernel density estimate, which is a smoothed version of the histogram and is a useful alternative when the data come from an underlying smooth distribution. The only difference between gf_dens() and gf_density() is the default geom used to show the density curve: gf_density() uses an area geom (which can be filled). gf_dens() using a line geom (which cannot be filled).

Usage

```
gf_density(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha = 0.5,
  color,
  fill,
  group,
  linetype,
  size,
  kernel = "gaussian",
  n = 512,
  trim = FALSE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "area",
  stat = "density",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_dens(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha = 0.5,
  color,
  group,
  linetype,
  size,
  kernel = "gaussian",
  n = 512,
  trim = FALSE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "line",
```

```
    stat = "density",
    position = "identity",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape ~ x. Faceting can be achieved by including | in the formula.
data	The data to be displayed in this layer. There are three options: If NULL, the default, the data is inherited from the plot data as specified in the call to ggplot(). A data.frame, or other object, will override the plot data. All objects will be fortified to produce a data frame. See fortify() for which variables will be created. A function will be called with a single argument, the plot data. The return value must be a data.frame, and will be used as the layer data. A function can be created from a formula (e.g. ~ head(.x,10)).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
kernel	Kernel. See list of available kernels in density().
n	number of equally spaced points at which the density is to be estimated, should be a power of two, see density() for details
trim	If FALSE, the default, each density is computed on the full range of the data. If TRUE, each density is computed over the range of that group: this typically means the estimated x values will not line-up, and hence you won't be able to stack density values. This parameter only matters if you are displaying multiple densities in one plot or if you are manually adjusting the scale limits.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().

`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	Use to override the default connection between `geom_density` and `stat_density`.
`stat`	Use to override the default connection between `geom_density` and `stat_density`.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`gf_ash()`, `ggplot2::geom_density()`

Examples

```
gf_dens()
gf_density(~Sepal.Length, fill = ~Species, data = iris)
gf_dens(~Sepal.Length, color = ~Species, data = iris)
gf_freqpoly(~Sepal.Length, color = ~Species, data = iris, bins = 15)
# Chaining in the data
iris %>% gf_dens(~Sepal.Length, color = ~Species)
```

gf_density_2d *Formula interface to geom_density_2d()*

Description

Perform a 2D kernel density estimation using MASS::kde2d() and display the results with contours. This can be useful for dealing with overplotting. This is a 2d version of geom_density().

Usage

```
gf_density_2d(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  contour = TRUE,
  n = 100,
  h = NULL,
  lineend = "butt",
  linejoin = "round",
  linemitre = 1,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "density_2d",
  stat = "density_2d",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_density2d(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
```

```
    group,
    linetype,
    size,
    contour = TRUE,
    n = 100,
    h = NULL,
    lineend = "butt",
    linejoin = "round",
    linemitre = 1,
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "density2d",
    stat = "density2d",
    position = "identity",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x, 10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.

size	A numeric size or a formula used for mapping size.
contour	If TRUE, contour the results of the 2d density estimation
n	number of grid points in each direction
h	Bandwidth (vector of length two). If NULL, estimated using MASS::bandwidth.nrd().
lineend	Line end style (round, butt, square).
linejoin	Line join style (round, mitre, bevel).
linemitre	Line mitre limit (number greater than 1).
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	Use to override the default connection between geom_density_2d and stat_density_2d.
stat	Use to override the default connection between geom_density_2d and stat_density_2d.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_density_2d()

Examples

```
gf_jitter(avg_drinks ~ age,
  alpha = 0.2, data = mosaicData::HELPrct,
  width = 0.4, height = 0.4
) %>%
  gf_density_2d(avg_drinks ~ age, data = mosaicData::HELPrct)
gf_jitter(avg_drinks ~ age,
  alpha = 0.2, data = mosaicData::HELPrct,
  width = 0.4, height = 0.4
) %>%
  gf_density2d(avg_drinks ~ age, data = mosaicData::HELPrct)
```

---

gf_dist *Plot distributions*

Description

Create a layer displaying a probability distribution.

Usage

```
gf_dist(
  object = ggplot(),
  dist,
  ...,
  xlim = NULL,
  kind = c("density", "cdf", "qq", "qqstep", "histogram"),
  resolution = 5000L,
  params = NULL
)
```

Arguments

object	a gg object.
dist	A character string providing the name of a distribution. Any distribution for which the functions with names formed by prepending "d", "p", or "q" to dist exist can be used.
...	additional arguments passed both to the distribution functions and to the layer. Note: Possible ambiguities using params or by preceding plot argument with plot_.
xlim	A numeric vector of length 2 providing lower and upper bounds for the portion of the distribution that will be displayed. The default is to attempt to determine reasonable bounds using quantiles of the distribution.

kind	One of "density", "cdf", "qq", "qqstep", or "histogram" describing what kind of plot to create.
resolution	An integer specifying the number of points to use for creating the plot.
params	a list of parameters for the distribution.

Examples

```
gf_dhistogram(~ rnorm(100), bins = 20) %>%
  gf_dist("norm", color = "red")

# shading tails -- but see pdist() for this
gf_dist("norm", fill = ~ (abs(x) <= 2), geom = "area")
gf_dist("norm", color = "red", kind = "cdf")
gf_dist("norm", fill = "red", kind = "histogram")
gf_dist("norm", color = "red", kind = "qqstep", resolution = 25) %>%
  gf_dist("norm", color = "black", kind = "qq", resolution = 25, size = 2, alpha = 0.5)
# size is used as parameter for binomial distribution
gf_dist("binom", size = 20, prob = 0.25)
# If we want to adjust size argument for plots, we have two choices:
gf_dist("binom", size = 20, prob = 0.25, plot_size = 2)
gf_dist("binom", params = list(size = 20, prob = 0.25), size = 2)
```

---

gf_dotplot *Formula interface to geom_dotplot()*

Description

Scatterplots in ggformula.

Usage

```
gf_dotplot(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  binwidth = NULL,
  binaxis = "x",
  method = "dotdensity",
  binpositions = "bygroup",
  stackdir = "up",
  stackratio = 1,
  dotsize = 1,
  stackgroups = FALSE,
```

```
  origin = NULL,
  right = TRUE,
  width = 0.9,
  drop = FALSE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape ~ x. Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
binwidth	When method is "dotdensity", this specifies maximum bin width. When method is "histodot", this specifies bin width. Defaults to 1/30 of the range of the data
binaxis	The axis to bin along, "x" (default) or "y"
method	"dotdensity" (default) for dot-density binning, or "histodot" for fixed bin widths (like stat_bin)
binpositions	When method is "dotdensity", "bygroup" (default) determines positions of the bins for each group separately. "all" determines positions of the bins with all the data taken together; this is used for aligning dot stacks across multiple groups.
stackdir	which direction to stack the dots. "up" (default), "down", "center", "centerwhole" (centered, but with dots aligned)
stackratio	how close to stack the dots. Default is 1, where dots just touch. Use smaller values for closer, overlapping dots.
dotsize	The diameter of the dots relative to binwidth, default 1.

`stackgroups`	should dots be stacked across groups? This has the effect that `position = "stack"` should have, but can't (because this geom has some odd properties).
`origin`	When `method` is "histodot", origin of first bin
`right`	When `method` is "histodot", should intervals be closed on the right (a, b], or not [a, b)
`width`	When `binaxis` is "y", the spacing of the dot stacks for dodging.
`drop`	If TRUE, remove all bins with zero counts
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`position`	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
`show.legend`	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Details

There are two basic approaches: *dot-density* and *histodot*. With dot-density binning, the bin positions are determined by the data and `binwidth`, which is the maximum width of each bin. See Wilkinson (1999) for details on the dot-density binning algorithm. With histodot binning, the bins have fixed positions and fixed widths, much like a histogram.

When binning along the x axis and stacking along the y axis, the numbers on y axis are not meaningful, due to technical limitations of ggplot2. You can hide the y axis, as in one of the examples, or manually scale it to match the number of dots.

Value

a gg object

Warning

Dotplots in `ggplot2` (and hence in `ggformula`) often require some fiddling because the default y-axis is meaningless and the ideal size of the dots depends on the aspect ratio of the plot.

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

References

Wilkinson, L. (1999) Dot plots. The American Statistician, 53(3), 276-281.

See Also

`ggplot2::geom_dotplot()`

Examples

```
gf_dotplot(~Sepal.Length, fill = ~Species, data = iris)
```

---

gf_ecdf — *Formula interace to empirical cumulative distribution*

Description

The empirical cumulative distribution function (ECDF) provides an alternative visualization of distribution. Compared to other visualizations that rely on density (like histograms or density plots) the ECDF doesn't require any tuning parameters and handles both continuous and categorical variables. The downside is that it requires more training to accurately interpret, and the underlying visual tasks are somewhat more challenging.

Usage

```
gf_ecdf(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  group,
  pad,
```

```
  n = NULL,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "step",
  stat = "ecdf",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
data	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
...	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
group	Used for grouping.
pad	If `TRUE`, pad the ecdf with additional points (-Inf, 0) and (Inf, 1)
n	if NULL, do not interpolate. If not NULL, this is the number of points to interpolate with.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.
geom	The geometric object to use display the data
stat	The statistical transformation to use on the data for this layer, as a string.

position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Examples

```
Data <- data.frame(
  x = c(rnorm(100, 0, 1), rnorm(100, 0, 3), rt(100, df = 3)),
  g = gl(3, 100, labels = c("N(0, 1)", "N(0, 3)", "T(df = 3)") )
)
gf_ecdf( ~ x, data = Data)
# Don't go to positive/negative infinity
gf_ecdf( ~ x, data = Data, pad = FALSE)

# Multiple ECDFs
gf_ecdf( ~ x, data = Data, color = ~ g)
```

---

gf_ellipse *Formula interface to stat_ellipse()*

Description

Formula interface to ggplot2::stat_ellipse().

Usage

```
gf_ellipse(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  type = "t",
  level = 0.95,
  segments = 51,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
```

```
  geom = "path",
  stat = "ellipse",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	A data frame with the variables to be plotted.
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`type`	The type of ellipse. The default `"t"` assumes a multivariate t-distribution, and `"norm"` assumes a multivariate normal distribution. `"euclid"` draws a circle with the radius equal to `level`, representing the euclidean distance from the center. This ellipse probably won't appear circular unless `coord_fixed()` is applied.
`level`	The level at which to draw an ellipse, or, if `type="euclid"`, the radius of the circle to be drawn.
`segments`	The number of segments to be used in drawing the ellipse.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	Geom for drawing ellipse. Note: `"polygon"` allows fill; `"path"` does not; on the other hand, `"path"` allows `alpha` to be applied to the border, while `"polygon"` applies `alpha` only to the interior.
`stat`	A character string naming the stat used to make the layer.
`position`	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.

`show.legend`	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

See Also

`ggplot2::stat_ellipse()`

Examples

```
gf_ellipse()
gf_point(eruptions ~ waiting, data = faithful) %>%
  gf_ellipse(alpha = 0.5)

gf_point(eruptions ~ waiting, data = faithful, color = ~ (eruptions > 3)) %>%
  gf_ellipse(alpha = 0.5)

gf_point(eruptions ~ waiting, data = faithful, color = ~ (eruptions > 3)) %>%
  gf_ellipse(type = "norm", linetype = ~ "norm") %>%
  gf_ellipse(type = "t",    linetype = ~ "t")

gf_point(eruptions ~ waiting, data = faithful, color = ~ (eruptions > 3)) %>%
  gf_ellipse(type = "norm",   linetype = ~ "norm") %>%
  gf_ellipse(type = "euclid", linetype = ~ "euclid", level = 3) %>%
  gf_refine(coord_fixed())

# Use geom = "polygon" to enable fill
gf_point(eruptions ~ waiting, data = faithful, fill = ~ (eruptions > 3)) %>%
  gf_ellipse(geom = "polygon", alpha = 0.3, color = "black")

gf_point(eruptions ~ waiting, data = faithful, fill = ~ (eruptions > 3)) %>%
  gf_ellipse(geom = "polygon", alpha = 0.3) %>%
  gf_ellipse(alpha = 0.3, color = "black")

gf_ellipse(eruptions ~ waiting, data = faithful, show.legend = FALSE,
  alpha = 0.3, fill = ~ (eruptions > 3), geom = "polygon") %>%
  gf_ellipse(level = 0.68, geom = "polygon", alpha = 0.3) %>%
  gf_point(data = faithful, color = ~ (eruptions > 3), show.legend = FALSE)
```

`gf_empty` *Create an "empty" plot*

Description

This is primarily useful as a way to start a sequence of piped plot layers.

Usage

```
gf_empty(environment = parent.frame())
```

Arguments

`environment`	An environment passed to `ggplot2::ggplot()`

Value

A plot with now layers.

Examples

```
gf_empty()
gf_empty() %>%
  gf_point(Sepal.Length ~ Sepal.Width, data = iris, color = ~Species)
```

`gf_errorbar` *Formula interface to geom_errorbar()*

Description

For each x value, `geom_ribbon()` displays a y interval defined by `ymin` and `ymax`. `geom_area()` is a special case of `geom_ribbon`, where the `ymin` is fixed to 0 and `y` is used instead of `ymax`.

Usage

```
gf_errorbar(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "errorbar",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
```

```
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape `ymin + ymax ~ x`. Faceting can be achieved by including `|` in the formula.
data	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.
geom	A character string naming the geom used to make the layer.
stat	The statistical transformation to use on the data for this layer, as a string.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If `TRUE`, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in `data`.

See Also

ggplot2::geom_errorbar()

Examples

```
if (require(mosaicData) && require(dplyr)) {
  HELP2 <- HELPrct %>%
    group_by(substance, sex) %>%
    summarise(
      mean.age = mean(age),
      median.age = median(age),
      max.age = max(age),
      min.age = min(age),
      sd.age = sd(age),
      lo = mean.age - sd.age,
      hi = mean.age + sd.age
    )

  gf_jitter(age ~ substance, data = HELPrct,
      alpha = 0.5, width = 0.2, height = 0, color = "skyblue") %>%
    gf_pointrange(mean.age + lo + hi ~ substance, data = HELP2,
      inherit = FALSE) %>%
    gf_facet_grid(~sex)

  gf_jitter(age ~ substance, data = HELPrct,
      alpha = 0.5, width = 0.2, height = 0, color = "skyblue") %>%
    gf_errorbar(lo + hi ~ substance, data = HELP2, inherit = FALSE) %>%
    gf_facet_grid(~sex)
  gf_jitter(age ~ substance, data = HELPrct,
      alpha = 0.5, width = 0.2, height = 0, color = "skyblue") %>%
    gf_boxplot(age ~ substance, data = HELPrct, color = "red") %>%
    gf_crossbar(mean.age + lo + hi ~ substance, data = HELP2) %>%
    gf_facet_grid(~sex)
}
```

---

gf_errorbarh — *Formula interface to geom_errorbarh()*

Description

A rotated version of geom_errorbar().

Usage

```
gf_errorbarh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
```

```
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "errorbarh",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape `y ~ x + xmin + xmax`. Faceting can be achieved by including `|` in the formula.
data	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also `gf_labs()`.

ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	The statistical transformation to use on the data for this layer, as a string.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_errorbarh()

Examples

```
if (require(dplyr)) {
  HELP2 <- mosaicData::HELPrct %>%
    group_by(substance, sex) %>%
    summarise(
      mean.age = mean(age),
      median.age = median(age),
```

```
        max.age = max(age),
        min.age = min(age),
        sd.age = sd(age),
        lo = mean.age - sd.age,
        hi = mean.age + sd.age
      )

    gf_jitter(substance ~ age, data = mosaicData::HELPrct,
        alpha = 0.5, height = 0.2, width = 0, color = "skyblue") %>%
      gf_errorbarh(substance ~ lo + hi, data = HELP2, inherit = FALSE) %>%
      gf_facet_grid(~sex)

    gf_jitter(age ~ substance, data = mosaicData::HELPrct,
        alpha = 0.5, width = 0.2, height = 0, color = "skyblue") %>%
      gf_errorbar(lo + hi ~ substance, data = HELP2, inherit = FALSE) %>%
      gf_facet_grid(~sex)
}
```

---

gf_facet_wrap *Add facets to a plot*

Description

These functions provide more control over faceting than is possible using the formula interface.

Usage

```
gf_facet_wrap(object, ...)

gf_facet_grid(object, ...)
```

Arguments

object	A ggplot object
...	Additional arguments passed to facet_wrap() or facet_grid(). This typically includes an unnamed formula argument describing the facets. scales and space are additional useful arguments. See the examples.

See Also

ggplot2::facet_grid(), ggplot2::facet_wrap().

Examples

```
gf_histogram(~avg_drinks, data = mosaicData::HELPrct) %>%
  gf_facet_grid(~substance)
gf_histogram(~avg_drinks, data = mosaicData::HELPrct) %>%
  gf_facet_grid(~substance, scales = "free")
gf_histogram(~avg_drinks, data = mosaicData::HELPrct) %>%
```

```
  gf_facet_grid(~substance, scales = "free", space = "free")
gf_line(births ~ date, data = mosaicData::Births, color = ~wday) %>%
  gf_facet_wrap(~year, scales = "free_x", nrow = 5) %>%
  gf_theme(
    axis.title.x = element_blank(),
    axis.text.x = element_blank(), axis.ticks.x = element_blank()
  ) %>%
  gf_labs(color = "Day")
```

`gf_fitdistr` *Plot density function based on fit to data*

Description

`MASS::fitdistr()` is used to fit coefficients of a specified family of distributions and the resulting density curve is displayed.

Usage

```
gf_fitdistr(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  dist = "dnorm",
  start = NULL,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "path",
  stat = "fitdistr",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = FALSE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See examples.
gformula	A formula with shape ~ x used to specify the data to be fit to a family of distributions.
data	A data frame containing the variable to be fitted.
...	Additional arguments
dist	A quoted name of a distribution function. See mosaicCore::fit_distr_fun() for more details about allowable distributions.
start	Starting value(s) for the search for MLE. (See MASS::fitdistr.)
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. NA, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`mosaicCore::fit_distr_fun()`

Examples

```
gf_fitdistr(~length, data = mosaicData::KidsFeet, inherit = FALSE) %>%
  gf_dhistogram(~length, data = mosaicData::KidsFeet, binwidth = 0.5, alpha = 0.25)

gf_dhistogram(~length, data = mosaicData::KidsFeet, binwidth = 0.5, alpha = 0.25) %>%
  gf_fitdistr()

set.seed(12345)
Dat <- data.frame(g = rgamma(500, 3, 10), f = rf(500, df1 = 3, df2 = 47))
gf_dhistogram(~g, data = Dat) %>%
  gf_fitdistr(dist = "dgamma")

gf_dhistogram(~g, data = Dat) %>%
  gf_fun(mosaicCore::fit_distr_fun(~g, data = Dat, dist = "dgamma"))

gf_dhistogram(~f, data = Dat) %>%
  gf_fitdistr(dist = "df", start = list(df1 = 2, df2 = 50))

# fitted parameters are default argument values
args(
  mosaicCore::fit_distr_fun(~f,
    data = Dat, dist = "df",
    start = list(df1 = 2, df2 = 50)
  )
)
args(mosaicCore::fit_distr_fun(~g, data = Dat, dist = "dgamma"))
```

gf_freqpoly *Formula interface to geom_freqpoly()*

Description

Visualise the distribution of a single continuous variable by dividing the x axis into bins and counting the number of observations in each bin. Histograms (geom_histogram()) display the counts with bars; frequency polygons (geom_freqpoly()) display the counts with lines. Frequency polygons are more suitable when you want to compare the distribution across the levels of a categorical variable.

Usage

```
gf_freqpoly(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  binwidth,
  bins,
  center,
  boundary,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "path",
  stat = "bin",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape ~ x or y ~ x. Faceting can be achieved by including | in the formula.

`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`binwidth`	The width of the bins. Can be specified as a numeric value or as a function that calculates width from unscaled x. Here, "unscaled x" refers to the original x values in the data, before application of any scale transformation. When specifying a function along with a grouping structure, the function will be called once per group. The default is to use the number of bins in `bins`, covering the range of the data. You should always override this value, exploring multiple widths to find the best to illustrate the stories in your data. The bin width of a date variable is the number of days in each time; the bin width of a time variable is the number of seconds.
`bins`	Number of bins. Overridden by `binwidth`. Defaults to 30.
`center`	bin position specifiers. Only one, `center` or `boundary`, may be specified for a single plot. `center` specifies the center of one of the bins. `boundary` specifies the boundary between two bins. Note that if either is above or below the range of the data, things will be shifted by the appropriate integer multiple of `width`. For example, to center on integers use `width = 1` and `center = 0`, even if `0` is outside the range of the data. Alternatively, this same alignment can be specified with `width = 1` and `boundary = 0.5`, even if `0.5` is outside the range of the data.
`boundary`	bin position specifiers. Only one, `center` or `boundary`, may be specified for a single plot. `center` specifies the center of one of the bins. `boundary` specifies the boundary between two bins. Note that if either is above or below the range of the data, things will be shifted by the appropriate integer multiple of `width`. For example, to center on integers use `width = 1` and `center = 0`, even if `0` is outside the range of the data. Alternatively, this same alignment can be specified with `width = 1` and `boundary = 0.5`, even if `0.5` is outside the range of the data.
`xlab`	Label for x-axis. See also `gf_labs()`.

`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	Use to override the default connection between `geom_histogram()`/`geom_freqpoly()` and `stat_bin()`.
`stat`	Use to override the default connection between `geom_histogram()`/`geom_freqpoly()` and `stat_bin()`.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_freqpoly()`

Examples

```
gf_histogram(~ Sepal.Length | Species, alpha = 0.2, data = iris, bins = 20) %>%
  gf_freqpoly(~Sepal.Length, data = iris, color = ~Species, bins = 20)
gf_freqpoly(~Sepal.Length, color = ~Species, data = iris, bins = 20)
if (utils::packageVersion("ggplot2") > "2.2.1") {
  gf_dens(~Sepal.Length, data = iris, color = "navy") %>%
    gf_freqpoly(stat(density) ~ Sepal.Length,
      data = iris,
      color = "red", bins = 20
    )
}
```

`gf_function` *Layers displaying graphs of functions*

Description

These functions provide two different interfaces for creating a layer that contains the graph of a function.

Usage

```
gf_function(object = NULL, fun, xlim, ..., inherit = FALSE)

gf_fun(object = NULL, formula, xlim, ..., inherit = FALSE)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`fun`	A function.
`xlim`	A numeric vector providing the extent of the x-axis when creating the first layer in a plot. Ignored when creating a subsequent layer.
`...`	Other arguments such as `position="dodge"`.
`inherit`	A logical indicating whether default attributes are inherited.
`formula`	A formula describing a function. See examples and `mosaicCore::makeFun()`.

Examples

```
gf_function(fun = sqrt, xlim = c(0, 10))
gf_dhistogram(~age, data = mosaicData::HELPrct, binwidth = 3, alpha = 0.6) %>%
  gf_function(
    fun = stats::dnorm,
    args = list(mean = mean(mosaicData::HELPrct$age), sd = sd(mosaicData::HELPrct$age)),
    color = "red"
  )
gf_fun(5 + 3 * cos(10 * x) ~ x, xlim = c(0, 2))
```

```
# Utility bill is quadratic in month?
f <- makeFun(lm(totalbill ~ poly(month, 2), data = mosaicData::Utilities))
gf_point(totalbill ~ month, data = mosaicData::Utilities, alpha = 0.6) %>%
  gf_fun(f(m) ~ m, color = "red")
```

`gf_function_2d` *Plot functions of two variables*

Description

Plot functions of two variables as tile and/or contour plots.

Usage

```
gf_function_2d(
  object = NULL,
  fun = identity,
  xlim = NULL,
  ylim = NULL,
  ...,
  tile = TRUE,
  contour = TRUE,
  resolution = 50
)

gf_function2d(
  object = NULL,
  fun = identity,
  xlim = NULL,
  ylim = NULL,
  ...,
  tile = TRUE,
  contour = TRUE,
  resolution = 50
)

gf_function_contour(
  object = NULL,
  fun = identity,
  xlim = NULL,
  ylim = NULL,
  ...,
  resolution = 50
)

gf_function_tile(
  object = NULL,
```

```
  fun = identity,
  xlim = NULL,
  ylim = NULL,
  ...,
  resolution = 50
)

gf_fun_2d(
  object = NULL,
  formula = NULL,
  xlim = NULL,
  ylim = NULL,
  tile = TRUE,
  contour = TRUE,
  ...,
  resolution = 50
)

gf_fun2d(
  object = NULL,
  formula = NULL,
  xlim = NULL,
  ylim = NULL,
  tile = TRUE,
  contour = TRUE,
  ...,
  resolution = 50
)

gf_fun_tile(
  object = NULL,
  formula = NULL,
  xlim = NULL,
  ylim = NULL,
  ...,
  resolution = 50
)

gf_fun_contour(
  object = NULL,
  formula = NULL,
  xlim = NULL,
  ylim = NULL,
  ...,
  resolution = 50
)
```

Arguments

`object`	An R object, typically of class "gg".
`fun`	A function of two variables to be plotted.
`xlim`	x limits for generating points to be plotted.
`ylim`	y limits for generating points to be plotted.
`...`	additional arguments passed to `gf_tile()` or `gf_contour()`.
`tile`	A logical indicating whether the tile layer should be drawn.
`contour`	A logical indicating whether the contour layer should be drawn.
`resolution`	A numeric vector of length 1 or 2 specifying the number of grid points at which the function is evaluated (in each dimension).
`formula`	A formula describing a function of two variables to be plotted. See `mosaic::makeFun()` for details regarding the conversion from a formula to a function.

Value

A gg plot.

Examples

```
theme_set(theme_bw())
gf_function_2d(fun = function(x, y) sin(2 * x * y), xlim = c(-pi, pi), ylim = c(-pi, pi)) %>%
  gf_refine(scale_fill_viridis_c())
gf_function_2d(fun = function(x, y) x + y, contour = FALSE)
gf_function_tile(fun = function(x, y) x * y) %>%
  gf_function_contour(fun = function(x, y) x * y, color = "white") %>%
  gf_refine(scale_fill_viridis_c())
gf_fun_tile(x * y ~ x + y, xlim = c(-3, 3), ylim = c(-2, 2)) %>%
  gf_fun_contour(x * y ~ x + y, color = "white") %>%
  gf_refine(scale_fill_viridis_c()) %>%
  gf_labs(fill = "product")
```

`gf_hex` *Formula interface to geom_hex()*

Description

Line plots in `ggformula`. `gf_path()` differs from `gf_line()` in that points are connected in the order in which they appear in `data`.

Usage

```
gf_hex(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  bins,
  binwidth,
  alpha,
  color,
  fill,
  group,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "hex",
  stat = "binhex",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object` When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.

`gformula` A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.

`data` The data to be displayed in this layer. There are three options:

If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`.

A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created.

A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x, 10)`).

`...` Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.

`bins`	numeric vector giving number of bins in both vertical and horizontal directions. Set to 30 by default.
`binwidth`	Numeric vector giving bin width in both vertical and horizontal directions. Overrides `bins` if both set.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`size`	A numeric size or a formula used for mapping size.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	Override the default connection between `geom_hex` and `stat_binhex`.
`stat`	Override the default connection between `geom_hex` and `stat_binhex`.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_hex()

Examples

```
gf_hex(avg_drinks ~ age, data = mosaicData::HELPrct, bins = 15) %>%
  gf_density2d(avg_drinks ~ age, data = mosaicData::HELPrct, color = "red", alpha = 0.5)
```

---

gf_histogram *Formula interface to geom_histogram()*

Description

Count and density histograms in ggformula.

Usage

```
gf_histogram(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  bins = 25,
  binwidth,
  alpha = 0.5,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "bar",
  stat = "bin",
  position = "stack",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_dhistogram(
  object = NULL,
  gformula = NULL,
```

```
    data = NULL,
    ...,
    bins = 25,
    binwidth,
    alpha = 0.5,
    color,
    fill,
    group,
    linetype,
    size,
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "bar",
    stat = "bin",
    position = "stack",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )

  gf_histogramh(
    object = NULL,
    gformula = NULL,
    data = NULL,
    ...,
    bins = 25,
    binwidth,
    alpha = 0.5,
    color,
    fill,
    group,
    linetype,
    size,
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "barh",
    stat = "binh",
    position = "stackv",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
```

```
  environment = parent.frame()
)

gf_dhistogramh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  bins = 25,
  binwidth,
  alpha = 0.5,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "barh",
  stat = "binh",
  position = "stackv",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `~ x` (or `y ~ x`, but this shape is not generally needed).
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x, 10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.

bins	Number of bins. Overridden by binwidth. Defaults to 30.
binwidth	The width of the bins. Can be specified as a numeric value or as a function that calculates width from unscaled x. Here, "unscaled x" refers to the original x values in the data, before application of any scale transformation. When specifying a function along with a grouping structure, the function will be called once per group. The default is to use the number of bins in bins, covering the range of the data. You should always override this value, exploring multiple widths to find the best to illustrate the stories in your data. The bin width of a date variable is the number of days in each time; the bin width of a time variable is the number of seconds.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	Use to override the default connection between geom_histogram()/geom_freqpoly() and stat_bin().
stat	Use to override the default connection between geom_histogram()/geom_freqpoly() and stat_bin().
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_histogram()`

Examples

```
x <- rnorm(1000)
gf_histogram(~x, bins = 30)
gf_dhistogram(~x, bins = 30)
gf_dhistogram(~x, binwidth = 0.5, center = 0, color = "black")
gf_dhistogram(~x, binwidth = 0.5, boundary = 0, color = "black")
gf_dhistogram(~x, bins = 30) %>%
  gf_fitdistr(dist = "dnorm") # see help for gf_fitdistr() for more info.

gf_histogram(~x, fill = ~ (abs(x) <= 2), boundary = 2, binwidth = 0.25)

gf_histogram(~ Sepal.Length | Species, data = iris, binwidth = 0.25)
gf_histogram(~age,
  data = mosaicData::HELPrct, binwidth = 5,
  fill = "skyblue", color = "black"
)
# bins can be adjusted left/right using center or boundary
gf_histogram(~age,
  data = mosaicData::HELPrct,
  binwidth = 5, fill = "skyblue", color = "black", center = 42.5
)
gf_histogram(~age,
  data = mosaicData::HELPrct,
  binwidth = 5, fill = "skyblue", color = "black", boundary = 40
)

gf_histogramh(~x, bins = 30)
gf_histogramh(x ~ ., bins = 30)
gf_histogramh(x ~ stat(density), bins = 30)
gf_dhistogramh(~x, bins = 30)
gf_dhistogramh(x ~ ., bins = 30)
```

```
# better to use gf_histogramh() here, but this works
gf_dhistogramh(x ~ stat(count), bins = 30)
```

---

gf_jitter *Formula interface to geom_jitter()*

Description

Jittered scatter plots in ggformula.

Usage

```
gf_jitter(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  size,
  shape,
  fill,
  width,
  height,
  group,
  stroke,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "point",
  stat = "identity",
  position = "jitter",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape y ~ x. Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.

...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
size	A numeric size or a formula used for mapping size.
shape	An integer or letter shape or a formula used for mapping shape.
fill	A color for filling, or a formula used for mapping fill.
width	Amount of horizontal jitter.
height	Amount of vertical jitter.
group	Used for grouping.
stroke	A numeric size of the border or a formula used to map stroke.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If `TRUE`, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_jitter()`, `gf_point()`

Examples

```
gf_jitter()
# without jitter
gf_point(age ~ sex, alpha = 0.25, data = mosaicData::HELPrct)
# jitter only horizontally
gf_jitter(age ~ sex, alpha = 0.25, data = mosaicData::HELPrct, width = 0.2, height = 0)
# alternative way to get jitter
gf_point(age ~ sex,
  alpha = 0.25, data = mosaicData::HELPrct,
  position = "jitter", width = 0.2, height = 0
)
```

`gf_labs` *Non-layer functions for gf plots*

Description

These functions modify things like labels, limits, scales, etc. for plots ggplot2 plots. They are wrappers around functions in ggplot2 that allow for chaining syntax.

Usage

```
gf_labs(object, ...)

gf_lims(object, ...)

gf_refine(object, ...)
```

Arguments

`object`	a gg object
`...`	additional arguments passed through to the similarly named function in **ggplot2**.

Details

`gf_refine()` provides a mechanism to replace + with the chaining operator from **magrittr**. Each of its ... arguments is added in turn to the base plot in `object`. The other functions are thin wrappers around specific `ggplot2` refinement functions and pass their ... arguments through to the similarly named `ggplot2` functions.

Value

a modified gg object

Examples

```
gf_dens(~cesd, color = ~substance, size = 1.5, data = mosaicData::HELPrct) %>%
  gf_labs(
    title = "Center for Epidemiologic Studies Depression measure",
    subtitle = "(at baseline)",
    color = "Abused substance: ",
    x = "CESD score",
    y = "",
    caption = "Source: HELPrct"
  ) %>%
  gf_theme(theme_classic()) %>%
  gf_theme(
    axis.text.y = element_blank(),
    legend.position = "top",
    plot.title = element_text(hjust = 0.5, color = "navy"),
    plot.subtitle = element_text(hjust = 0.5, color = "navy", size = 12)
  )

gf_point(eruptions ~ waiting, data = faithful, alpha = 0.5)
gf_point(eruptions ~ waiting, data = faithful, alpha = 0.5) %>%
  gf_lims(x = c(65, NA), y = c(3, NA))

# modify scales using gf_refine()
gf_jitter(Sepal.Length ~ Sepal.Width, color = ~Species, data = iris) %>%
  gf_refine(scale_color_brewer(type = "qual", palette = 3)) %>%
  gf_theme(theme_bw())

gf_jitter(Sepal.Length ~ Sepal.Width, color = ~Species, data = iris) %>%
  gf_refine(scale_color_manual(values = c("red", "navy", "limegreen"))) %>%
  gf_theme(theme_bw())
```

---

gf_line — *Formula interface to geom_line() and geom_path()*

Description

Line plots in `ggformula`. `gf_path()` differs from `gf_line()` in that points are connected in the order in which they appear in `data`.

Usage

```
gf_line(
  object = NULL,
  gformula = NULL,
  data = NULL,
```

```
    ...,
    alpha,
    color,
    fill,
    group,
    linetype,
    size,
    lineend,
    linejoin,
    linemitre,
    arrow,
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "line",
    stat = "identity",
    position = "identity",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )

  gf_path(
    object = NULL,
    gformula = NULL,
    data = NULL,
    ...,
    alpha,
    color,
    group,
    linetype,
    size,
    lineend = "butt",
    linejoin = "round",
    linemitre = 1,
    arrow = NULL,
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "path",
    stat = "identity",
    position = "identity",
    show.legend = NA,
```

```
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	A data frame with the variables to be plotted.
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`lineend`	Line end style (round, butt, square).
`linejoin`	Line join style (round, mitre, bevel).
`linemitre`	Line mitre limit (number greater than 1).
`arrow`	Arrow specification, as created by `grid::arrow()`.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	A character string naming the stat used to make the layer.
`position`	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
`show.legend`	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_line()`, `gf_point()`

Examples

```
gf_line()
gf_point(age ~ sex, alpha = 0.25, data = mosaicData::HELPrct)
gf_point(births ~ date, color = ~wday, data = mosaicData::Births78)
# lines make the exceptions stand out more prominently
gf_line(births ~ date, color = ~wday, data = mosaicData::Births78)
gf_path()
if (require(dplyr)) {
  data.frame(t = seq(1, 10 * pi, length.out = 400)) %>%
    mutate(x = t * cos(t), y = t * sin(t)) %>%
    gf_path(y ~ x, color = ~t)
}
```

`gf_linerange` *Formula interface to geom_linerange() and geom_pointrange()*

Description

Various ways of representing a vertical interval defined by `x`, `ymin` and `ymax`. Each case draws a single graphical object.

Usage

```
gf_linerange(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "linerange",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_pointrange(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  fatten = 2,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "pointrange",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
```

```
)

gf_summary(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  fun.y = NULL,
  fun.ymax = NULL,
  fun.ymin = NULL,
  fun.args = list(),
  fatten = 2,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "pointrange",
  stat = "summary",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_linerangeh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "linerangeh",
  stat = "identity",
```

```
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_pointrangeh(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "pointrangeh",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object
: When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.

gformula
: A formula with shape `ymin + ymax ~ x`. Faceting can be achieved by including `|` in the formula.

data
: The data to be displayed in this layer. There are three options:

  If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`.

  A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created.

  A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).

...
: Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute =`

	~ `expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.
`fatten`	A multiplicative factor used to increase the size of the middle bar in `geom_crossbar()` and the middle point in `geom_pointrange()`.
`fun.y`	Deprecated, use the versions specified above instead.
`fun.ymax`	Deprecated, use the versions specified above instead.
`fun.ymin`	Deprecated, use the versions specified above instead.
`fun.args`	Optional additional arguments passed on to the functions.

See Also

`ggplot2::geom_linerange()`

`ggplot2::geom_pointrange()`

`ggplot2::geom_pointrange()`, `ggplot2::stat_summary()`

Examples

```
gf_linerange()

gf_ribbon(low_temp + high_temp ~ date,
  data = mosaicData::Weather,
  fill = ~city, alpha = 0.4
) %>%
  gf_theme(theme = theme_minimal())
gf_linerange(
  low_temp + high_temp ~ date | city ~ .,
  data = mosaicData::Weather,
  color = ~ ((low_temp + high_temp) / 2)
) %>%
  gf_refine(scale_colour_gradientn(colors = rev(rainbow(5)))) %>%
  gf_labs(color = "mid-temp")

gf_ribbon(low_temp + high_temp ~ date | city ~ ., data = mosaicData::Weather)

# Chaining in the data
mosaicData::Weather %>%
  gf_ribbon(low_temp + high_temp ~ date, alpha = 0.4) %>%
  gf_facet_grid(city ~ .)
if (require(mosaicData) && require(dplyr)) {
  HELP2 <- HELPrct %>%
    group_by(substance, sex) %>%
    summarise(
      age = NA,
      mean.age = mean(age),
      median.age = median(age),
      max.age = max(age),
      min.age = min(age),
      sd.age = sd(age),
      lo = mean.age - sd.age,
      hi = mean.age + sd.age
    )

  gf_jitter(age ~ substance, data = HELPrct,
      alpha = 0.5, width = 0.2, height = 0, color = "skyblue") %>%
    gf_pointrange(mean.age + lo + hi ~ substance, data = HELP2) %>%
    gf_facet_grid(~sex)

  gf_jitter(age ~ substance, data = HELPrct,
    alpha = 0.5, width = 0.2, height = 0, color = "skyblue") %>%
    gf_errorbar(lo + hi ~ substance, data = HELP2, inherit = FALSE) %>%
    gf_facet_grid(~sex)

  # width is defined differently for gf_boxplot() and gf_jitter()
  #   * for gf_boxplot() it is the full width of the box.
  #   * for gf_jitter() it is half that -- the maximum amount added or subtracted.
  gf_boxplot(age ~ substance, data = HELPrct, width = 0.4) %>%
    gf_jitter(width = 0.4, height = 0, color = "skyblue", alpha = 0.5)
```

```
  gf_boxplot(age ~ substance, data = HELPrct, width = 0.4) %>%
    gf_jitter(width = 0.2, height = 0, color = "skyblue", alpha = 0.5)
}
p <- gf_jitter(mpg ~ cyl, data = mtcars, height = 0, width = 0.15); p
p %>% gf_summary(fun.data = "mean_cl_boot", color = "red", size = 2)
# You can supply individual functions to summarise the value at
# each x:
p %>% gf_summary(fun.y = "median", color = "red", size = 2, geom = "point")
p %>%
  gf_summary(fun.y = "mean", color = "red", size = 2, geom = "point") %>%
  gf_summary(fun.y = mean, geom = "line")
p %>%
  gf_summary(fun.y = mean, fun.ymin = min, fun.ymax = max, color = "red")
p %>%
  gf_summary(fun.ymin = min, fun.ymax = max, color = "red", geom = "linerange")

gf_bar(~ cut, data = diamonds)
gf_col(price ~ cut, data = diamonds, stat = "summary_bin", fun.y = "mean")

# Don't use gf_lims() to zoom into a summary plot - this throws the
# data away
p <- gf_summary(mpg ~ cyl, data = mtcars, fun.y = "mean", geom = "point")
p
p %>% gf_lims(y = c(15, 30))
# Instead use coord_cartesian()
p %>% gf_refine(coord_cartesian(ylim = c(15, 30)))
# A set of useful summary functions is provided from the Hmisc package.

p <- gf_jitter(mpg ~ cyl, data = mtcars, width = 0.15, height = 0); p
p %>% gf_summary(fun.data = mean_cl_boot, color = "red")
p %>% gf_summary(fun.data = mean_cl_boot, color = "red", geom = "crossbar")
p %>% gf_summary(fun.data = mean_sdl, group = ~ cyl, color = "red",
                 geom = "crossbar", width = 0.3)
p %>% gf_summary(group = ~ cyl, color = "red", geom = "crossbar", width = 0.3,
        fun.data = mean_sdl, fun.args = list(mult = 1))
p %>% gf_summary(fun.data = median_hilow, group = ~ cyl, color = "red",
        geom = "crossbar", width = 0.3)

# An example with highly skewed distributions:
if (require("ggplot2movies")) {
  set.seed(596)
  Mov <- movies[sample(nrow(movies), 1000), ]
  m2 <- gf_jitter(votes ~ factor(round(rating)), data = Mov, width = 0.15, height = 0, alpha = 0.3)
  m2 <- m2 %>%
    gf_summary(fun.data = "mean_cl_boot", geom = "crossbar",
               colour = "red", width = 0.3) %>%
    gf_labs(x = "rating")
  m2
  # Notice how the overplotting skews off visual perception of the mean
  # supplementing the raw data with summary statistics is _very_ important

  # Next, we'll look at votes on a log scale.
```

```
  # Transforming the scale means the data are transformed
  # first, after which statistics are computed:
  m2 %>% gf_refine(scale_y_log10())
  # Transforming the coordinate system occurs after the
  # statistic has been computed. This means we're calculating the summary on the raw data
  # and stretching the geoms onto the log scale.  Compare the widths of the
  # standard errors.
  m2 %>% gf_refine(coord_trans(y="log10"))
}
gf_linerangeh(date ~ low_temp + high_temp | ~city,
  data = Weather,
  color = ~avg_temp
) %>%
  gf_refine(scale_color_viridis_c(begin = 0.1, end = 0.9, option = "C"))
gf_pointrangeh(date ~ avg_temp + low_temp + high_temp | ~city,
  data = Weather,
  color = ~avg_temp
) %>%
  gf_refine(scale_color_viridis_c(begin = 0.1, end = 0.9, option = "C"))
```

---

gf_point *Formula interface to geom_point()*

Description

Scatterplots in ggformula.

Usage

```
gf_point(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  size,
  shape,
  fill,
  group,
  stroke,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "point",
  stat = "identity",
```

```
    position = "identity",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape y ~ x. Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, (c) attributes of the layer as a whole, which are set with attribute = value, or (d) arguments for the geom, stat, or position function.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
size	A numeric size or a formula used for mapping size.
shape	An integer or letter shape or a formula used for mapping shape.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
stroke	A numeric size of the border or a formula used to map stroke.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title, subtitle, caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. NA, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_point()`, `gf_line()`, `gf_jitter()`

Examples

```
gf_point()
gf_point((10 * ((1:25) %/% 10)) ~ ((1:25) %% 10),
  shape = 1:25,
  fill = "skyblue", color = "navy", size = 4, stroke = 1, data = NA
)
gf_point(mpg ~ hp, color = ~cyl, size = ~wt, data = mtcars)
# faceting -- two ways
gf_point(mpg ~ hp, data = mtcars) %>%
  gf_facet_wrap(~am)
gf_point(mpg ~ hp | am, group = ~cyl, data = mtcars)
gf_point(mpg ~ hp | ~am, group = ~cyl, data = mtcars)
gf_point(mpg ~ hp | am ~ ., group = ~cyl, data = mtcars)
# Chaining in the data
mtcars %>% gf_point(mpg ~ wt)

# short cuts for main labels in the plot
gf_point(births ~ date,
  color = ~wday, data = mosaicData::Births78,
  xlab = "Date", ylab = "Number of Live Births",
  title = "Interesting Patterns in the Number of Births",
  subtitle = "(United States, 1978)",
  caption = "Source: mosaicData::Births78"
)
```

gf_polygon *Formula interface to geom_polygon()*

Description

Scatterplots in ggformula.

Usage

```
gf_polygon(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  size,
  shape,
  fill,
  group,
  stroke,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "polygon",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, (c) attributes of the layer as a whole, which are set with `attribute = value`, or (d) arguments for the geom, stat, or position function.

alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
size	A numeric size or a formula used for mapping size.
shape	An integer or letter shape or a formula used for mapping shape.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
stroke	A numeric size of the border or a formula used to map stroke.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If `TRUE`, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_point()`, `gf_line()`, `gf_jitter()`

Examples

```
gf_polygon()
if (require(maps) && require(ggthemes) && require(dplyr)) {
  US <- map_data("state") %>%
    dplyr::mutate(name_length = nchar(region))
  States <- US %>%
    dplyr::group_by(region) %>%
    dplyr::summarise(lat = mean(range(lat)), long = mean(range(long))) %>%
    dplyr::mutate(name = abbreviate(region, 3))

  gf_polygon(lat ~ long,
    data = US, group = ~group,
    fill = ~name_length, color = "white"
  ) %>%
    gf_text(lat ~ long,
      label = ~name, data = States,
      color = "gray70", inherit = FALSE
    ) %>%
    gf_refine(ggthemes::theme_map())
}
```

---

gf_qq *Formula interface to geom_qq()*

Description

`gf_qq()` an `gf_qqstep()` both create quantile-quantile plots. They differ in how they display the qq-plot. `gf_qq()` uses points and `gf_qqstep()` plots a step function through these points.

Usage

```
gf_qq(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  group,
  distribution = stats::qnorm,
  dparams = list(),
  xlab,
  ylab,
  title,
  subtitle,
  caption,
```

```
  geom = "point",
  stat = "qq",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_qqline(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  group,
  distribution = stats::qnorm,
  dparams = list(),
  linetype = "dashed",
  alpha = 0.7,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "line",
  stat = "qqline",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_qqstep(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  group,
  distribution = stats::qnorm,
  dparams = list(),
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "step",
  stat = "qq",
```

```
    position = "identity",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape ~ sample. Facets can be added using |.
data	The data to be displayed in this layer. There are three options: If NULL, the default, the data is inherited from the plot data as specified in the call to ggplot(). A data.frame, or other object, will override the plot data. All objects will be fortified to produce a data frame. See fortify() for which variables will be created. A function will be called with a single argument, the plot data. The return value must be a data.frame, and will be used as the layer data. A function can be created from a formula (e.g. ~ head(.x,10)).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
group	Used for grouping.
distribution	Distribution function to use, if x not specified
dparams	Additional parameters passed on to distribution function.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	Use to override the default connection between geom_histogram()/geom_freqpoly() and stat_bin().
stat	Use to override the default connection between geom_histogram()/geom_freqpoly() and stat_bin().
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.

`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`alpha`	Opacity (0 = invisible, 1 = opaque).

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_qq()`

Examples

```
gf_qq(~ rnorm(100))
gf_qq(~ Sepal.Length | Species, data = iris) %>% gf_qqline()
gf_qq(~ Sepal.Length | Species, data = iris) %>% gf_qqline(tail = 0.10)
gf_qq(~Sepal.Length, color = ~Species, data = iris) %>%
  gf_qqstep(~Sepal.Length, color = ~Species, data = iris)
```

`gf_quantile` *Formula interface to geom_quantile()*

Description

This fits a quantile regression to the data and draws the fitted quantiles with lines. This is as a continuous analogue to `geom_boxplot()`.

Usage

```
gf_quantile(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  weight,
  lineend = "butt",
  linejoin = "round",
  linemitre = 1,
  quantiles,
  formula,
  method,
  method.args,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "quantile",
  stat = "quantile",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object` When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.

`gformula` A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.

`data` The data to be displayed in this layer. There are three options:

If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`.

A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created.

A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function`

	can be created from a formula (e.g. ~ head(.x,10)).
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
weight	Useful for summarized data, weight provides a count of the number of values with the given combination of x and y values.
lineend	Line end style (round, butt, square).
linejoin	Line join style (round, mitre, bevel).
linemitre	Line mitre limit (number greater than 1).
quantiles	conditional quantiles of y to calculate and display
formula	formula relating y variables to x variables
method	Quantile regression method to use. Available options are "rq" (for quantreg::rq()) and "rqss" (for quantreg::rqss()).
method.args	List of additional arguments passed on to the modelling function defined by method.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	Use to override the default connection between geom_quantile and stat_quantile.
stat	Use to override the default connection between geom_quantile and stat_quantile.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_quantile()`

Examples

```
gf_point((1 / hwy) ~ displ, data = mpg) %>%
  gf_quantile((1 / hwy) ~ displ)
```

---

gf_raster — *Formula interface to geom_raster()*

Description

Formula interface to geom_raster()

Usage

```
gf_raster(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  hjust = 0.5,
  vjust = 0.5,
  interpolate = FALSE,
```

```
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "raster",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape `y ~ x` or `fill ~ x + y`
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
hjust	horizontal and vertical justification of the grob. Each justification value should be a number between 0 and 1. Defaults to 0.5 for both, centering each pixel over its data location.
vjust	horizontal and vertical justification of the grob. Each justification value should be a number between 0 and 1. Defaults to 0.5 for both, centering each pixel over its data location.
interpolate	If `TRUE` interpolate linearly, if `FALSE` (the default) don't interpolate.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.

`geom`	A character string naming the geom used to make the layer.
`stat`	A character string naming the stat used to make the layer.
`position`	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
`show.legend`	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_raster()`

Examples

```
# Justification controls where the cells are anchored
D <- expand.grid(x = 0:5, y = 0:5)
D$z <- runif(nrow(D))
# centered squares
gf_raster(z ~ x + y, data = D)
gf_raster(y ~ x, fill = ~z, data = D)
# zero padding
gf_raster(z ~ x + y, data = D, hjust = 0, vjust = 0)
```

gf_rect *Formula interface to geom_rect()*

Description

Line plots in ggformula. gf_path() differs from gf_line() in that points are connected in the order in which they appear in data.

Usage

```
gf_rect(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "rect",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape ymin + ymax ~ xmin + xmax. Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.

alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If `TRUE`, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_rect()

Examples

```
gf_rect(1 + 2 ~ 3 + 4, alpha = 0.3, color = "red")
# use data = data.frame() so we get 1 rectangle and not 1 per row of faithful
# use inherit = FALSE because we are not reusing eruptions and waiting
gf_point(eruptions ~ waiting, data = faithful) %>%
  gf_rect(1.5 + 3 ~ 45 + 68,
    fill = "red", alpha = 0.2,
    data = data.frame(), inherit = FALSE) %>%
  gf_rect(3 + 5.5 ~ 68 + 100,
    fill = "green", alpha = 0.2,
    data = data.frame(), inherit = FALSE)
```

---

gf_ribbon *Formula interface to geom_ribbon()*

Description

For each x value, `geom_ribbon()` displays a y interval defined by `ymin` and `ymax`. `geom_area()` is a special case of `geom_ribbon`, where the `ymin` is fixed to 0 and `y` is used instead of `ymax`.

Usage

```
gf_ribbon(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha = 0.3,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "ribbon",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `ymin + ymax ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x, 10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

See Also

`ggplot2::geom_ribbon()`

Examples

```
gf_ribbon()

gf_ribbon(low_temp + high_temp ~ date, data = mosaicData::Weather, fill = ~city, alpha = 0.4) %>%
  gf_theme(theme = theme_minimal())
gf_linerange(
  low_temp + high_temp ~ date | city ~ .,
  color = ~high_temp,
  data = mosaicData::Weather
) %>%
  gf_refine(scale_colour_gradientn(colors = rev(rainbow(5))))
gf_ribbon(low_temp + high_temp ~ date | city ~ ., data = mosaicData::Weather)
# Chaining in the data
mosaicData::Weather %>%
  gf_ribbon(low_temp + high_temp ~ date, alpha = 0.4) %>%
  gf_facet_grid(city ~ .)
```

---

gf_rug *Formula interface to geom_rug()*

Description

gf_rugx() and gf_rugy() are versions that only add a rug to x- or y- axis. By default, these functions do not inherit from the formula in the original layer (because doing so would often result in rugs on both axes), so the formula is required.

Usage

```
gf_rug(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  sides = "bl",
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "rug",
  stat = "identity",
  position = "identity",
  show.legend = NA,
```

```
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )

  gf_rugx(
    object = NULL,
    gformula = NULL,
    data = NULL,
    ...,
    sides = "b",
    alpha,
    color,
    group,
    linetype,
    size,
    height = 0,
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "rug",
    stat = "identity",
    position = "identity",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )

  gf_rugy(
    object = NULL,
    gformula = NULL,
    data = NULL,
    ...,
    sides = "l",
    alpha,
    color,
    group,
    linetype,
    size,
    width = 0,
    xlab,
    ylab,
    title,
    subtitle,
    caption,
```

```
    geom = "rug",
    stat = "identity",
    position = "identity",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x` (`gf_rug()`) or `~ x` (`gf_rugx()`) or `~ y` (`gf_rugy()`).
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`sides`	A string that controls which sides of the plot the rugs appear on. It can be set to a string containing any of `"trbl"`, for top, right, bottom, and left.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.

show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.
height	amount of vertical jittering when position is jittered.
width	amount of horizontal jittering when position is jittered.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_rug()

Examples

```
gf_point(Sepal.Length ~ Sepal.Width, data = iris) %>%
  gf_rug(Sepal.Length ~ Sepal.Width)

# There are several ways to control x- and y-rugs separately
gf_point(Sepal.Length ~ Sepal.Width, data = iris) %>%
  gf_rugx(~Sepal.Width, data = iris, color = "red") %>%
  gf_rugy(Sepal.Length ~ ., data = iris, color = "green")

gf_point(Sepal.Length ~ Sepal.Width, data = iris) %>%
  gf_rug(. ~ Sepal.Width, data = iris, color = "red", inherit = FALSE) %>%
  gf_rug(Sepal.Length ~ ., data = iris, color = "green", inherit = FALSE)

gf_point(Sepal.Length ~ Sepal.Width, data = iris) %>%
  gf_rug(. ~ Sepal.Width, data = iris, color = "red", sides = "b") %>%
```

```
  gf_rug(Sepal.Length ~ ., data = iris, color = "green", sides = "l")

# jitter requires both an x and a y, but we can turn off one or the other with sides
gf_jitter(Sepal.Length ~ Sepal.Width, data = iris) %>%
  gf_rug(color = "green", sides = "b", position = "jitter")

# rugs work with some 1-varialbe plots as well.
gf_histogram(~eruptions, data = faithful) %>%
  gf_rug(~eruptions, data = faithful, color = "red") %>%
  gf_rug(~eruptions, data = faithful, color = "navy", sides = "t")

# we can take advantage of inheritance to shorten the code
gf_histogram(~eruptions, data = faithful) %>%
  gf_rug(color = "red") %>%
  gf_rug(color = "navy", sides = "t")

# Need to turn off inheritance when using gf_dhistogram:
gf_dhistogram(~eruptions, data = faithful) %>%
  gf_rug(~eruptions, data = faithful, color = "red", inherit = FALSE)

# using jitter with gf_histogram() requires manually setting the y value.
gf_dhistogram(~Sepal.Width, data = iris) %>%
  gf_rug(0 ~ Sepal.Width, data = iris, color = "green", sides = "b", position = "jitter")

# the choice of y value can affect how the plot looks.
gf_dhistogram(~Sepal.Width, data = iris) %>%
  gf_rug(0.5 ~ Sepal.Width, data = iris, color = "green", sides = "b", position = "jitter")
```

---

gf_segment *Formula interface to geom_segment()*

Description

geom_segment draws a straight line between points (x, y) and (xend, yend). geom_curve draws a curved line. See the underlying drawing function grid::curveGrob() for the parameters that control the curve.

Usage

```
gf_segment(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
```

```
  arrow = NULL,
  lineend = "butt",
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "segment",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y + yend ~ x + xend`.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x, 10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`arrow`	specification for arrow heads, as created by arrow().
`lineend`	Line end style (round, butt, square).
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.

title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	The statistical transformation to use on the data for this layer, as a string.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_segment()

Examples

```
D <- data.frame(x1 = 2.62, x2 = 3.57, y1 = 21.0, y2 = 15.0)
gf_point(mpg ~ wt, data = mtcars) %>%
  gf_curve(y1 + y2 ~ x1 + x2, data = D, color = "navy") %>%
  gf_segment(y1 + y2 ~ x1 + x2, data = D, color = "red")
```

gf_sf *Mapping with shape files*

Description

Mapping with shape files

Usage

```
gf_sf(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  geometry,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  stat = "sf",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	A data frame with the variables to be plotted.
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, (c) attributes of the layer as a whole, which are set with `attribute = value`, or (d) arguments for the geom, stat, or position function.
`alpha`	Opacity (0 = invisible, 1 = opaque).

color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
geometry	A column of class sfc containing simple features data. (Another option is that `data` may contain a column named `geometry`.) `geometry` is never inherited.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If `TRUE`, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_line(), gf_point()

Examples

```
if (require(maps) && require(maptools) &&
  require(sf) && require(rgeos) &&
  utils::packageVersion("ggplot2") > "2.2.1") {
  US <- sf::st_as_sf(map("state", plot = FALSE, fill = TRUE))
  gf_sf(fill = ~ factor(nchar(ID)), data = US) %>%
    gf_refine(coord_sf())

  # We can specify shape data and external data separately using geometry
  MI <- sf::st_as_sf(map("county", "michigan", plot = FALSE, fill = TRUE))
  gf_sf(
    fill = ~ log10(population), data = MIpop %>% dplyr::arrange(county),
    geometry = ~ MI$geometry, color = "white"
  ) %>%
    gf_refine(coord_sf(), theme_bw())

  # alternatively we can merge external data and shape data into one data frame.
  MI %>%
    dplyr::mutate(county = gsub("michigan,", "", ID)) %>%
    dplyr::left_join(MIpop %>% dplyr::mutate(county = tolower(county))) %>%
    gf_sf(fill = ~ population / 1e3) %>%
    gf_refine(
      coord_sf(), theme_bw(),
      scale_fill_continuous(name = "population (thousands)", trans = "log10")
    )
}
```

---

gf_sina — *Formula interface to geom_sina()*

Description

The sina plot is a data visualization chart suitable for plotting any single variable in a multiclass dataset. It is an enhanced jitter strip chart, where the width of the jitter is controlled by the density distribution of the data within each class.

Usage

```
gf_sina(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
```

```
  color,
  size,
  fill,
  group,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "point",
  stat = "sina",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`size`	A numeric size or a formula used for mapping size.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.

caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	The geometric object to use display the data
stat	The statistical transformation to use on the data for this layer, as a string.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggforce::geom_sina()

Examples

```
gf_sina(age ~ substance, data = mosaicData::HELPrct)
```

gf_smooth *Formula interface to geom_smooth()*

Description

LOESS and linear model smoothers in ggformula.

Usage

```
gf_smooth(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  method = "auto",
  formula = y ~ x,
  se = FALSE,
  method.args,
  n = 80,
  span = 0.75,
  fullrange = FALSE,
  level = 0.95,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "smooth",
  stat = "smooth",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_lm(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha = 0.3,
  lm.args = list(),
  interval = "none",
  level = 0.95,
  fullrange = TRUE,
  xlab,
```

```
  ylab,
  title,
  subtitle,
  caption,
  geom = "lm",
  stat = "lm",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	A data frame with the variables to be plotted.
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`method`	Smoothing method (function) to use, accepts either `NULL` or a character vector, e.g. `"lm"`, `"glm"`, `"gam"`, `"loess"` or a function, e.g. `MASS::rlm` or `mgcv::gam`, `stats::lm`, or `stats::loess`. `"auto"` is also accepted for backwards compatibility. It is equivalent to `NULL`. For `method = NULL` the smoothing method is chosen based on the size of the largest group (across all panels). `stats::loess()` is used for less than 1,000 observations; otherwise `mgcv::gam()` is used with `formula = y ~ s(x, bs = "cs")` with `method = "REML"`. Somewhat anecdotally, `loess` gives a better appearance, but is $O(N^2)$ in memory, so does not work for larger datasets. If you have fewer than 1,000 observations but want to use the same `gam()` model that `method = NULL` would use, then set method = "gam", formula = y ~ s(x, bs = "cs").
`formula`	Formula to use in smoothing function, eg. `y ~ x`, `y ~ poly(x, 2)`, `y ~ log(x)`. `NULL` by default, in which case `method = NULL` implies `formula = y ~ x` when there are fewer than 1,000 observations and `formula = y ~ s(x, bs = "cs")` otherwise.
`se`	Display confidence interval around smooth? (`TRUE` by default, see `level` to control.)
`method.args`	List of additional arguments passed on to the modelling function defined by `method`.
`n`	Number of points at which to evaluate smoother.
`span`	Controls the amount of smoothing for the default loess smoother. Smaller numbers produce wigglier lines, larger numbers produce smoother lines.

fullrange	Should the fit span the full range of the plot, or just the data?
level	Level of confidence interval to use (0.95 by default).
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. NA, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.
alpha	Opacity (0 = invisible, 1 = opaque).
lm.args	A list of arguments to stats::lm().
interval	One of "none", "confidence" or "prediction".

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_smooth(), gf_spline()

Examples

```
gf_smooth()
gf_lm()
gf_smooth(births ~ date, color = ~wday, data = mosaicData::Births78)
gf_smooth(births ~ date,
  color = ~wday, data = mosaicData::Births78,
  fullrange = TRUE
)
gf_smooth(births ~ date,
  color = ~wday, data = mosaicData::Births78,
  show.legend = FALSE, se = FALSE
)
gf_smooth(births ~ date,
  color = ~wday, data = mosaicData::Births78,
  show.legend = FALSE, se = TRUE
)
gf_lm(length ~ width,
  data = mosaicData::KidsFeet,
  color = ~biggerfoot, alpha = 0.2
) %>%
  gf_point()
gf_lm(length ~ width,
  data = mosaicData::KidsFeet,
  color = ~biggerfoot, fullrange = FALSE, alpha = 0.2
)
gf_point()
gf_lm(length ~ width,
  color = ~sex, data = mosaicData::KidsFeet,
  formula = y ~ poly(x, 2), linetype = "dashed"
) %>%
  gf_point()
gf_lm(length ~ width,
  color = ~sex, data = mosaicData::KidsFeet,
  formula = log(y) ~ x, backtrans = exp
) %>%
  gf_point()

gf_lm(hwy ~ displ,
  data = mpg,
  formula = log(y) ~ poly(x, 3), backtrans = exp,
  interval = "prediction", fill = "skyblue"
) %>%
  gf_lm(
    formula = log(y) ~ poly(x, 3), backtrans = exp,
    interval = "confidence", color = "red"
  ) %>%
  gf_point()
```

`gf_spline` *Formula interface to geom_spline()*

Description

Fitting splines in ggformula.

Usage

```
gf_spline(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  weight,
  df,
  spar,
  tol,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "line",
  stat = "spline",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape y ~ x. Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute = ~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
group	Used for grouping.

linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
weight	An optional vector of weights. See `smooth.spline()`.
df	desired equivalent degrees of freedom. See `smooth.spline()` for details.
spar	A smoothing parameter, typically in (0,1]. See `smooth.spline()` for details.
tol	A tolerance for sameness or uniqueness of the `x` values. The values are binned into bins of size tol and values which fall into the same bin are regarded as the same. Must be strictly positive (and finite). When `NULL`, `IQR(x) * 10e-6` is used.
xlab	Label for x-axis. See also `gf_labs()`.
ylab	Label for y-axis. See also `gf_labs()`.
title	Title, sub-title, and caption for the plot. See also `gf_labs()`.
subtitle	Title, sub-title, and caption for the plot. See also `gf_labs()`.
caption	Title, sub-title, and caption for the plot. See also `gf_labs()`.
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. `NA`, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If `TRUE`, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

geom_spline(), gf_smooth(), gf_lm()

Examples

```
gf_spline(births ~ date, color = ~wday, data = mosaicData::Births78)
gf_spline(births ~ date, color = ~wday, data = mosaicData::Births78, df = 20)
gf_spline(births ~ date, color = ~wday, data = mosaicData::Births78, df = 4)
```

---

gf_spoke *Formula interface to geom_spoke()*

Description

This is a polar parameterisation of geom_segment. It is useful when you have variables that describe direction and distance.

Usage

```
gf_spoke(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  angle,
  radius,
  alpha,
  color,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "spoke",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x, 10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`angle`	The angle at which segment leaves the point (x,y).
`radius`	The length of the segment.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_spoke()`

Examples

```
SomeData <- expand.grid(x = 1:10, y = 1:10)
SomeData$angle <- runif(100, 0, 2 * pi)
SomeData$speed <- runif(100, 0, sqrt(0.1 * SomeData$x))

gf_point(y ~ x, data = SomeData) %>%
  gf_spoke(y ~ x, angle = ~angle, radius = 0.5)

gf_point(y ~ x, data = SomeData) %>%
  gf_spoke(y ~ x, angle = ~angle, radius = ~speed)
```

---

gf_step *Formula interface to geom_step()*

Description

`geom_path()` connects the observations in the order in which they appear in the data. `geom_line()` connects them in order of the variable on the x axis. `geom_step()` creates a stairstep plot, highlighting exactly when changes occur. The `group` aesthetic determines which cases are connected together.

Usage

```
gf_step(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  size,
  direction = "hv",
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "step",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).

`color`	A color or a formula used for mapping color.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`direction`	direction of stairs: 'vh' for vertical then horizontal, 'hv' for horizontal then vertical, or 'mid' for step half-way between adjacent x-values.
`xlab`	Label for x-axis. See also `gf_labs()`.
`ylab`	Label for y-axis. See also `gf_labs()`.
`title`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`subtitle`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	A character string naming the geom used to make the layer.
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.
`show.help`	If `TRUE`, display some minimal help.
`inherit`	A logical indicating whether default attributes are inherited.
`environment`	An environment in which to look for variables not found in `data`.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in `gformula`. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

ggplot2::geom_step()

Examples

```
gf_step(births ~ date, data = mosaicData::Births78, color = ~wday)

# Roll your own Kaplan-Meier plot

if (require(survival) && require(broom)) {
  # fit a survival model
  surv_fit <- survfit(coxph(Surv(time, status) ~ age + sex, lung))
  surv_fit
  # use broom::tidy() to create a tidy data frame for plotting
  surv_df <- tidy(surv_fit)
  head(surv_df)
  # now create a plot
  surv_df %>%
    gf_step(estimate ~ time) %>%
    gf_ribbon(conf.low + conf.high ~ time, alpha = 0.2)
}
```

---

gf_text *Formula interface to geom_text() and geom_label()*

Description

Text geoms are useful for labeling plots. They can be used by themselves as scatterplots or in cobination with other geoms, for example, for labeling points or for annotating the height of bars. `geom_text()` adds only text to the plot. `geom_label()` draws a rectangle behind the text, making it easier to read.

Usage

```
gf_text(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  label,
  alpha,
  angle,
  color,
  family,
  fontface,
  group,
  hjust,
  lineheight,
```

```
  size,
  vjust,
  parse = FALSE,
  nudge_x = 0,
  nudge_y = 0,
  check_overlap = FALSE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "text",
  stat = "identity",
  position = "nudge",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_label(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  label,
  alpha,
  angle,
  color,
  family,
  fontface,
  group,
  hjust,
  vjust,
  lineheight,
  size,
  parse,
  nudge_x = 0,
  nudge_y = 0,
  label.padding = unit(0.25, "lines"),
  label.r = unit(0.15, "lines"),
  label.size = 0.25,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  stat = "identity",
```

```
  position = "nudge",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`label`	The text to be displayed.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`angle`	An angle for rotating the text.
`color`	A color or a formula used for mapping color.
`family`	A font family.
`fontface`	One of `"plain"`, `"bold"`, `"italic"`, or `"bold italic"`.
`group`	Used for grouping.
`hjust, vjust`	Numbers between 0 and 1 indicating how to justify text relative the the specified location.
`lineheight`	Line height.
`size`	A numeric size or a formula used for mapping size.
`parse`	If `TRUE`, the labels will be parsed into expressions and displayed as described in `?plotmath`.
`nudge_x`	Horizontal and vertical adjustment to nudge labels by. Useful for offsetting text from points, particularly on discrete scales. Cannot be jointy specified with `position`.

nudge_y	Horizontal and vertical adjustment to nudge labels by. Useful for offsetting text from points, particularly on discrete scales. Cannot be jointy specified with position.
check_overlap	If TRUE, text that overlaps previous text in the same layer will not be plotted. check_overlap happens at draw time and in the order of the data. Therefore data should be arranged by the label column before calling geom_label() or geom_text().
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	The statistical transformation to use on the data for this layer, as a string.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function. Cannot be jointy specified with nudge_x or nudge_y.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.
label.padding	Amount of padding around label. Defaults to 0.25 lines.
label.r	Radius of rounded corners. Defaults to 0.15 lines.
label.size	Size of label border, in mm.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

See Also

`ggplot2::geom_text()`

Examples

```
gf_text(Sepal.Length ~ Sepal.Width,
  data = iris,
  label = ~Species, color = ~Species, size = 2, angle = 30
)
gf_point(Sepal.Length ~ Sepal.Width, data = iris, color = ~Species) %>%
  gf_text(Sepal.Length ~ Sepal.Width,
    data = iris,
    label = ~Species, color = ~Species,
    size = 2, angle = 0, hjust = 0, nudge_x = 0.1, nudge_y = 0.1
  )
if (require(dplyr)) {
  iris_means <-
    iris %>%
    group_by(Species) %>%
    summarise(Sepal.Length = mean(Sepal.Length), Sepal.Width = mean(Sepal.Width))
  gf_point(Sepal.Length ~ Sepal.Width, data = iris, color = ~Species) %>%
    gf_label(Sepal.Length ~ Sepal.Width,
      data = iris_means,
      label = ~Species, color = ~Species, size = 2, alpha = 0.7
    )
}
```

---

gf_theme *Themes for ggformula*

Description

Themes for ggformula

Usage

```
gf_theme(object, theme, ...)
```

Arguments

object	a gg object
theme	a ggplot2 theme function like `theme_minimal()`.
...	If `theme` is missing, then these additional arguments are theme elements of the sort handled by `ggplot2::theme()`.

Value

a modified gg object

gf_tile *Formula interface to geom_tile()*

Description

geom_rect and geom_tile do the same thing, but are parameterised differently: geom_rect uses the locations of the four corners (xmin, xmax, ymin and ymax), while geom_tile uses the center of the tile and its size (x, y, width, height). geom_raster is a high performance special case for when all the tiles are the same size.

Usage

```
gf_tile(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "tile",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

Arguments

object	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
gformula	A formula with shape y ~ x. Faceting can be achieved by including | in the formula.
data	A data frame with the variables to be plotted.
...	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with attribute = value, (b) ggplot2 aesthetics to be mapped with attribute =

	~ expression, or (c) attributes of the layer as a whole, which are set with attribute = value.
alpha	Opacity (0 = invisible, 1 = opaque).
color	A color or a formula used for mapping color.
fill	A color for filling, or a formula used for mapping fill.
group	Used for grouping.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
size	A numeric size or a formula used for mapping size.
xlab	Label for x-axis. See also gf_labs().
ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	A character string naming the geom used to make the layer.
stat	A character string naming the stat used to make the layer.
position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
show.legend	A logical indicating whether this layer should be included in the legends. NA, the default, includes layer in the legends if any of the attributes of the layer are mapped.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of `gformula`. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

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See Also

`ggplot2::geom_tile()`

Examples

```
D <- expand.grid(x = 0:5, y = 0:5)
D$z <- runif(nrow(D))
gf_tile(y ~ x, fill = ~z, data = D)
gf_tile(z ~ x + y, data = D)
```

---

gf_violin — *Formula interface to geom_violin()*

Description

A violin plot is a compact display of a continuous distribution. It is a blend of `geom_boxplot()` and `geom_density()`: a violin plot is a mirrored density plot displayed in the same way as a boxplot.

Usage

```
gf_violin(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  size,
  weight,
  draw_quantiles = NULL,
  trim = TRUE,
  scale = "area",
  bw,
  adjust = 1,
  kernel = "gaussian",
```

```
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "violin",
    stat = "ydensity",
    position = "dodge",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )

  gf_violinh(
    object = NULL,
    gformula = NULL,
    data = NULL,
    ...,
    alpha,
    color,
    fill,
    group,
    linetype,
    size,
    weight,
    draw_quantiles = NULL,
    trim = TRUE,
    scale = "area",
    bw,
    adjust = 1,
    kernel = "gaussian",
    xlab,
    ylab,
    title,
    subtitle,
    caption,
    geom = "violinh",
    stat = "xdensity",
    position = "dodgev",
    show.legend = NA,
    show.help = NULL,
    inherit = TRUE,
    environment = parent.frame()
  )
```

Arguments

`object`	When chaining, this holds an object produced in the earlier portions of the chain. Most users can safely ignore this argument. See details and examples.
`gformula`	A formula with shape `y ~ x`. Faceting can be achieved by including `|` in the formula.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`...`	Additional arguments. Typically these are (a) ggplot2 aesthetics to be set with `attribute = value`, (b) ggplot2 aesthetics to be mapped with `attribute = ~ expression`, or (c) attributes of the layer as a whole, which are set with `attribute = value`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`size`	A numeric size or a formula used for mapping size.
`weight`	Useful for summarized data, `weight` provides a count of the number of values with the given combination of `x` and `y` values.
`draw_quantiles`	If `not(NULL)` (default), draw horizontal lines at the given quantiles of the density estimate.
`trim`	If `TRUE` (default), trim the tails of the violins to the range of the data. If `FALSE`, don't trim the tails.
`scale`	if "area" (default), all violins have the same area (before trimming the tails). If "count", areas are scaled proportionally to the number of observations. If "width", all violins have the same maximum width.
`bw`	The smoothing bandwidth to be used. If numeric, the standard deviation of the smoothing kernel. If character, a rule to choose the bandwidth, as listed in `stats::bw.nrd()`.
`adjust`	A multiplicate bandwidth adjustment. This makes it possible to adjust the bandwidth while still using the a bandwidth estimator. For example, `adjust = 1/2` means use half of the default bandwidth.
`kernel`	Kernel. See list of available kernels in `density()`.
`xlab`	Label for x-axis. See also `gf_labs()`.

ylab	Label for y-axis. See also gf_labs().
title	Title, sub-title, and caption for the plot. See also gf_labs().
subtitle	Title, sub-title, and caption for the plot. See also gf_labs().
caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom	Use to override the default connection between geom_violin and stat_ydensity.
stat	Use to override the default connection between geom_violin and stat_ydensity.
position	Position adjustment, either as a string, or the result of a call to a position adjustment function.
show.legend	logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
show.help	If TRUE, display some minimal help.
inherit	A logical indicating whether default attributes are inherited.
environment	An environment in which to look for variables not found in data.

Value

a gg object

Specifying plot attributes

Positional attributes (a.k.a, aesthetics) are specified using the formula in gformula. Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form attribute = value or mapped using arguments of the form attribute = ~ expression.

In formulas of the form A | B, B will be used to form facets using facet_wrap() or facet_grid(). This provides an alternative to gf_facet_wrap() and gf_facet_grid() that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment of gformula. This will typically do the right thing when formulas are created on the fly, but might not be the right thing if formulas created in one environment are used to create plots in another.

References

Hintze, J. L., Nelson, R. D. (1998) Violin Plots: A Box Plot-Density Trace Synergism. The American Statistician 52, 181-184.

See Also

ggplot2::geom_violin()

Examples

```
gf_violin(age ~ substance, data = mosaicData::HELPrct)
gf_violin(age ~ substance, data = mosaicData::HELPrct, fill = ~sex)
gf_violinh(substance ~ age, data = mosaicData::HELPrct)
gf_violinh(substance ~ age, data = mosaicData::HELPrct, fill = ~sex)
```

`ggformula` *Formula interface to ggplot2*

Description

Formula interface to ggplot2

The ggformula system

The functions in **ggformula** provide a formula interface to **ggplot2** layer functions and a system for working with pipes to create multi-layer plots and to refine plots. For plots with just one layer, the formula interface is more compact than native **ggplot2** code and is consistent with modeling functions like `stats::lm()` that use a formula interface and with the numerical summary functions in the **mosaic** package.

Specifying plot attributes

Positional attributes (a.k.a aesthetics) are typically specified using a formula (see the `gformula` argument). Setting and mapping of additional attributes can be done through the use of additional arguments. Attributes can be set can be set using arguments of the form `attribute = value` or mapped using arguments of the form `attribute = ~ expression`. A (sometimes partial) list of available attributes can be obtained by executing plotting functions with no arguments.

In formulas of the form `A | B`, `B` will be used to form facets using `facet_wrap()` or `facet_grid()`. This provides an alternative to `gf_facet_wrap()` and `gf_facet_grid()` that is terser and may feel more familiar to users of **lattice**.

Evaluation

Evaluation of the **ggplot2** code occurs in the environment specified by `environment`. This will typically do the right thing, but is exposed in case some non-standard behavior is desired. In earlier versions, the environment of the formula was used, but since some functions in the package do not require a formula, a separate argument is used now.

Examples

```
apropos("gf_")
gf_point()
```

layer_factory *Create a ggformula layer function*

Description

Primarily intended for package developers, this function factory is used to create the layer functions in the ggformula package.

Usage

```
layer_factory(
  geom = "point",
  position = "identity",
  stat = "identity",
  pre = { },
  aes_form = y ~ x,
  extras = alist(),
  note = NULL,
  aesthetics = aes(),
  inherit.aes = TRUE,
  check.aes = TRUE,
  data = NULL,
  layer_fun = quo(ggplot2::layer)
)
```

Arguments

`geom`	The geom to use for the layer (may be specified as a string).
`position`	The position function to use for the layer (may be specified as a string).
`stat`	The stat function to use for the layer (may be specified as a string).
`pre`	code to run as a "pre-process".
`aes_form`	A single formula or a list of formulas specifying how attributes are inferred from the formula. Use `NULL` if the function may be used without a formula.
`extras`	An alist of additional arguments (potentially with defaults)
`note`	A note to add to the quick help.
`aesthetics`	Additional aesthetics (typically created using `ggplot2::aes()`) set rather than inferred from formula. `gf_dhistogram()` uses this to set the y aesthetic to `stat(density)`, for example.
`inherit.aes`	A logical indicating whether aesthetics should be inherited from prior layers or a vector of character names of aesthetics to inherit.
`check.aes`	A logical indicating whether a warning should be emited when aesthetics provided don't match what is expected.
`data`	A data frame or `NULL` or `NA`.
`layer_fun`	The function used to create the layer or a quosure that evaluates to such a function.

Value

A function.

`MIpop` *Population of Michigan counties*

Description

Population of Michigan counties

Usage

```
data(MIpop)
```

Format

A data frame with populations of Michigan counties.

rank Population rank.

county County name.

population Population (2010 census).

`StatAsh` *ggproto classes for ggplot2*

Description

These are typically accessed through their associated geom_*, stat_* or gf_* functions.

These are typically accessed through their associated geom_*, stat_* or gf_* functions.

Usage

```
StatAsh

StatSpline

StatQqline

StatLm

GeomLm

StatAsh

StatFitdistr
```

See Also

stat_ash()

gf_ash()

stat_spline()

gf_spline()

stat_qq()

gf_qq()

stat_lm()

gf_lm()

geom_lm()

gf_lm()

stat_ash()

gf_ash()

---

stat_fitdistr *A stat for fitting distributions*

Description

This stat computes points for plotting a distribution function. Fitting is done using `MASS::fitdistr()` when analytic solutions are not available.

Usage

```
stat_fitdistr(
  mapping = NULL,
  data = NULL,
  geom = "path",
  position = "identity",
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE,
  dist = "dnorm",
  start = NULL,
  ...
)
```

Arguments

mapping	Aesthetics created using `aes()` or `aes_string()`.
data	A data frame.
geom	A character string naming the geom used to make the layer.

position	Either a character string naming the position function used for the layer or a position object returned from a call to a position function.
na.rm	If TRUE, do not emit a warning about missing data.
show.legend	A logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes.
inherit.aes	If FALSE, overrides the default aesthetics, rather than combining with them.
dist	A character string indicating the distribution to fit. Examples include "dnorm", "dgamma", etc.
start	A list of starting values used by MASS::fitdistr() when numerically approximating the maximum likelihood estimate.
...	Additional arguments.

Value

A gg object

---

stat_lm *Linear Model Displays*

Description

Adds linear model fits to plots. geom_lm() and stat_lm() are essentially equivalent. Use geom_lm() unless you want a non-standard geom.

Usage

```
stat_lm(
  mapping = NULL,
  data = NULL,
  geom = "lm",
  position = "identity",
  interval = c("none", "prediction", "confidence"),
  level = 0.95,
  formula = y ~ x,
  lm.args = list(),
  backtrans = identity,
  ...,
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE
)

geom_lm(
  mapping = NULL,
  data = NULL,
```

```
  stat = "lm",
  position = "identity",
  interval = c("none", "prediction", "confidence"),
  level = 0.95,
  formula = y ~ x,
  lm.args = list(),
  backtrans = identity,
  ...,
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE
)
```

Arguments

`mapping`	Set of aesthetic mappings created by `aes()` or `aes_()`. If specified and `inherit.aes = TRUE` (the default), it is combined with the default mapping at the top level of the plot. You must supply `mapping` if there is no plot mapping.
`data`	The data to be displayed in this layer. There are three options: If `NULL`, the default, the data is inherited from the plot data as specified in the call to `ggplot()`. A `data.frame`, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created. A `function` will be called with a single argument, the plot data. The return value must be a `data.frame`, and will be used as the layer data. A `function` can be created from a `formula` (e.g. `~ head(.x,10)`).
`geom, stat`	Use to override the default connection between `geom_lm` and `stat_lm`.
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function.
`interval`	One of `"none"`, `"confidence"` or `"prediction"`.
`level`	The level used for confidence or prediction intervals
`formula`	a formula describing the model in terms of `y` (response) and `x` (predictor).
`lm.args`	A list of arguments supplied to `lm()` when performing the fit.
`backtrans`	a function that transforms the response back to the original scale when the `formula` includes a transformation on `y`.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`na.rm`	If `FALSE`, the default, missing values are removed with a warning. If `TRUE`, missing values are silently removed.
`show.legend`	logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.

inherit.aes If FALSE, overrides the default aesthetics, rather than combining with them. This is most useful for helper functions that define both data and aesthetics and shouldn't inherit behaviour from the default plot specification, e.g. borders().

Details

Stat calculation is performed by the (currently undocumented) predictdf. Pointwise confidence or prediction bands are calculated using the predict() method.

See Also

lm() for details on linear model fitting.

Examples

```
ggplot(data = mosaicData::KidsFeet, aes(y = length, x = width, color = sex)) +
  geom_lm() +
  geom_point()
ggplot(data = mosaicData::KidsFeet, aes(y = length, x = width, color = sex)) +
  geom_lm(interval = "prediction", color = "skyblue") +
  geom_lm(interval = "confidence") +
  geom_point() +
  facet_wrap(~sex)
# non-standard display
ggplot(data = mosaicData::KidsFeet, aes(y = length, x = width, color = sex)) +
  stat_lm(aes(fill = sex),
    color = NA, interval = "confidence", geom = "ribbon",
    alpha = 0.2
  ) +
  geom_point() +
  facet_wrap(~sex)
ggplot(mpg, aes(displ, hwy)) +
  geom_lm(
    formula = log(y) ~ poly(x, 3), backtrans = exp,
    interval = "prediction", fill = "skyblue"
  ) +
  geom_lm(
    formula = log(y) ~ poly(x, 3), backtrans = exp, interval = "confidence",
    color = "red"
  ) +
  geom_point()
```

---

stat_qqline *A Stat for Adding Reference Lines to QQ-Plots*

Description

This stat computes quantiles of the sample and theoretical distribution for the purpose of providing reference lines for QQ-plots.

Usage

```
stat_qqline(
  mapping = NULL,
  data = NULL,
  geom = "line",
  position = "identity",
  ...,
  distribution = stats::qnorm,
  dparams = list(),
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE
)
```

Arguments

mapping	An aesthetic mapping produced with aes() or aes_string().
data	A data frame.
geom	A geom.
position	A position object.
...	Additional arguments
distribution	A quantile function.
dparams	A list of arguments for distribution.
na.rm	A logical indicating whether a warning should be issued when missing values are removed before plotting.
show.legend	A logical indicating whether legends should be included for this layer. If NA, legends will be include for each aesthetic that is mapped.
inherit.aes	A logical indicating whether aesthetics should be inherited. When FALSE, the supplied mapping will be the only aesthetics used.

Examples

```
ggplot(data = iris, aes(sample = Sepal.Length)) +
  geom_qq() +
  stat_qqline(alpha = 0.7, color = "red", linetype = "dashed") +
  facet_wrap(~Species)
```

---

stat_spline *Geoms and stats for spline smoothing*

Description

Similar to geom_smooth, this adds spline fits to plots.

Usage

```
stat_spline(
  mapping = NULL,
  data = NULL,
  geom = "line",
  position = "identity",
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE,
  weight = NULL,
  df = NULL,
  spar = NULL,
  cv = FALSE,
  all.knots = FALSE,
  nknots = stats::.nknots.smspl,
  df.offset = 0,
  penalty = 1,
  control.spar = list(),
  tol = NULL,
  ...
)

geom_spline(
  mapping = NULL,
  data = NULL,
  stat = "spline",
  position = "identity",
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE,
  weight = NULL,
  df = NULL,
  spar = NULL,
  cv = FALSE,
  all.knots = FALSE,
  nknots = stats::.nknots.smspl,
  df.offset = 0,
  penalty = 1,
  control.spar = list(),
  tol = NULL,
  ...
)
```

Arguments

`mapping`	An aesthetic mapping produced with `aes()` or `aes_string()`.
`data`	A data frame.
`geom`	A geom.

`position`	A position object.
`na.rm`	A logical indicating whether a warning should be issued when missing values are removed before plotting.
`show.legend`	A logical indicating whether legends should be included for this layer. If `NA`, legends will be included for each aesthetic that is mapped.
`inherit.aes`	A logical indicating whether aesthetics should be inherited. When `FALSE`, the supplied `mapping` will be the only aesthetics used.
`weight`	An optional vector of weights. See `smooth.spline()`.
`df`	desired equivalent degrees of freedom. See `smooth.spline()` for details.
`spar`	A smoothing parameter, typically in (0,1]. See `smooth.spline()` for details.
`cv`	A logical. See `smooth.spline()` for details.
`all.knots`	A logical. See `smooth.spline()` for details.
`nknots`	An integer or function giving the number of knots to use when `all.knots = FALSE`. See `smooth.spline()` for details.
`df.offset`	A numerical value used to increase the degrees of freedom when using GVC. See `smooth.spline()` for details.
`penalty`	the coefficient of the penalty for degrees of freedom in the GVC criterion. See `smooth.spline()` for details.
`control.spar`	An optional list used to control root finding when the parameter `spar` is computed. See `smooth.spline()` for details.
`tol`	A tolerance for sameness or uniqueness of the `x` values. The values are binned into bins of size tol and values which fall into the same bin are regarded as the same. Must be strictly positive (and finite). When `NULL`, `IQR(x) * 10e-6` is used.
`...`	Additional arguments
`stat`	A stat.

Examples

```
if (require(mosaicData)) {
  ggplot(Births) + geom_spline(aes(x = date, y = births, colour = wday))
  ggplot(Births) + geom_spline(aes(x = date, y = births, colour = wday), nknots = 10)
}
```

Index