Package ‘ggformula’

July 31, 2025

Title Formula Interface to the Grammar of Graphics

Description Provides a formula interface to 'ggplot2' graphics.

Type Package

Version 0.12.2

License MIT + file LICENSE

LazyData TRUE

LazyLoad TRUE

Depends R (>= 4.1), ggplot2 (>= 3.3), scales, ggridges

Imports mosaicCore (>= 0.7.0), rlang, tibble, stringr, grid, labelled

Suggests tidyr, mosaicData, dplyr, lattice, mosaic, palmerpenguins, testthat, vdiffr, knitr, rmarkdown, lubridate, survival, broom, maps, sf, purrr, ggthemes, covr, ggplot2movies, interp, quantreg

VignetteBuilder knitr

RoxygenNote 7.3.2

Encoding UTF-8

URL `https://github.com/ProjectMOSAIC/ggformula`

BugReports `https://github.com/ProjectMOSAIC/ggformula/issues`

Collate 'MIpop-doc.R' 'formula2aes.R' 'gf_aux.R' 'gf_dist.R' 'layer_factory.R' 'gf_function2d.R' 'gf_functions.R' 'gf_plot.R' 'ggridges.R' 'ggstrings.R' 'newplots.R' 'reexports.R' 'scales.R' 'utils.R' 'relabel.R' 'vdiffr.R' 'ggstance-deprecated.R' 'ggformula-package.R' 'zzz.R'

NeedsCompilation no

Author Daniel Kaplan [aut],
Randall Pruim [aut, cre]

Maintainer Randall Pruim <`rpruim@calvin.edu`>

Repository CRAN

Date/Publication 2025-07-31 12:30:02 UTC

Contents

`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)))
```

`get_variable_labels` *Set and extract labels from a labeled object*

Description

Some packages like expss provide mechanisms for providing longer labels to R objects. These labels can be used when labeling plots and tables, for example, without requiring long or awkward variable names. This is an experimental feature and currently only supports expss or any other system that stores a label in the `label` attribute of a vector.

Usage

```
get_variable_labels(...)
```

Arguments

`...`	passed to `labelled::var_label()`

Details

`get_variable_labels()` is a synonym of `labelled::var_label()`.

See Also

`labelled::var_label()`, `labelled::set_variable_labels()`

Examples

```
KF <-
  mosaicData::KidsFeet |>
  set_variable_labels(
      length      = 'foot length (cm)',
      width       = 'foot width (cm)',
      birthmonth  = 'birth month',
      birthyear   = 'birth year',
      biggerfoot  = 'bigger foot',
      domhand     = 'dominant hand'
  )
KF |>
  gf_point(length ~ width, color = ~ domhand)
get_variable_labels(KF)
```

`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,
  linetype,
  linewidth,
  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,
  linetype,
  linewidth,
  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,
  linetype,
  linewidth,
  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`.

color	A color or a formula used for mapping color.
linetype	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
linewidth	A numerical line width or a formula used for mapping linewidth.
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, subtitle, 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.
xintercept, yintercept, slope, intercept	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_annotate *Add an annotation layer to a graphic*

Description

This function adds geoms to a plot, but unlike a typical geom function, the properties of the geoms are not mapped from variables of a data frame, but are instead passed in as vectors. This is useful for adding small annotations (such as text labels) or if you have your data in vectors, and for some reason don't want to put them in a data frame.

Usage

```
gf_annotate(
  object,
  geom = "text",
  x = NULL,
  y = NULL,
  xmin = NULL,
  xmax = NULL,
  ymin = NULL,
  ymax = NULL,
  xend = NULL,
  yend = NULL,
  ...,
  na.rm = FALSE
)
```

Arguments

`object`	a gg object
`geom`	name of geom to use for annotation
`x`, `y`, `xmin`, `ymin`, `xmax`, `ymax`, `xend`, `yend`	positioning aesthetics - you must specify at least one of these.
`...`	Other arguments passed on to `layer()`'s `params` argument. These arguments broadly fall into one of 4 categories below. Notably, further arguments to the `position` argument, or aesthetics that are required can *not* be passed through `...`. Unknown arguments that are not part of the 4 categories below are ignored. • Static aesthetics that are not mapped to a scale, but are at a fixed value and apply to the layer as a whole. For example, `colour = "red"` or `linewidth = 3`. The geom's documentation has an **Aesthetics** section that lists the available options. The 'required' aesthetics cannot be passed on to the `params`. Please note that while passing unmapped aesthetics as vectors is technically possible, the order and required length is not guaranteed to be parallel to the input data. • When constructing a layer using a `stat_*()` function, the `...` argument can be used to pass on parameters to the `geom` part of the layer. An example of this is `stat_density(geom = "area", outline.type = "both")`. The geom's documentation lists which parameters it can accept. • Inversely, when constructing a layer using a `geom_*()` function, the `...` argument can be used to pass on parameters to the `stat` part of the layer. An example of this is `geom_area(stat = "density", adjust = 0.5)`. The stat's documentation lists which parameters it can accept. • The `key_glyph` argument of `layer()` may also be passed on through `...`. This can be one of the functions described as key glyphs, to change the display of the layer in the legend.
`na.rm`	If `FALSE`, the default, missing values are removed with a warning. If `TRUE`, missing values are silently removed.

Details

Note that all position aesthetics are scaled (i.e. they will expand the limits of the plot so they are visible), but all other aesthetics are set. This means that layers created with this function will never affect the legend.

Unsupported geoms

Due to their special nature, reference line geoms `geom_abline()`, `geom_hline()`, and `geom_vline()` can't be used with `annotate()`. You can use these geoms directly for annotations.

See Also

The custom annotations section of the online ggplot2 book.

Examples

```
p <- gf_point(mpg ~wt, data = mtcars)
p |> gf_annotate("text", x = 4, y = 25, label = "Some text")
p |> gf_annotate("text", x = 2:5, y = 25, label = "Some text")
p |> gf_annotate("rect", xmin = 3, xmax = 4.2, ymin = 12, ymax = 21,
             alpha = .2)
p |> gf_annotate("segment", x = 2.5, xend = 4, y = 15, yend = 25,
             colour = "blue")
p |> gf_annotate("pointrange", x = 3.5, y = 20, ymin = 12, ymax = 28,
             colour = "red", size = 2.5, linewidth = 1.5)

p |> gf_annotate("text", x = 2:3, y = 20:21, label = c("my label", "label 2"))

p |> gf_annotate("text", x = 4, y = 25, label = "italic(R) ^ 2 == 0.75",
             parse = TRUE)
p |> gf_annotate("text", x = 4, y = 25,
             label = "paste(italic(R) ^ 2, \" = .75\")", parse = TRUE)
```

`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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`	The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following: • A `Geom` ggproto subclass, for example `GeomPoint`. • A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`. • For more information and other ways to specify the geom, see the layer geom documentation.
`stat`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`.
`mapping`	set of aesthetic mappings created by ggplot2::aes()] or `ggplot2::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 `ggplot2::facet_wrap()` or `ggplot2::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()`, `gf_histogram()`.

Examples

```
data(penguins, package = "palmerpenguins")
gf_ash(~bill_length_mm, color = ~species, data = penguins)
gf_ash(~bill_length_mm, color = ~species, data = penguins, adjust = 2)
gf_ash(~bill_length_mm, color = ~species, data = penguins, binwidth = 1)
gf_ash(~bill_length_mm, color = ~species, data = penguins, binwidth = 1, 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,
  linewidth,
  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,
  linewidth,
  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,
  linewidth,
  xlab,
  ylab = "proportion",
  title,
  subtitle,
  caption,
  geom = "bar",
  stat = "count",
  position = "stack",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame(),
  denom = ~PANEL
)

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

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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`width`	Width of the bars.
`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`, `stat`	Override the default connection between `geom_bar()` and `stat_count()`. For more information about overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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`.
`denom`	A formula, the right hand side of which describes the denominators used for computing proportions and percents. These are computed after the stat has been applied to the data and should refer to variables available at that point. See the examples.

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 `ggplot2::facet_wrap()` or `ggplot2::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
# use denom to control which denominators are used.
gf_props(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge()
)
gf_props(substance ~ .,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge(),
  orientation = 'y'
)
gf_props(substance ~ .,
  data = mosaicData::HELPrct, fill = ~sex,
  position = "dodge"
)
```

```
gf_percents(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge()
)
gf_percents(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge(),
  denom = ~x
)
gf_percents(~substance,
  data = mosaicData::HELPrct, fill = ~sex,
  position = position_dodge(),
  denom = ~fill
)
gf_percents(~substance | sex,
  data = mosaicData::HELPrct, fill = ~homeless,
  position = position_dodge()
)
gf_percents(~substance | sex,
  data = mosaicData::HELPrct,
  fill = ~homeless,
  denom = ~fill,
  position = position_dodge()
)
gf_percents(~substance | sex,
  data = mosaicData::HELPrct,
  fill = ~homeless,
  denom = ~interaction(fill, PANEL),
  position = position_dodge()
)
if (require(scales)) {
  gf_percents(~substance,
    data = mosaicData::HELPrct, fill = ~sex,
    position = position_dodge(),
    denom = ~ x,
  ) |>
    gf_refine(scale_y_continuous(labels = scales::percent))
}
```

gf_barh *Deprecated horizontal plotting functions*

Description

These functions were wrappers around functions from ggstance from an era before ggplot2 supported horizonally oriented geoms. ggstance has not been updated to comply with the current version of ggplot2, and since the functionalilty is now available by other means, these functions have been deprecated.

Usage

```
gf_barh(...)

gf_countsh(...)

gf_colh(...)

gf_propsh(...)

gf_percentsh(...)

gf_boxploth(...)

gf_linerangeh(...)

gf_pointrangeh(...)

gf_crossbarh(...)

gf_violinh(...)

gf_errorbarh(...)
```

Arguments

`...`	additional arguments

Examples

```
gf_violin(carat ~ color, data = diamonds)
gf_violin(carat ~ color, data = diamonds) |>
  gf_refine(coord_flip())
gf_violin(color ~ carat, data = diamonds)
gf_density(~ carat, data = diamonds)
gf_density(carat ~ ., data = diamonds)
```

`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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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 `ggplot2::facet_wrap()` or `ggplot2::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 `ggplot2::facet_wrap()` or `ggplot2::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, 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 `ggplot2::facet_wrap()` or `ggplot2::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,
  linewidth,
  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,
  orientation = NA,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`coef`	Length of the whiskers as multiple of IQR. Defaults to 1.5.

`outlier.color`, `outlier.fill`, `outlier.shape`, `outlier.size`, `outlier.stroke`, `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).
`orientation`	The orientation of the layer. The default (`NA`) automatically determines the orientation from the aesthetic mapping. In the rare event that this fails it can be given explicitly by setting `orientation` to either `"x"` or `"y"`. See the *Orientation* section for more detail.
`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`, `stat`	Use to override the default connection between `geom_boxplot()` and `stat_boxplot()`. For more information about overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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_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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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 `ggplot2::facet_wrap()` or `ggplot2::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() and geom_contour_filled()*

Description

ggplot2 can not draw true 3D surfaces, but you can use `geom_contour()`, `geom_contour_filled()`, and `geom_tile()` to visualise 3D surfaces in 2D.

These functions require regular data, where the x and y coordinates form an equally spaced grid, and each combination of x and y appears once. Missing values of z are allowed, but contouring will only work for grid points where all four corners are non-missing. If you have irregular data, you'll need to first interpolate on to a grid before visualising, using `interp::interp()`, `akima::bilinear()`, or similar.

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()
)

gf_contour_filled(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "contour_filled",
  stat = "contour_filled",
  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, subtitle, caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.

`geom` The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following:

- A `Geom` ggproto subclass, for example `GeomPoint`.
- A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`.
- For more information and other ways to specify the geom, see the layer geom documentation.

`stat` The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following:

- A `Stat` ggproto subclass, for example `StatCount`.
- A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`.
- For more information and other ways to specify the stat, see the layer stat documentation.

`position` A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following:

- The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position.
- A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`.
- For more information and other ways to specify the position, see the layer position documentation.

`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 `ggplot2::facet_wrap()` or `ggplot2::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_contour_filled(density ~ waiting + eruptions, data = faithfuld, bins = 10,
    show.legend = FALSE) |>
  gf_jitter(eruptions ~ waiting, data = faithful, color = "white", alpha = 0.5,
    inherit = FALSE)
```

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`, `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 `ggplot2::facet_wrap()` or `ggplot2::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. This doesn't make much difference
# here because the smallest count is already close to 0.

gf_count(hwy ~ cty, data = mpg, alpha = 0.3) |>
  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,
  middle.linetype,
  middle.colour = NULL,
  middle.color = NULL,
  middle.linewidth = NULL,
  box.colour = NULL,
  box.color = NULL,
  box.linetype = NULL,
  box.linewidth = NULL,
  na.rm = FALSE,
  orientation = NA,
  inherit.aes = TRUE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "crossbar",
  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.
`middle.linetype`, `middle.colour`, `middle.color`, `middle.linewidth`	Arguments to control the middle line.
`box.colour`, `box.color`, `box.linetype`, `box.linewidth`	Arguments to control the box.
`na.rm`	If `FALSE`, the default, missing values are removed with a warning. If `TRUE`, missing values are silently removed.
`orientation`	The orientation of the layer. The default (`NA`) automatically determines the orientation from the aesthetic mapping. In the rare event that this fails it can be given explicitly by setting `orientation` to either `"x"` or `"y"`. See the *Orientation* section for more detail.
`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()`.
`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`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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 |>
    summarise(.by = c(substance, sex),
      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", middle.linewidth = 1, middle.color = "red") |>
    gf_facet_grid(~sex)

  gf_jitter(substance ~ age, data = HELPrct,
      alpha = 0.7, height = 0.2, width = 0, color = "skyblue") |>
    gf_crossbar(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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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 `grid::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`, `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`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.

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 ggplot2::facet_wrap() or ggplot2::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,
  linewidth,
  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,
  fill = NA,
  group,
  linetype,
  linewidth,
  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()
)

gf_dens2(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha = 0.5,
  color,
  fill = NA,
  group,
  linetype,
  linewidth,
  kernel = "gaussian",
  n = 512,
  trim = FALSE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "density_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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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, subtitle, caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom, stat`	Use to override the default connection between `geom_density()` and `stat_density()`. For more information about overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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()
data(penguins, package = "palmerpenguins")
gf_density(~bill_length_mm, fill = ~species, data = penguins)
gf_dens(~bill_length_mm, color = ~species, data = penguins)
gf_dens2(~bill_length_mm, color = ~species, fill = ~species, data = penguins)
gf_freqpoly(~bill_length_mm, color = ~species, data = penguins, bins = 15)
# Chaining in the data
data(penguins, package = "palmerpenguins")
penguins |> gf_dens(~bill_length_mm, color = ~species)
# horizontal orientation
penguins |> gf_dens(bill_length_mm ~ ., color = ~species)
```

`gf_density_2d` *Formula interface to geom_density_2d() and geom_density_2d_filled()*

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()`. `geom_density_2d()` draws contour lines, and `geom_density_2d_filled()` draws filled contour bands.

Usage

```
gf_density_2d(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  linewidth,
  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_density_2d_filled(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  linewidth,
  contour = TRUE,
  n = 100,
  h = NULL,
  lineend = "butt",
  linejoin = "round",
  linemitre = 1,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "density_2d_filled",
  stat = "density_2d_filled",
  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,
  linewidth,
  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()
)

gf_density2d_filled(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  group,
  linetype,
  linewidth,
  contour = TRUE,
  n = 100,
  h = NULL,
  lineend = "butt",
  linejoin = "round",
  linemitre = 1,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "density2d_filled",
  stat = "density_2d_filled",
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`, `subtitle`, `caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`, `stat`	Use to override the default connection between `geom_density_2d()` and `stat_density_2d()`. For more information at overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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_density_2d_filled(avg_drinks ~ age, data = mosaicData::HELPrct, show.legend = FALSE) |>
  gf_jitter(avg_drinks ~ age,
    alpha = 0.3, data = mosaicData::HELPrct,
    width = 0.4, height = 0.4,
    color = "white"
)
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_density2d_filled(avg_drinks ~ age, data = mosaicData::HELPrct, show.legend = FALSE) |>
  gf_jitter(avg_drinks ~ age,
    alpha = 0.4, data = mosaicData::HELPrct,
    width = 0.4, height = 0.4,
    color = "white"
)
```

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,
  eps = 1e-06,
  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.
`eps`	a (small) numeric value. When other defaults are not available, the distribution is processed from the `eps` to `1 - eps` quantiles.
`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, linewidth = 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`, `subtitle`, `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 `ggplot2::facet_wrap()` or `ggplot2::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

```
data(penguins, package = "palmerpenguins")
gf_dotplot(~bill_length_mm, fill = ~species, data = penguins)
```

---

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()`'s `params` argument. These arguments broadly fall into one of 4 categories below. Notably, further arguments to the `position` argument, or aesthetics that are required can *not* be passed through `...`. Unknown arguments that are not part of the 4 categories below are ignored.

  - Static aesthetics that are not mapped to a scale, but are at a fixed value and apply to the layer as a whole. For example, `colour = "red"` or `linewidth = 3`. The geom's documentation has an **Aesthetics** section that lists the available options. The 'required' aesthetics cannot be passed on to the `params`. Please note that while passing unmapped aesthetics as vectors is technically possible, the order and required length is not guaranteed to be parallel to the input data.
  - When constructing a layer using a `stat_*()` function, the `...` argument can be used to pass on parameters to the `geom` part of the layer. An example of this is `stat_density(geom = "area", outline.type = "both")`. The geom's documentation lists which parameters it can accept.
  - Inversely, when constructing a layer using a `geom_*()` function, the `...` argument can be used to pass on parameters to the `stat` part of the layer. An example of this is `geom_area(stat = "density", adjust = 0.5)`. The stat's documentation lists which parameters it can accept.
  - The `key_glyph` argument of `layer()` may also be passed on through `...`. This can be one of the functions described as key glyphs, to change the display of the layer in the legend.

`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, subtitle, caption`
: Title, sub-title, and caption for the plot. See also `gf_labs()`.

`geom`	The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following: • A `Geom` ggproto subclass, for example `GeomPoint`. • A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`. • For more information and other ways to specify the geom, see the layer geom documentation.
`stat`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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, subtitle, 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()
data(penguins, package = "palmerpenguins")
gf_empty() |>
  gf_point(bill_length_mm ~ bill_depth_mm, data = penguins, 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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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` The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following:

- A `Geom` ggproto subclass, for example `GeomPoint`.
- A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`.
- For more information and other ways to specify the geom, see the layer geom documentation.

`stat` The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following:

- A `Stat` ggproto subclass, for example `StatCount`.
- A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`.
- For more information and other ways to specify the stat, see the layer stat documentation.

`position` A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following:

- The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position.

- A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`.
- For more information and other ways to specify the position, see the layer position documentation.

`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_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 `ggplot2::facet_wrap()` or `ggplot2::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, bins =25) |>
  gf_facet_grid(~substance)
gf_histogram(~avg_drinks, data = mosaicData::HELPrct, bins =25) |>
  gf_facet_grid(~substance, scales = "free")
gf_histogram(~avg_drinks, data = mosaicData::HELPrct, bins =25) |>
  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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`size`	size aesthetic for dots in pmf plots.
`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 `ggplot2::facet_wrap()` or `ggplot2::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(
  f = rf(500, df1 = 3, df2 = 47),
  g = rgamma(500, 3, 10)
)
gf_dhistogram(~g, data = Dat) |>
  gf_fitdistr(dist = "dgamma", linewidth = 1.4)
fitted_density <- mosaicCore::fit_distr_fun(~g, data = Dat, dist = "dgamma")
gf_dhistogram(~g, data = Dat) |>
  gf_fun(fitted_density(x) ~ x, inherit = FALSE)

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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`, `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 `binwidth`. For example, to center on integers use `binwidth = 1` and `center = 0`, even if `0` is outside the range of the data. Alternatively, this same alignment can be specified with `binwidth = 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`, `subtitle`, `caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`, `stat`	Use to override the default connection between `geom_histogram()`/`geom_freqpoly()` and `stat_bin()`. For more information at overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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

```
data(penguins, package = "palmerpenguins")
gf_histogram(~ bill_length_mm | species, alpha = 0.2, data = penguins, bins = 20) |>
  gf_freqpoly(~bill_length_mm, data = penguins, color = ~species, bins = 20)
gf_freqpoly(~bill_length_mm, color = ~species, data = penguins, bins = 20)
gf_dens(~bill_length_mm, data = penguins, color = "navy") |>
  gf_freqpoly(after_stat(density) ~ bill_length_mm,
    data = penguins,
    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, data = NULL, ..., inherit = FALSE)

gf_fun(object = NULL, formula, ..., 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.
`data`	A data frame with the variables to be plotted.
`...`	Additional arguments passed as `params` to `layer()`. This includes `xlim`, a numeric vector providing the extent of the x-axis values used to evaluate `fun` for plotting. By default, `xlim` is not used for other layers.
`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_guides *Guides for ggformula*

Description

Guides for each scale can be set scale-by-scale with the `guide` argument, or en masse with `gf_guides()`.

Usage

```
gf_guides(object, ...)
```

Arguments

`object`	a gg object
`...`	arguments passed to `ggplot2::guides()`.

Value

a modified gg object

See Also

`ggplot2::guides()`

Examples

```
dat <-
  data.frame(
    x = 1:5, y = 1:5,
    p = 1:5, q = factor(1:5), r = factor(1:5)
 )

p <-
  dat |>
  gf_point( y ~ x, colour = ~ p, size = ~ q, shape = ~r)

# without guide specification
p

# Show colorbar guide for colour.
# All these examples below have a same effect.

p |> gf_guides(colour = "colorbar", size = "legend", shape = "legend")
```

```
p |> gf_guides(colour = guide_colorbar(), size = guide_legend(),
           shape = guide_legend())
p +
  scale_colour_continuous(guide = "colorbar") +
  scale_size_discrete(guide = "legend") +
  scale_shape(guide = "legend")

# Remove some guides
p |> gf_guides(colour = "none")
p |> gf_guides(colour = "colorbar",size = "none")

# Guides are integrated where possible

p |>
  gf_guides(
    colour = guide_legend("title"),
    size = guide_legend("title"),
    shape = guide_legend("title")
  )
g <- guide_legend("title")
p |> gf_guides(colour = g, size = g, shape = g)

p |> gf_theme(legend.position = "bottom")

# position of guides

# Set order for multiple guides
mpg |>
  gf_point(cty ~ displ, size = ~hwy, shape = ~ drv) |>
  gf_guides(
    colour = guide_colourbar(order = 1),
    shape = guide_legend(order = 2),
    size = guide_legend(order = 3)
  )
```

`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,
  linetype,
  linewidth,
  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.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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, stat`	Override the default connection between `geom_hex()` and `stat_bin_hex()`. For more information about overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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,
  binwidth,
  alpha = 0.5,
  color,
  fill,
  group,
  linetype,
  linewidth,
  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,
  binwidth,
  alpha = 0.5,
  color,
  fill,
  group,
  linetype,
  linewidth,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "bar",
  stat = "bin",
  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 `~ 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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`, `stat`	Use to override the default connection between `geom_histogram()`/`geom_freqpoly()` and `stat_bin()`. For more information at overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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", bins = 30)
gf_dhistogram(~x, binwidth = 0.5, boundary = 0, color = "black", bins = 30)
gf_dhistogram(x ~ ., binwidth = 0.5, boundary = 0, color = "black", bins = 30)
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)

data(penguins, package = "palmerpenguins")
gf_histogram(~ bill_length_mm | species, data = penguins, 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_histogram(age ~ .,
  data = mosaicData::HELPrct,
  binwidth = 5, fill = "skyblue", color = "black", boundary = 40
)
```

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`, `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 `ggplot2::facet_wrap()` or `ggplot2::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/pipe operator `|>`. Each of its `\dots` 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 `\dots` arguments through to the similarly named `ggplot2` functions.

Value

a modified gg object

Examples

```
gf_dens(~cesd, color = ~substance, linewidth = 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()
data(penguins, package = "palmerpenguins")
gf_jitter(bill_length_mm ~ bill_depth_mm, color = ~species, data = penguins) |>
  gf_refine(scale_color_brewer(type = "qual", palette = 3)) |>
  gf_theme(theme_bw())

gf_jitter(bill_length_mm ~ bill_depth_mm, color = ~species, data = penguins) |>
  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,
  linewidth,
  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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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, 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 `ggplot2::facet_wrap()` or `ggplot2::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,
  linewidth,
  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,
  linewidth,
  size,
  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,
  linewidth = 1,
  size,
  fun.y = NULL,
  fun.ymax = NULL,
  fun.ymin = NULL,
  fun.args = list(),
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "pointrange",
  stat = "summary",
  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`	Set or map color.
`group`	Use to set or map group.

`linetype`, `linewidth`
: Set or map style of the line.

`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`
: The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following:

- A `Geom` ggproto subclass, for example `GeomPoint`.
- A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`.
- For more information and other ways to specify the geom, see the layer geom documentation.

`stat`
: The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following:

- A `Stat` ggproto subclass, for example `StatCount`.
- A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`.
- For more information and other ways to specify the stat, see the layer stat documentation.

`position`
: A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following:

- The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position.
- A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`.
- For more information and other ways to specify the position, see the layer position documentation.

`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`.

`size`
: size aesthetic for points (`gf_pointrange()`).

`fun.ymin`, `fun.y`, `fun.ymax`
: **[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(
      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, linewidth = 1.3)
# You can supply individual functions to summarise the value at
# each x:
p |> gf_summary(fun.y = "median", color = "red", size = 3, geom = "point")
p |>
  gf_summary(fun.y = "mean", color = "red", size = 3, geom = "point") |>
  gf_summary(fun.y = mean, geom = "line")
p |>
  gf_summary(fun.y = mean, fun.ymin = min, fun.ymax = max, color = "red")
## Not run:
  p |>
  gf_summary(fun.ymin = min, fun.ymax = max, color = "red", geom = "linerange")

## End(Not run)

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.
## Not run:
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)

## End(Not run)

# 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_plot *Formula interface to ggplot()*

Description

Create a new ggplot and (optionally) set default dataset aesthetics mapping.

Usage

```
gf_plot(...)
```

Arguments

`...`	arguments that can include `data` (a data frame or something that can be `ggplot2::fortify()`ed to become one) and aesthetics specified using the following formula notation: `aesthetic = ~ expression`. See examples.

Value

a gg object

Examples

```
gf_plot(mtcars, x = ~ wt, y = ~ mpg, color = ~ factor(cyl)) |>
  gf_density_2d() |>
  gf_point()
```

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 `ggplot2::facet_wrap()` or `ggplot2::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

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_polygon(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  linewidth,
  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`, 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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`shape, stroke`	Aesthetics for polygons.
`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, 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 `ggplot2::facet_wrap()` or `ggplot2::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_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 = "path",
  stat = "qq_line",
  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, subtitle, caption	Title, sub-title, and caption for the plot. See also gf_labs().
geom, stat	Use to override the default connection between geom_histogram()/geom_freqpoly() and stat_bin(). For more information at overriding these connections, see how the stat and geom arguments work.
position	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The position argument accepts the following: • The result of calling a position function, such as position_jitter(). This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the position_ prefix. For example, to use position_jitter(), give the position as "jitter". • For more information and other ways to specify the position, see the layer position documentation.
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 ggplot2::facet_wrap() or ggplot2::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))
data(penguins, package = "palmerpenguins")
gf_qq(~ bill_length_mm | species, data = penguins) |> gf_qqline()
gf_qq(~ bill_length_mm | species, data = penguins) |> gf_qqline(tail = 0.10)
gf_qq(~bill_length_mm, color = ~species, data = penguins) |>
  gf_qqstep(~bill_length_mm, color = ~species, data = penguins)
```

`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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`, `subtitle`, `caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`, `stat`	Use to override the default connection between `geom_quantile()` and `stat_quantile()`. For more information about overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`hjust, 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, 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 `ggplot2::facet_wrap()` or `ggplot2::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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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 `ggplot2::facet_wrap()` or `ggplot2::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_relabel *Modify plot labeling*

Description

Some packages like expss provide mechanisms for providing longer labels to R objects. These labels can be used when labeling plots and tables, for example, without requiring long or awkward variable names. This is an experimental feature and currently only supports expss or any other system that stores a label in the `label` attribute of a vector.

Usage

```
gf_relabel(plot, labels = get_variable_labels(plot$data), ...)

## S3 method for class 'gf_ggplot'
print(x, labels = get_variable_labels(x$data), ...)
```

Arguments

`plot`	A ggplot.
`labels`	A named list of labels.
`...`	Additional named labels. See examples.
`x`	A ggplot.

Value

A plot with potentially modified labels.

Examples

```
# labeling using a list
labels <- list(width = "width of foot (cm)", length = "length of foot (cm)",
  domhand = "dominant hand")
gf_point(length ~ width, color = ~domhand, data = mosaicData::KidsFeet) |>
  gf_relabel(labels)

# labeling using ...
gf_point(length ~ width, color = ~domhand, data = mosaicData::KidsFeet) |>
  gf_relabel(
    width = "width of foot (cm)",
   length = "length of foot (cm)",
   domhand = "dominant hand")

# Alternatively, we can store labels with data.
KF <- mosaicData::KidsFeet |>
  set_variable_labels(
    length = 'foot length (cm)',
    width = 'foot width (cm)'
  )
gf_point(length ~ width, data = KF)
gf_density2d(length ~ width, data = KF)
get_variable_labels(KF)
```

---

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, subtitle, caption`

Title, sub-title, and caption for the plot. See also `gf_labs()`.

`geom` The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following:

- A `Geom` ggproto subclass, for example `GeomPoint`.
- A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`.
- For more information and other ways to specify the geom, see the layer geom documentation.

`stat` The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following:

- A `Stat` ggproto subclass, for example `StatCount`.
- A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`.
- For more information and other ways to specify the stat, see the layer stat documentation.

`position` A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following:

- The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position.
- A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`.
- For more information and other ways to specify the position, see the layer position documentation.

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
## Not run:
mosaicData::Weather |>
  gf_ribbon(low_temp + high_temp ~ date, alpha = 0.4) |>
  gf_facet_grid(city ~ .)

## End(Not run)
```

---

gf_ridgeline *Formula interface to ggridges plots*

Description

Formula interface to ggridges plots

Usage

```
gf_ridgeline(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  height,
  scale = 1,
  min_height = 0,
  color,
  fill,
  alpha,
  group,
  linetype,
  linewidth,
  point_size,
  point_shape,
  point_colour,
  point_fill,
  point_alpha,
  point_stroke,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "ridgeline",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_density_ridges(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  height,
  scale = 1,
  rel_min_height = 0,
  color,
  fill,
  alpha,
  group,
  linetype,
  linewidth,
  point_size,
  point_shape,
  point_colour,
  point_fill,
  point_alpha,
  point_stroke,
  panel_scaling = TRUE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "density_ridges",
  stat = "density_ridges",
  position = "points_sina",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_density_ridges2(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  height,
  scale = 1,
  rel_min_height = 0,
  color,
  fill,
  alpha,
  group,
  linetype,
  linewidth,
  point_size,
  point_shape,
  point_colour,
  point_fill,
  point_alpha,
  point_stroke,
  panel_scaling = TRUE,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "density_ridges2",
  stat = "density_ridges",
  position = "points_sina",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)
```

```
gf_density_ridgeline_gradient(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  height,
  color,
  fill,
  alpha,
  group,
  linetype,
  linewidth,
  gradient_lwd = 0.5,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "ridgeline_gradient",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = TRUE,
  environment = parent.frame()
)

gf_density_ridges_gradient(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  height,
  panel_scaling = TRUE,
  color,
  fill = ~stat(x),
  alpha,
  group,
  linetype,
  linewidth,
  gradient_lwd = 0.5,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "density_ridges_gradient",
  stat = "density_ridges",
  position = "points_sina",
  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`.
`height`	The height of each ridgeline at the respective x value. Automatically calculated and provided by `ggridges::stat_density_ridges()` if the default stat is not changed.
`scale`	A scaling factor to scale the height of the ridgelines relative to the spacing between them. A value of 1 indicates that the maximum point of any ridgeline touches the baseline right above, assuming even spacing between baselines.
`min_height`	A height cutoff on the drawn ridgelines. All values that fall below this cutoff will be removed. The main purpose of this cutoff is to remove long tails right at the baseline level, but other uses are possible. The cutoff is applied before any height scaling is applied via the scale aesthetic. Default is 0, so negative values are removed.
`color`	A color or a formula used for mapping color.
`fill`	A color for filling, or a formula used for mapping fill.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`group`	Used for grouping.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`linewidth`	A numerical line width or a formula used for mapping linewidth.

`point_shape`, `point_colour`, `point_size`, `point_fill`, `point_alpha`, `point_stroke`	As in `ggridges::geom_ridgeline()`.
`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`, `stat`	Use to override the default connection between `geom_density()` and `stat_density()`. For more information about overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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`.
`rel_min_height`	Lines with heights below this cutoff will be removed. The cutoff is measured relative to the overall maximum, so `rel_min_height = 0.01` would remove everything. Default is 0, so nothing is removed.
`panel_scaling`	If `TRUE`, the default, relative scaling is calculated separately for each panel. If `FALSE`, relative scaling is calculated globally.
`gradient_lwd`	A parameter to needed to remove rendering artifacts inside the rendered gradients. Should ideally be 0, but often needs to be around 0.5 or higher.

Details

Note that the `ggridges::stat_density_ridges()` makes joint density estimation across all datasets. This may not generate the desired result when using faceted plots. As an alternative, you can set `stat = "density"` to use `ggplot2::stat_density()`. In this case, it is required to add the aesthetic mapping `height = after_stat(density)` (see examples).

See Also

`ggridges::geom_density_ridges()`

`ggridges::geom_ridgeline()`

`ggridges::geom_density_ridges_gradient()`

Examples

```
data.frame(
  x = rep(1:5, 3), y = c(rep(0, 5), rep(1, 5), rep(3, 5)),
  height = c(0, 1, 3, 4, 0, 1, 2, 3, 5, 4, 0, 5, 4, 4, 1)
) |>
  gf_ridgeline(y ~ x, height = ~ height, group = ~y, fill = "lightblue", alpha = 0.7)
diamonds |>
  gf_density_ridges(cut ~ price,
    scale = 2, fill = ~ cut, alpha = 0.6, show.legend = FALSE) |>
  gf_theme(theme_ridges()) |>
  gf_refine(
    scale_y_discrete(expand = c(0.01, 0)),
    scale_x_continuous(expand = c(0.01, 0))
  )
diamonds |>
  gf_density_ridges(clarity ~ price | cut,
    scale = 2, fill = ~ clarity, alpha = 0.6, show.legend = FALSE) |>
  gf_theme(theme_ridges()) |>
  gf_refine(
    scale_y_discrete(expand = c(0.01, 0)),
    scale_x_continuous(expand = c(0.01, 0))
  )
## Not run:
diamonds |>
 gf_density_ridges(clarity ~ price | cut, height = ~after_stat(density), stat = "density",
    scale = 2, fill = ~ clarity, alpha = 0.6, show.legend = FALSE) |>
  gf_theme(theme_ridges()) |>
  gf_refine(
    scale_y_discrete(expand = c(0.01, 0)),
    scale_x_continuous(expand = c(0.01, 0))
  )

## End(Not run)
## Not run:
diamonds |>
 gf_density_ridges2(cut ~ price, scale = 2, fill = ~ cut, alpha = 0.6, show.legend = FALSE) |>
  gf_theme(theme_ridges()) |>
  gf_refine(
    scale_y_discrete(expand = c(0.01, 0)),
    scale_x_continuous(expand = c(0.01, 0))
  )

## End(Not run)
diamonds |>
  gf_density_ridges(cut ~ price,
    scale = 2, fill = ~ cut, alpha = 0.6, show.legend = FALSE) |>
  gf_theme(theme_ridges()) |>
  gf_refine(
    scale_y_discrete(expand = c(0.01, 0)),
    scale_x_continuous(expand = c(0.01, 0))
  )
diamonds |>
```

```
    gf_density_ridges(clarity ~ price | cut,
      scale = 2, fill = ~ clarity, alpha = 0.6, show.legend = FALSE) |>
    gf_theme(theme_ridges()) |>
    gf_refine(
      scale_y_discrete(expand = c(0.01, 0)),
      scale_x_continuous(expand = c(0.01, 0))
    )
  ## Not run:
  diamonds |>
   gf_density_ridges(clarity ~ price | cut, height = ~ after_stat(density), stat = "density",
      scale = 2, fill = ~ clarity, alpha = 0.6, show.legend = FALSE) |>
    gf_theme(theme_ridges()) |>
    gf_refine(
      scale_y_discrete(expand = c(0.01, 0)),
      scale_x_continuous(expand = c(0.01, 0))
    )

  ## End(Not run)
  ## Not run:
  mosaicData::Weather |>
    gf_density_ridges_gradient(month ~ high_temp | city ~ ., fill = ~stat(x),
      group = ~ month, show.legend = FALSE, rel_min_height = 0.02) |>
    gf_refine(scale_fill_viridis_c(option = "B"), theme_bw())

  ## End(Not run)
```

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,
  linewidth,
  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,
  linewidth,
  height = 0,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "rug",
  stat = "identity",
  position = "identity",
  show.legend = NA,
  show.help = NULL,
  inherit = FALSE,
  environment = parent.frame()
)

gf_rugy(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  sides = "l",
  alpha,
  color,
  group,
  linetype,
  linewidth,
  width = 0,
  xlab,
  ylab,
  title,
  subtitle,
  caption,
  geom = "rug",
  stat = "identity",
  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 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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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

```
data(penguins, package = "palmerpenguins")
gf_point(bill_length_mm ~ bill_depth_mm, data = penguins) |>
  gf_rug(bill_length_mm ~ bill_depth_mm)

# There are several ways to control x- and y-rugs separately
gf_point(bill_length_mm ~ bill_depth_mm, data = penguins) |>
  gf_rugx(~bill_depth_mm, data = penguins, color = "red") |>
  gf_rugy(bill_length_mm ~ ., data = penguins, color = "green")

gf_point(bill_length_mm ~ bill_depth_mm, data = penguins) |>
  gf_rug(. ~ bill_depth_mm, data = penguins, color = "red", inherit = FALSE) |>
  gf_rug(bill_length_mm ~ ., data = penguins, color = "green", inherit = FALSE)

gf_point(bill_length_mm ~ bill_depth_mm, data = penguins) |>
  gf_rug(. ~ bill_depth_mm, data = penguins, color = "red", sides = "b") |>
  gf_rug(bill_length_mm ~ ., data = penguins, 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(bill_length_mm ~ bill_depth_mm, data = penguins) |>
  gf_rug(color = "green", sides = "b", position = "jitter")

# rugs work with some 1-varialbe plots as well.
gf_histogram(~eruptions, data = faithful, bins = 25) |>
  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, bins = 25) |>
  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(~bill_depth_mm, data = penguins) |>
  gf_rug(0 ~ bill_depth_mm, data = penguins, color = "green", sides = "b", position = "jitter")

# the choice of y value can affect how the plot looks.
gf_dhistogram(~bill_depth_mm, data = penguins) |>
```

```
gf_rug(0.5 ~ bill_depth_mm, data = penguins, 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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`arrow`	specification for arrow heads, as created by `grid::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, 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`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`.

- For more information and other ways to specify the position, see the layer position documentation.

`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 `ggplot2::facet_wrap()` or `ggplot2::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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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`, `subtitle`, `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 `ggplot2::facet_wrap()` or `ggplot2::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 (requireNamespace('maps', quietly = TRUE)) {
  library(maps)
  world1 <- sf::st_as_sf(map('world', plot = FALSE, fill = TRUE))
  gf_sf(data = world1)
}

if (requireNamespace('maps', quietly = TRUE)) {
  world2 <- sf::st_transform(
    world1,
    "+proj=laea +y_0=0 +lon_0=155 +lat_0=-90 +ellps=WGS84 +no_defs"
  )
  gf_sf(data = world2)
}
```

---

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()`'s `params` argument. These arguments broadly fall into one of 4 categories below. Notably, further arguments to the `position` argument, or aesthetics that are required can *not* be passed through `...`. Unknown arguments that are not part of the 4 categories below are ignored. • Static aesthetics that are not mapped to a scale, but are at a fixed value and apply to the layer as a whole. For example, `colour = "red"` or `linewidth = 3`. The geom's documentation has an **Aesthetics** section that lists the available options. The 'required' aesthetics cannot be passed on to the `params`. Please note that while passing unmapped aesthetics as vectors is technically possible, the order and required length is not guaranteed to be parallel to the input data. • When constructing a layer using a `stat_*()` function, the `...` argument can be used to pass on parameters to the `geom` part of the layer. An example of this is `stat_density(geom = "area", outline.type = "both")`. The geom's documentation lists which parameters it can accept. • Inversely, when constructing a layer using a `geom_*()` function, the `...` argument can be used to pass on parameters to the `stat` part of the layer. An example of this is `geom_area(stat = "density", adjust = 0.5)`. The stat's documentation lists which parameters it can accept. • The `key_glyph` argument of `layer()` may also be passed on through `...`. This can be one of the functions described as key glyphs, to change the display of the layer in the legend.
`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`, `subtitle`, `caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`	The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following: • A `Geom` ggproto subclass, for example `GeomPoint`. • A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`. • For more information and other ways to specify the geom, see the layer geom documentation.
`stat`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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

```
## Not run:
  library(ggforce)
  gf_sina(age ~ substance, data = mosaicData::HELPrct)

## End(Not run)
```

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,
  linewidth = 1,
  linetype,
  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. Only used with loess, i.e. when `method = "loess"`, or when `method = NULL` (the default) and there are fewer than 1,000 observations.
`fullrange`	If `TRUE`, the smoothing line gets expanded to the range of the plot, potentially beyond the data. This does not extend the line into any additional padding created by `expansion`.
`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, 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`.
`alpha`	Opacity (0 = invisible, 1 = opaque).
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`linetype`	A linetype (numeric or "dashed", "dotted", etc.) or a formula used for mapping linetype.
`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 `ggplot2::facet_wrap()` or `ggplot2::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()

  clotting <- data.frame(
   u = c(5,10,15,20,30,40,60,80,100),
   lot1 = c(118,58,42,35,27,25,21,19,18),
   lot2 = c(69,35,26,21,18,16,13,12,12))
  gf_point(lot1 ~ u, data = clotting) |>
    gf_smooth(formula = y ~ log(x), method = "glm",
              method.args = list(family = Gamma))
  gf_point(lot2 ~ u, data = clotting) |>
    gf_smooth(formula = y ~ log(x), color = "red", method = "glm",
              method.args = list(family = Gamma))
```

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,
  linewidth,
  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.
linewidth	A numerical line width or a formula used for mapping linewidth.
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, 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 ggplot2::facet_wrap() or ggplot2::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,
  linewidth,
  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.
linewidth	A numerical line width or a formula used for mapping linewidth.
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	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`.

- For more information and other ways to specify the stat, see the layer stat documentation.

`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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, 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`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the override the default coupling between geoms and stats. The `stat` argument accepts the following: • A `Stat` ggproto subclass, for example `StatCount`. • A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`. • For more information and other ways to specify the stat, see the layer stat documentation.

`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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 combination 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,
  size,
  parse,
  nudge_x = 0,
  nudge_y = 0,
  label.padding = unit(0.25, "lines"),
  label.r = unit(0.15, "lines"),
  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, nudge_y`	Passed to `ggplot2::position_nudge()` to nudge text or labels horizontally or vertically.
`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_text()`. Note that this argument is not supported by `geom_label()`.
`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`	The statistical transformation to use on the data for this layer. When using a `geom_*()` function to construct a layer, the `stat` argument can be used the over-ride the default coupling between geoms and stats. The `stat` argument accepts the following:

- A `Stat` ggproto subclass, for example `StatCount`.
- A string naming the stat. To give the stat as a string, strip the function name of the `stat_` prefix. For example, to use `stat_count()`, give the stat as `"count"`.
- For more information and other ways to specify the stat, see the layer stat documentation.

`position`	A position adjustment to use on the data for this layer. Cannot be jointy specified with `nudge_x` or `nudge_y`. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. • A string nameing the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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.

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 `ggplot2::facet_wrap()` or `ggplot2::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

```
data(penguins, package = "palmerpenguins")
gf_text(bill_length_mm ~ bill_depth_mm,
  data = penguins,
  label = ~species, color = ~species, size = 2, angle = 30
)
penguins |>
gf_point(bill_length_mm ~ bill_depth_mm, color = ~species, alpha = 0.5) |>
  gf_text(bill_length_mm ~ bill_depth_mm,
    label = ~species, color = ~species,
    size = 2, angle = 0, hjust = 0, nudge_x = 0.1, nudge_y = 0.1
  )
if (require(dplyr)) {
  data(penguins, package = "palmerpenguins")
  penguins_means <-
    penguins |>
    group_by(species) |>
    summarise(bill_length_mm = mean(bill_length_mm), bill_depth_mm = mean(bill_depth_mm))
  gf_point(bill_length_mm ~ bill_depth_mm, data = penguins, color = ~species) |>
    gf_label(bill_length_mm ~ bill_depth_mm,
      data = penguins_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 `ggplot2::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, and no pattern fills are applied.

Usage

```
gf_tile(
  object = NULL,
  gformula = NULL,
  data = NULL,
  ...,
  alpha,
  color,
  fill,
  group,
  linetype,
  linewidth,
  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.
`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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 `ggplot2::facet_wrap()` or `ggplot2::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 `ggplot2::facet_wrap()` or `ggplot2::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_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,
  linewidth,
  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()
)
```

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.

`linewidth`	A numerical line width or a formula used for mapping linewidth.
`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()`. Note that automatic calculation of the bandwidth does not take weights into account.
`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`, `subtitle`, `caption`	Title, sub-title, and caption for the plot. See also `gf_labs()`.
`geom`, `stat`	Use to override the default connection between `geom_violin()` and `stat_ydensity()`. For more information about overriding these connections, see how the stat and geom arguments work.
`position`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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 `ggplot2::facet_wrap()` or `ggplot2::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)
```

`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.
`...`	Additional arguments.

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).

`percs_by_group` *Compute groupwise proportions and percents*

Description

Transform a vector of counts and a vector of groups into a vector of proportions or percentages within groups.

Usage

```
percs_by_group(x, group)

props_by_group(x, group)
```

Arguments

`x`	A vector of counts
`group`	A vector to determine groups.

Examples

```
x <- c(20, 30, 30, 70)
g1 <- c("A", "A", "B", "B")
g2 <- c("A", "B", "A", "B")
props_by_group(x, g1)
percs_by_group(x, g1)
props_by_group(x, g2)
```

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()`

`ggplot2::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()`. 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`	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The `position` argument accepts the following: • The result of calling a position function, such as `position_jitter()`. This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the `position_` prefix. For example, to use `position_jitter()`, give the position as `"jitter"`. • For more information and other ways to specify the position, see the layer position documentation.
`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()`'s `params` argument. These arguments broadly fall into one of 4 categories below. Notably, further arguments to the `position` argument, or aesthetics that are required can *not* be passed through `...`. Unknown arguments that are not part of the 4 categories below are ignored. • Static aesthetics that are not mapped to a scale, but are at a fixed value and apply to the layer as a whole. For example, `colour = "red"` or `linewidth = 3`. The geom's documentation has an **Aesthetics** section that lists the available options. The 'required' aesthetics cannot be passed on to the `params`. Please note that while passing unmapped aesthetics as vectors is technically possible, the order and required length is not guaranteed to be parallel to the input data. • When constructing a layer using a `stat_*()` function, the `...` argument can be used to pass on parameters to the `geom` part of the layer. An example of this is `stat_density(geom = "area", outline.type = "both")`. The geom's documentation lists which parameters it can accept. • Inversely, when constructing a layer using a `geom_*()` function, the `...` argument can be used to pass on parameters to the `stat` part of the layer. An example of this is `geom_area(stat = "density", adjust = 0.5)`. The stat's documentation lists which parameters it can accept.

- The key_glyph argument of layer() may also be passed on through .... This can be one of the functions described as key glyphs, to change the display of the layer in the legend.

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() +
  ggplot2::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() +
  ggplot2::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 ggplot2::aes()] or ggplot2::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

```
data(penguins, package = "palmerpenguins")
ggplot(data = penguins, aes(sample = bill_length_mm)) +
  geom_qq() +
  stat_qqline(alpha = 0.7, color = "red", linetype = "dashed") +
  ggplot2::facet_wrap(~species)
```

`stat_spline` *Geoms and stats for spline smoothing*

Description

Similar to ggplot2::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 ggplot2::aes()] or ggplot2::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