Package: ggmulti (via r-universe)

November 4, 2024

Type Package

Title High Dimensional Data Visualization

Version 1.0.6

Description It provides materials (i.e. 'serial axes' objects, Andrew's plot, various glyphs for scatter plot) to visualize high dimensional data.

License GPL-2

Depends R (>= 3.4.0), methods, ggplot2

Imports stats, utils, grid, dplyr, tidyr, cli

Suggests png, tools, stringr, markdown, magrittr, gridExtra, tibble, testthat, grDevices, knitr, rmarkdown, tidyverse, gtable, covr, maps, nycflights13, ggplot2movies

RoxygenNote 7.2.1

LazyData true

Encoding UTF-8

VignetteBuilder knitr

Language en-US

Repository https://z267xu.r-universe.dev

RemoteUrl https://github.com/z267xu/ggmulti

RemoteRef HEAD

RemoteSha d742b207bc2d3d66fa4d51024bba156ed34c9d8a

Contents

`add_serialaxes_layers` *Layers for serial axes coordinate*

Description

Project the regular `geom` layers onto the serial axes coordinate.

Usage

```
add_serialaxes_layers(layer, plot, object, axes)
```

Arguments

`layer`	a layer object
`plot`	a `ggplot` object
`object`	some parameters used to modify this serial axes `ggplot` object (i.e. `axes.sequence`, ...)
`axes`	canvas sequence axes

Details

The class is determined by layers you add. For example, you want to add a boxplot layer on serial axes coordinate. By the ggplot syntax, it should be `ggplot(data, mapping) + geom_boxplot() + coord_serialaxes()` To make it work, object `add_serialaxes_layers.GeomBoxplot` must be created. In this function, some computations will be applied.

`coord_radial` *Radial axes*

Description

A radial (spider) coordinate. A wrapper of the function `coord_polar()` by forcing it linear.

Usage

```
coord_radial(theta = "x", start = 0, direction = 1, clip = "on")
```

Arguments

`theta`	variable to map angle to (x or y)
`start`	Offset of starting point from 12 o'clock in radians. Offset is applied clockwise or anticlockwise depending on value of `direction`.
`direction`	1, clockwise; -1, anticlockwise
`clip`	Should drawing be clipped to the extent of the plot panel? A setting of `"on"` (the default) means yes, and a setting of `"off"` means no. For details, please see `coord_cartesian()`.

Details

The serial histogram and serial density cannot be applied on a radial coordinate yet.

Examples

```
if(require("dplyr")) {
ggplot(NBAstats2021, mapping = aes(colour = Playoff)) +
  geom_serialaxes(
    axes.sequence = c("PTS", "OPTS", "3PM", "O3PM", "PTS"),
      scaling = "variable"
    ) +
  coord_radial() +
  scale_x_continuous(
    breaks = 1:5,
    labels = c("Points",
               "Oppo Points",
               "3P Made",
               "Oppo 3P Made",
               "Points Per Game")) +
  scale_y_continuous(labels = NULL) +
  facet_wrap(~CONF)
  }
```

`coord_serialaxes` *Serial axes coordinates*

Description

It is mainly used to visualize the high dimensional data set either on the parallel coordinate or the radial coordinate.

Usage

```
coord_serialaxes(
  axes.layout = c("parallel", "radial"),
  scaling = c("data", "variable", "observation", "none"),
  axes.sequence = character(0L),
  positive = TRUE,
  ...
)
```

Arguments

`axes.layout`	Serial axes layout, either "parallel" or "radial".
`scaling`	One of `data`, `variable`, `observation` or `none` (not suggested the layout is the same with `data`) to specify how the data is scaled.
`axes.sequence`	A vector with variable names that defines the axes sequence.
`positive`	If `y` is set as the density estimate, where the smoothed curved is faced to, right (`positive`) or left (`negative`) as vertical layout; up (`positive`) or down (`negative`) as horizontal layout?
`...`	other arguments used to modify layers

Details

Serial axes coordinate system (parallel or radial) is different from the Cartesian coordinate system or its transformed system (say `polar` in `ggplot2`) since it does not have a formal transformation (i.e. in polar coordinate system, "x = rcos(theta)", "y = rsin(theta)"). In serial axes coordinate system, mapping aesthetics does not really require "x" or "y". Any "non-aesthetics" components passed in the `mapping` system will be treated as an individual axis.

To project a common `geom` layer on such serialaxes, users can customize function `add_serialaxes_layers`.

Value

a `ggproto` object

Potential Risk

In package `ggmulti`, the function `ggplot_build.gg` is provided. At the `ggplot` construction time, the system will call `ggplot_build.gg` first. If the plot input is not a `CoordSerialaxes` coordinate system, the next method `ggplot_build.ggplot` will be called to build a "gg" plot; else some geometric transformations will be applied first, then the next method `ggplot_build.ggplot` will be executed. So, the potential risk is, if some other packages e.g. `foo`, also provide a function `ggplot_build.gg` that is used for their specifications but the namespace is beyond the `ggmulti` (`ggmulti:::ggplot_build.gg` is covered), error may occur. If so, please consider using the `geom_serialaxes`.

Examples

```
if(require("dplyr")) {
# Data
nba <- NBAstats2021 %>%
  mutate(
    dPTS = PTS - OPTS,
    dREB = REB - OREB,
    dAST = AST - OAST,
    dTO = TO - OTO
  )
# set sequence by `axes.sequence`
p <- ggplot(nba,
            mapping = aes(
              dPTS = dPTS,
              dREB = dREB,
              dAST = dAST,
              dTO = dTO,
              colour = Win
            )) +
       geom_path(alpha = 0.2) +
       coord_serialaxes(axes.layout = "radial") +
       scale_color_gradient(low="blue", high="red")
p
# quantile layer
p + geom_quantiles(quantiles = c(0.5),
                   colour = "green", linewidth = 1.2)

# facet
p +
  facet_grid(Playoff ~ CONF)
}
```

`dot_product` *Transformation Coefficients*

Description

The dimension of the original data set is `n\*p`. It can be projected onto a `n\*k` space. The functions below are to provide such transformations, e.g. the `Andrews coefficient` (a Fourier transformation) and the `Legendre` polynomials.

Usage

```
andrews(p = 4, k = 50 * (p - 1), ...)

legendre(p = 4, k = 50 * (p - 1), ...)
```

Arguments

`p`	The number of dimensions
`k`	The sequence length
`...`	Other arguments passed on to methods. Mainly used for customized transformation function

Value

A list contains two named components

1. vector: A length `k` vector (define the domain)
2. matrix: A `p\*k` transformed coefficient matrix

References

Andrews, David F. "Plots of high-dimensional data." *Biometrics* (1972): 125-136.

Abramowitz, Milton, and Irene A. Stegun, eds. "Chapter 8" *Handbook of mathematical functions with formulas, graphs, and mathematical tables*. Vol. 55. US Government printing office, 1948.

Examples

```
x <- andrews(p = 4)
dat <- iris[, -5]
proj <- t(as.matrix(dat) %*% x$matrix)
matplot(x$vector, proj,
        type = "l", lty = 1,
        col = "black",
        xlab = "x",
        ylab = "Andrews coefficients",
        main = "Iris")
```

`Geom-ggproto` *Base Geom ggproto classes for ggplot2*

Description

All `geom_` functions (like `geom_point`) return a layer that contains a `Geom` object (like `GeomPoint`). The `Geom` object is responsible for rendering the data in the plot. Each of the `Geom` objects is a `ggproto` object, descended from the top-level Geom, and each implements various methods and fields. Compared to `Stat` and `Position`, `Geom` is a little different because the execution of the setup and compute functions is split up. setup_data runs before position adjustments, and `draw_layer` is not run until render time, much later. This means there is no `setup_params` because it's hard to communicate the changes.

Usage

```
GeomDensity_

GeomBar_

GeomImageGlyph

GeomPolygonGlyph

GeomQuantiles

GeomSerialaxesDensity

GeomSerialAxesGlyph

GeomSerialaxesHist

GeomSerialaxesQuantile

GeomSerialaxes
```

Format

An object of class `GeomDensity_` (inherits from `GeomRibbon`, `Geom`, `ggproto`, `gg`) of length 6.

An object of class `GeomBar_` (inherits from `GeomBar`, `GeomRect`, `Geom`, `ggproto`, `gg`) of length 4.

An object of class `GeomImageGlyph` (inherits from `Geom`, `ggproto`, `gg`) of length 7.

An object of class `GeomPolygonGlyph` (inherits from `Geom`, `ggproto`, `gg`) of length 7.

An object of class `GeomQuantiles` (inherits from `GeomQuantile`, `GeomPath`, `Geom`, `ggproto`, `gg`) of length 1.

An object of class `GeomSerialaxesDensity` (inherits from `GeomDensity_`, `GeomRibbon`, `Geom`, `ggproto`, `gg`) of length 2.

An object of class `GeomSerialAxesGlyph` (inherits from `Geom`, `ggproto`, `gg`) of length 7.

An object of class `GeomSerialaxesHist` (inherits from `GeomBar_`, `GeomBar`, `GeomRect`, `Geom`, `ggproto`, gg) of length 2.

An object of class `GeomSerialaxesQuantile` (inherits from `GeomPath`, `Geom`, `ggproto`, `gg`) of length 4.

An object of class `GeomSerialaxes` (inherits from `GeomPath`, `Geom`, `ggproto`, gg) of length 3.

`geom_density_` *More general smoothed density estimates*

Description

Computes and draws kernel density estimate. Compared with `geom_density()`, it provides more general cases that accepting `x` and `y`. See details

Usage

```
geom_density_(
  mapping = NULL,
  data = NULL,
  stat = "density_",
  position = "identity_",
  ...,
  scale.x = NULL,
  scale.y = c("data", "group", "variable"),
  as.mix = FALSE,
  positive = TRUE,
  prop = 0.9,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_density_(
  mapping = NULL,
  data = NULL,
  geom = "density_",
  position = "stack_",
  ...,
  bw = "nrd0",
  adjust = 1,
  kernel = "gaussian",
  n = 512,
  trim = FALSE,
  na.rm = FALSE,
```

```
    orientation = NA,
    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)`).
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`scale.x`	A sorted length 2 numerical vector representing the range of the whole data will be scaled to. The default value is (0, 1).
`scale.y`	one of `data` and `group` to specify.

Type	**Description**
data (default)	The density estimates are scaled by the whole data set
group	The density estimates are scaled by each group

If the `scale.y` is `data`, it is meaningful to compare the density (shape and area) across all groups; else it is only meaningful to compare the density within each group. See details.

`as.mix`	Logical. Within each group, if `TRUE`, the sum of the density estimate area is mixed and scaled to maximum 1. The area of each subgroup (in general, within each group one color represents one subgroup) is proportional to the count; if `FALSE` the area of each subgroup is the same, with maximum 1. See details.
`positive`	If `y` is set as the density estimate, where the smoothed curved is faced to, right (‘positive‘) or left (‘negative‘) as vertical layout; up (‘positive‘) or down (‘negative‘) as horizontal layout?
`prop`	adjust the proportional maximum height of the estimate (density, histogram, ...).
`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.
`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()`.
`geom`, `stat`	Use to override the default connection between `geom_density()` and `stat_density()`.
`bw`	The smoothing bandwidth to be used. If numeric, the standard deviation of the smoothing kernel. If character, a rule to choose the bandwidth, as listed in `stats::bw.nrd()`.
`adjust`	A multiplicate bandwidth adjustment. This makes it possible to adjust the bandwidth while still using the a bandwidth estimator. For example, `adjust = 1/2` means use half of the default bandwidth.
`kernel`	Kernel. See list of available kernels in `density()`.
`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.

Details

The `x` (or `y`) is a group variable (categorical) and `y` (or `x`) is the target variable (numerical) to be plotted. If only one of `x` or `y` is provided, it will treated as a target variable and `ggplot2::geom_density` will be executed.

There are four combinations of `scale.y` and `as.mix`.

`scale.y` = "group" and `as.mix` = FALSE The density estimate area of each subgroup (represented by each color) within the same group is the same.

`scale.y` = "group" and `as.mix` = TRUE The density estimate area of each subgroup (represented by each color) within the same group is proportional to its own counts.

`scale.y` = "data" and `as.mix` = FALSE The sum of density estimate area of all groups is scaled to maximum of 1. and the density area for each group is proportional to the its count. Within each group, the area of each subgroup is the same.

`scale.y` = "data" and `as.mix` = TRUE The sum of density estimate area of all groups is scaled to maximum of 1 and the area of each subgroup (represented by each color) is proportional to its own count.

See vignettes[https://great-northern-diver.github.io/ggmulti/articles/histogram-density-.html] for more intuitive explanation.

Orientation

This geom treats each axis differently and, thus, can thus have two orientations. Often the orientation is easy to deduce from a combination of the given mappings and the types of positional scales in use. Thus, ggplot2 will by default try to guess which orientation the layer should have. Under rare circumstances, the orientation is ambiguous and guessing may fail. In that case the orientation can be specified directly using the `orientation` parameter, which can be either `"x"` or `"y"`. The value gives the axis that the geom should run along, `"x"` being the default orientation you would expect for the geom.

See Also

`geom_density`, `geom_hist_`

Examples

```
if(require(dplyr)) {
  mpg %>%
    dplyr::filter(drv != "f") %>%
    ggplot(mapping = aes(x = drv, y = cty, fill = factor(cyl))) +
    geom_density_(alpha = 0.1)

  # only `x` or `y` is provided
  # that would be equivalent to call function `geom_density()`
  diamonds %>%
    dplyr::sample_n(500) %>%
    ggplot(mapping = aes(x = price)) +
    geom_density_()

  # density and boxplot
  # set the density estimate on the left
  mpg %>%
    dplyr::filter(drv != "f") %>%
    ggplot(mapping = aes(x = drv, y = cty,
                         fill = factor(cyl))) +
    geom_density_(alpha = 0.1,
                  scale.y = "group",
                  as.mix = FALSE,
                  positive = FALSE) +
    geom_boxplot()

  # x as density
  set.seed(12345)
  suppressWarnings(
    diamonds %>%
      dplyr::sample_n(500) %>%
      ggplot(mapping = aes(x = price, y = cut, fill = color)) +
      geom_density_(orientation = "x", prop = 0.25,
                    position = "stack_",
                    scale.y = "group")
  )
}
```

```
# settings of `scale.y` and `as.mix`

ggplots <- lapply(list(
                      list(scale.y = "data", as.mix = TRUE),
                      list(scale.y = "data", as.mix = FALSE),
                      list(scale.y = "group", as.mix = TRUE),
                      list(scale.y = "group", as.mix = FALSE)
                    ),
                   function(vars) {
                     scale.y <- vars[["scale.y"]]
                     as.mix <- vars[["as.mix"]]
                     ggplot(mpg,
                            mapping = aes(x = drv, y = cty, fill = factor(cyl))) +
                       geom_density_(alpha = 0.1, scale.y = scale.y, as.mix = as.mix) +
                       labs(title = paste("scale.y =", scale.y),
                            subtitle = paste("as.mix =", as.mix))
                   })
suppressWarnings(
  gridExtra::grid.arrange(grobs = ggplots)
)
```

`geom_hist_` *More general histogram*

Description

More general histogram (`geom_histogram`) or bar plot (`geom_bar`). Both `x` and `y` could be accommodated. See details

Usage

```
geom_hist_(
  mapping = NULL,
  data = NULL,
  stat = "hist_",
  position = "stack_",
  ...,
  scale.x = NULL,
  scale.y = c("data", "group", "variable"),
  as.mix = FALSE,
  binwidth = NULL,
  bins = NULL,
  positive = TRUE,
  prop = 0.9,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
```

```
)

geom_histogram_(
  mapping = NULL,
  data = NULL,
  stat = "bin_",
  position = "stack_",
  ...,
  scale.x = NULL,
  scale.y = c("data", "group"),
  as.mix = FALSE,
  positive = TRUE,
  prop = 0.9,
  binwidth = NULL,
  bins = NULL,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

geom_bar_(
  mapping = NULL,
  data = NULL,
  stat = "count_",
  position = "stack_",
  ...,
  scale.x = NULL,
  scale.y = c("data", "group"),
  positive = TRUE,
  prop = 0.9,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_hist_(
  mapping = NULL,
  data = NULL,
  geom = "bar_",
  position = "stack_",
  ...,
  binwidth = NULL,
  bins = NULL,
  center = NULL,
  boundary = NULL,
  breaks = NULL,
```

```
  closed = c("right", "left"),
  pad = FALSE,
  width = NULL,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_bin_(
  mapping = NULL,
  data = NULL,
  geom = "bar_",
  position = "stack_",
  ...,
  binwidth = NULL,
  bins = NULL,
  center = NULL,
  boundary = NULL,
  breaks = NULL,
  closed = c("right", "left"),
  pad = FALSE,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_count_(
  mapping = NULL,
  data = NULL,
  geom = "bar_",
  position = "stack_",
  ...,
  width = NULL,
  na.rm = FALSE,
  orientation = NA,
  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)`).
`position`	Position adjustment, either as a string, or the result of a call to a position adjustment function. Function `geom_hist_` and `geom_histogram_` understand `stack_` (stacks bars on top of each other), or `dodge_` and `dodge2_` (overlapping objects side-to-side) instead of `stack`, `dodge` or `dodge2`
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`scale.x`	A sorted length 2 numerical vector representing the range of the whole data will be scaled to. The default value is (0, 1).
`scale.y`	one of `data` and `group` to specify.

Type	**Description**
data (default)	The density estimates are scaled by the whole data set
group	The density estimates are scaled by each group

If the `scale.y` is `data`, it is meaningful to compare the density (shape and area) across all groups; else it is only meaningful to compare the density within each group. See details.

`as.mix`	Logical. Within each group, if `TRUE`, the sum of the density estimate area is mixed and scaled to maximum 1. The area of each subgroup (in general, within each group one color represents one subgroup) is proportional to the count; if `FALSE` the area of each subgroup is the same, with maximum 1. See details.
`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.
`positive`	If `y` is set as the density estimate, where the smoothed curved is faced to, right (‘positive‘) or left (‘negative‘) as vertical layout; up (‘positive‘) or down (‘negative‘) as horizontal layout?
`prop`	adjust the proportional maximum height of the estimate (density, histogram, ...).
`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.
`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()`.
`geom`, `stat`	Use to override the default connection between geom_hist_()/geom_histogram_()/geom_bar_() and stat_hist_()/stat_bin_()/stat_count_().
`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.
`breaks`	Alternatively, you can supply a numeric vector giving the bin boundaries. Overrides `binwidth`, `bins`, `center`, and `boundary`.
`closed`	One of `"right"` or `"left"` indicating whether right or left edges of bins are included in the bin.
`pad`	If `TRUE`, adds empty bins at either end of x. This ensures frequency polygons touch 0. Defaults to `FALSE`.
`width`	Bar width. By default, set to 90% of the `resolution()` of the data.

Details

`x` (or `y`) is a group variable (categorical) and `y` (or `x`) a target variable (numerical) to be plotted. If only one of `x` or `y` is provided, it will treated as a target variable and `ggplot2::geom_histogram` will be executed. Several things should be noticed:

1. If both `x` and `y` are given, they can be one discrete one continuous or two discrete. But they cannot be two continuous variables (which one will be considered as a group variable?).

2. `geom_hist_` is a wrapper of `geom_histogram_` and `geom_count_`. Suppose the `y` is our interest (`x` is the categorical variable), `geom_hist_()` can accommodate either continuous or discrete `y`. While, `geom_histogram_()` only accommodates the continuous `y` and `geom_bar_()` only accommodates the discrete `y`.

3. There are four combinations of `scale.y` and `as.mix`.

`scale.y` = "group" and `as.mix` = FALSE The density estimate area of each subgroup (represented by each color) within the same group is the same.

`scale.y` = "group" and `as.mix` = TRUE The density estimate area of each subgroup (represented by each color) within the same group is proportional to its own counts.

`scale.y` **= "data" and** `as.mix` **= FALSE** The sum of density estimate area of all groups is scaled to maximum of 1. and the density area for each group is proportional to the its count. Within each group, the area of each subgroup is the same.

`scale.y` **= "data" and** `as.mix` **= TRUE** The sum of density estimate area of all groups is scaled to maximum of 1 and the area of each subgroup (represented by each color) is proportional to its own count.

See vignettes[https://great-northern-diver.github.io/ggmulti/articles/histogram-density-.html] for more intuitive explanation. Note that, if it is a grouped bar chart (both `x` and `y` are categorical), parameter ‘as.mix‘ is meaningless.

Orientation

This geom treats each axis differently and, thus, can thus have two orientations. Often the orientation is easy to deduce from a combination of the given mappings and the types of positional scales in use. Thus, ggplot2 will by default try to guess which orientation the layer should have. Under rare circumstances, the orientation is ambiguous and guessing may fail. In that case the orientation can be specified directly using the `orientation` parameter, which can be either `"x"` or `"y"`. The value gives the axis that the geom should run along, `"x"` being the default orientation you would expect for the geom.

See Also

`geom_histogram`, `geom_density_`

Examples

```
if(require(dplyr) && require(tidyr)) {

  # histogram
  p0 <- mpg %>%
    dplyr::filter(manufacturer %in% c("dodge", "ford", "toyota", "volkswagen")) %>%
    ggplot(mapping = aes(x = manufacturer, y = cty))
  p0 + geom_hist_()

  ## set position
  #### default is "stack_"
  p0 + geom_hist_(mapping = aes(fill = fl))
  #### "dodge_"
  p0 + geom_hist_(position = "dodge_",
                  mapping = aes(fill = fl))
  #### "dodge2_"
  p0 + geom_hist_(position = "dodge2_",
                  mapping = aes(fill = fl))

  # bar chart
  mpg %>%
    ggplot(mapping = aes(x = drv, y = class)) +
    geom_hist_(orientation = "y")

  # scale.y as "group"
```

```
  p <- iris %>%
    tidyr::pivot_longer(cols = -Species,
                        names_to = "Outer sterile whorls",
                        values_to = "x") %>%
    ggplot(mapping = aes(x = `Outer sterile whorls`,
                         y = x, fill = Species)) +
    stat_hist_(scale.y = "group",
               prop = 0.6,
               alpha = 0.5)
  p
  # with density on the left
  p + stat_density_(scale.y = "group",
                    prop = 0.6,
                    alpha = 0.5,
                    positive = FALSE)

  ########### only `x` or `y` is provided ###########
  # that would be equivalent to call function
  # `geom_histogram()` or `geom_bar()`
  ### histogram
  diamonds %>%
    dplyr::sample_n(500) %>%
    ggplot(mapping = aes(x = price)) +
    geom_hist_()
  ### bar chart
  diamonds %>%
    dplyr::sample_n(500) %>%
    ggplot(mapping = aes(x = cut)) +
    geom_hist_()
}
```

`geom_image_glyph` *Add image glyphs on scatter plot*

Description

Each point glyph can be an image (png, jpeg, etc) object.

Usage

```
geom_image_glyph(
  mapping = NULL,
  data = NULL,
  stat = "identity",
  position = "identity",
  ...,
  images,
  imagewidth = 1.2,
  imageheight = 0.9,
```

```
  interpolate = TRUE,
  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)`).
`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto` `Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`images`	a list of images (a raster object, bitmap image). If not provided, a point visual (`geom_point()`) will be displayed.
`imagewidth`	Numerical; width of image
`imageheight`	Numerical; height of image
`interpolate`	A logical value indicating whether to linearly interpolate the image (the alternative is to use nearest-neighbour interpolation, which gives a more blocky result). See `rasterGrob`.
`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()`.

Value

a `geom` layer

Aesthetics

geom_..._glyph() understands the following aesthetics (required aesthetics are in bold):

- **x**
- **y**
- alpha
- colour
- fill
- group
- size
- linetype
- shape
- stroke

The size unit is `cm`

Note that the shape and stroke do not have real meanings unless the essential argument `images` is missing. If so, a point visual will be displayed with corresponding shape and stroke.

See Also

`geom_serialaxes_glyph`, `geom_polygon_glyph`

Examples

```
# image glyph
if(require("png")) {
img_path <- list.files(file.path(find.package(package = 'ggmulti'),
                                 "images"),
                       full.names = TRUE)
Raptors <- png::readPNG(img_path[2L])
Warriors <- png::readPNG(img_path[3L])

pg <- ggplot(data = data.frame(x = 1:2, y = rep(1, 2)),
       mapping = aes(x = x, y = y)) +
  geom_image_glyph(images = list(Raptors,
                                 Warriors),
                   imagewidth = rep(1.2, 2),
                   imageheight = c(0.9, 1.2)) +
  coord_cartesian(xlim = extendrange(c(1,2)))
pg
# query the images (a numerical array)
build <- ggplot2::ggplot_build(pg)
# `imageRaptors` and `imageWarriors` are three dimensional
# arrays (third dimension specifying the plane)
```

```
imageRaptors <- build$data[[1]]$images[[1]]
imageWarriors <- build$data[[1]]$images[[2]]

if(require("grid")) {
grid.newpage()
grid.raster(imageRaptors)
grid.newpage()
grid.raster(imageWarriors)
}

# THIS IS SLOW
mercLogo <- png::readPNG(img_path[1L])

p <- ggplot(mapping = aes(x = hp, y = mpg)) +
       geom_point(
         data = mtcars[!grepl("Merc", rownames(mtcars)), ],
         color = "skyblue") +
       geom_image_glyph(
         data = mtcars[grepl("Merc", rownames(mtcars)), ],
         images = mercLogo,
         imagewidth = 1.5
       )
p

}
```

`geom_polygon_glyph` *Add polygon glyphs on scatter plot*

Description

Each point glyph can be a polygon object. We provide some common polygon coords in `polygon_glyph`. Also, users can customize their own polygons.

Usage

```
geom_polygon_glyph(
  mapping = NULL,
  data = NULL,
  stat = "identity",
  position = "identity",
  ...,
  polygon_x,
  polygon_y,
  linewidth = 1,
  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)`).
`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`polygon_x`	nested list of x-coordinates of polygons, one list element for each scatterplot point. If not provided, a point visual (`geom_point()`) will be displayed.
`polygon_y`	nested list of y-coordinates of polygons, one list element for each scatterplot point. If not provided, a point visual (`geom_point()`) will be displayed.
`linewidth`	line width of the "glyph" object
`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()`.

Value

a `geom` layer

Aesthetics

geom_..._glyph() understands the following aesthetics (required aesthetics are in bold):

- **x**

- **y**
- alpha
- colour
- fill
- group
- size
- linetype
- shape
- stroke

The size unit is `cm`

Note that the shape and stroke do not have real meanings unless the essential argument `polygon_x` or `polygon_y` is missing. If so, a point visual will be displayed with corresponding shape and stroke.

See Also

`geom_serialaxes_glyph`, `geom_image_glyph`

Examples

```
# polygon glyph
p <- ggplot(data = data.frame(x = 1:4, y = 1:4),
            mapping = aes(x = x, y = y)) +
  geom_polygon_glyph(polygon_x = list(x_star, x_cross, x_hexagon, x_airplane),
                     polygon_y = list(y_star, y_cross, y_hexagon, y_airplane),
                     colour = 'black', fill = 'red')
p

# the coords of each polygons can be achieved by calling function `ggplot_build`
build <- ggplot2::ggplot_build(p)
polygon_x <- build$data[[1]]$polygon_x
polygon_y <- build$data[[1]]$polygon_y
```

`geom_quantiles` *Add quantile layers on serial axes coordinate*

Description

In `ggplot2`, `geom_quantile()` is used to fit a quantile regression to the data and draws the fitted quantiles with lines. However, `geom_quantiles()` is mainly used to draw quantile lines on serial axes. See examples

Usage

```
geom_quantiles(
  mapping = NULL,
  data = NULL,
  stat = "quantile",
  position = "identity",
  ...,
  lineend = "butt",
  linejoin = "round",
  linemitre = 10,
  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)`).
`stat`	The statistical transformation to use on the data for this layer, as a string.
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`lineend`	Line end style (round, butt, square).
`linejoin`	Line join style (round, mitre, bevel).
`linemitre`	Line mitre limit (number greater than 1).
`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()`.

See Also

`geom_serialaxes_quantile`

Examples

```
p <- ggplot(iris,
            mapping = aes(
              Sepal.Length = Sepal.Length,
              Sepal.Width = Sepal.Width,
              Petal.Length = Petal.Length,
              Petal.Width = Petal.Width
            )
  ) +
  geom_path(alpha = 0.2)  +
  coord_serialaxes(scaling = "variable")
p + geom_quantiles(colour = c("red", "green", "blue"),
                   quantiles = c(0.25, 0.5, 0.75),
                   linewidth = 2)
```

`geom_serialaxes` *Serial axes layer*

Description

Draw a serial axes layer, parallel axes under Cartesian system and radial axes under Polar system. It only takes the "widens" data. Each non-aesthetics component defined in the mapping `aes()` will be treated as an axis.

Usage

```
geom_serialaxes(
  mapping = NULL,
  data = NULL,
  stat = "serialaxes",
  position = "identity",
  ...,
  axes.sequence = character(0L),
  merge = TRUE,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
```

```
)

stat_serialaxes(
  mapping = NULL,
  data = NULL,
  geom = "serialaxes",
  position = "identity",
  ...,
  axes.sequence = character(0L),
  merge = TRUE,
  axes.position = NULL,
  scaling = c("data", "variable", "observation", "none"),
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_dotProduct(
  mapping = NULL,
  data = NULL,
  geom = "path",
  position = "identity",
  ...,
  axes.sequence = character(0L),
  merge = TRUE,
  scaling = c("data", "variable", "observation", "none"),
  transform = andrews,
  na.rm = FALSE,
  orientation = NA,
  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)`).

`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto` `Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`axes.sequence`	A vector to define the axes sequence. In serial axes coordinate, the sequence can be either determined in `mapping` (function `aes()`) or by `axes.sequence`. The only difference is that the `mapping` aesthetics will omit the duplicated axes (check examples in `geom_serialaxes`).
`merge`	Should `axes.sequence` be merged with mapping aesthetics as a single mapping `uneval` object?
`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.
`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()`.
`geom`	The geometric object to use to display the data, either as a `ggproto` `Geom` subclass or as a string naming the geom stripped of the `geom_` prefix (e.g. `"point"` rather than `"geom_point"`)
`axes.position`	A numerical vector to determine the axes sequence position; the length should be the same with the length of `axes.sequence` (or mapping `aesthetics`, see examples).
`scaling`	one of `data`, `variable`, `observation` or `none` (not suggested the layout is the same with `data`) to specify how the data is scaled.
`transform`	A transformation function, can be either `andrews`, `legendre` or some other customized transformation functions.

Details

The difference between the "lengthens" data and "widens" data can be found in Tidy Data. How to transform one to the other is explained in tidyr

See Also

`coord_serialaxes`, `geom_serialaxes_density`, `geom_serialaxes_quantile`, `geom_serialaxes_hist`

Andrews plot `andrews`, Legendre polynomials `legendre`

Examples

```
# parallel coordinate
p <- ggplot(NBAstats2021,
            mapping = aes(FGA = FGA,
                          `3PA` = `3PA`,
                          FTA = FTA,
                          OFGA = OFGA,
                          O3PA = O3PA,
                          OFTA = OFTA,
                          colour = CONF))

# Teams in West are more likely to make 3-point field goals.
# Besides, they have a better performance in restricting opponents
# to make 3-point field goals.
p +
  geom_serialaxes(scaling = "variable",
                  alpha = 0.4,
                  linewidth = 3) +
  scale_x_continuous(breaks = 1:6,
                     labels = c("FGA", "3PA", "FTA",
                                "OFGA", "O3PA", "OFTA")) +
  scale_y_continuous(labels = NULL)

# andrews plot
p + geom_serialaxes(stat = "dotProduct",
                    scaling = "variable",
                    transform = andrews) # default

# Legendre polynomials
p + geom_serialaxes(stat = "dotProduct",
                    scaling = "variable",
                    transform = legendre)


############# Determine axes sequence
# 1. set the duplicated axes by mapping aesthetics
ggplot(iris, mapping = aes(Sepal.Length = Sepal.Length,
                           Sepal.Width = Sepal.Width,
                           Sepal.Length = Sepal.Length,
                           Sepal.Width = Sepal.Width,
                           colour = Species)) +
  # only two axes, duplicated axes are removed
  geom_serialaxes()

# 2. set the duplicated axes by axes.sequence
ggplot(iris, mapping = aes(colour = Species)) +
  geom_serialaxes(
    axes.sequence = c("Sepal.Length", "Sepal.Width",
                      "Sepal.Length", "Sepal.Width"))
```

`geom_serialaxes_density`

Smoothed density estimates for "widens" data under serial axes coordinate

---

Description

Computes and draws kernel density estimates on serial axes coordinate for each non-aesthetics component defined in the mapping `aes()`.

Usage

```
geom_serialaxes_density(
  mapping = NULL,
  data = NULL,
  stat = "serialaxes_density",
  position = "identity_",
  ...,
  axes.sequence = character(0L),
  merge = TRUE,
  scale.y = c("data", "group"),
  as.mix = TRUE,
  positive = TRUE,
  prop = 0.9,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_serialaxes_density(
  mapping = NULL,
  data = NULL,
  geom = "serialaxes_density",
  position = "stack_",
  ...,
  axes.sequence = character(0L),
  merge = TRUE,
  axes.position = NULL,
  scaling = c("data", "variable", "observation", "none"),
  bw = "nrd0",
  adjust = 1,
  kernel = "gaussian",
  n = 512,
  trim = FALSE,
  na.rm = FALSE,
  orientation = NA,
```

```
  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)`).
`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto` `Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`axes.sequence`	A vector to define the axes sequence. In serial axes coordinate, the sequence can be either determined in `mapping` (function `aes()`) or by `axes.sequence`. The only difference is that the `mapping` aesthetics will omit the duplicated axes (check examples in `geom_serialaxes`).
`merge`	Should `axes.sequence` be merged with mapping aesthetics as a single mapping `uneval` object?
`scale.y`	one of `data` and `group` to specify.

Type	**Description**
data (default)	The density estimates are scaled by the whole data set
group	The density estimates are scaled by each group

If the `scale.y` is `data`, it is meaningful to compare the density (shape and area) across all groups; else it is only meaningful to compare the density within each group. See details.

`as.mix`	Logical. Within each group, if `TRUE`, the sum of the density estimate area is mixed and scaled to maximum 1. The area of each subgroup (in general, within each group one color represents one subgroup) is proportional to the count; if `FALSE` the area of each subgroup is the same, with maximum 1. See details.

`positive`	If `y` is set as the density estimate, where the smoothed curved is faced to, right (‘positive‘) or left (‘negative‘) as vertical layout; up (‘positive‘) or down (‘negative‘) as horizontal layout?
`prop`	adjust the proportional maximum height of the estimate (density, histogram, ...).
`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.
`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()`.
`geom`	The geometric object to use to display the data, either as a `ggproto` `Geom` subclass or as a string naming the geom stripped of the `geom_` prefix (e.g. `"point"` rather than `"geom_point"`)
`axes.position`	A numerical vector to determine the axes sequence position; the length should be the same with the length of `axes.sequence` (or mapping `aesthetics`, see examples).
`scaling`	one of `data`, `variable`, `observation` or `none` (not suggested the layout is the same with `data`) to specify how the data is scaled.
`bw`	The smoothing bandwidth to be used. If numeric, the standard deviation of the smoothing kernel. If character, a rule to choose the bandwidth, as listed in `stats::bw.nrd()`.
`adjust`	A multiplicate bandwidth adjustment. This makes it possible to adjust the bandwidth while still using the a bandwidth estimator. For example, `adjust = 1/2` means use half of the default bandwidth.
`kernel`	Kernel. See list of available kernels in `density()`.
`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.

See Also

`geom_density_`, `geom_serialaxes`, `geom_serialaxes_quantile`, `geom_serialaxes_hist`

Examples

```
p <- ggplot(iris, mapping = aes(Sepal.Length = Sepal.Length,
                                Sepal.Width = Sepal.Width,
                                Petal.Length = Petal.Length,
                                Petal.Width = Petal.Width,
                                colour = Species,
                                fill = Species)) +
       geom_serialaxes(alpha = 0.2) +
       geom_serialaxes_density(alpha = 0.5) +
       scale_x_continuous(breaks = 1:4,
                          labels = colnames(iris)[-5]) +
       scale_y_continuous(labels = NULL) +
       xlab("variable") +
       ylab("") +
       theme(axis.text.x = element_text(angle = 45, vjust = 0.5))
p
```

`geom_serialaxes_glyph` *Add serial axes glyphs on scatter plot*

Description

To visualize high dimensional data on scatterplot. Each point glyph is surrounded by a serial axes (parallel axes or radial axes) object.

Usage

```
geom_serialaxes_glyph(
  mapping = NULL,
  data = NULL,
  stat = "identity",
  position = "identity",
  ...,
  serialaxes.data,
  axes.sequence = character(0L),
  scaling = c("data", "variable", "observation", "none"),
  axes.layout = c("parallel", "radial"),
  andrews = FALSE,
  show.axes = FALSE,
  show.enclosing = FALSE,
  linewidth = 1,
  axescolour = "black",
  bboxcolour = "black",
  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)`).
`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto` `Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`serialaxes.data`	a serial axes numerical data set. If not provided, a point visual (`geom_point()`) will be displayed.
`axes.sequence`	A vector to define the axes sequence. In serial axes coordinate, the sequence can be either determined in `mapping` (function `aes()`) or by `axes.sequence`. The only difference is that the `mapping` aesthetics will omit the duplicated axes (check examples in `geom_serialaxes`).
`scaling`	one of `data`, `variable`, `observation` or `none` (not suggested the layout is the same with `data`) to specify how the data is scaled.
`axes.layout`	either "radial" or "parallel"
`andrews`	Logical; Andrew's plot (a Fourier transformation)
`show.axes`	boolean to indicate whether axes should be shown or not
`show.enclosing`	boolean to indicate whether enclosing should be shown or not
`linewidth`	line width of the "glyph" object
`axescolour`	axes color
`bboxcolour`	bounding box color
`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()`.

Value

a `geom` layer

Aesthetics

geom_..._glyph() understands the following aesthetics (required aesthetics are in bold):

- **x**
- **y**
- alpha
- colour
- fill
- group
- size
- linetype
- shape
- stroke

The size unit is `cm`

Note that the shape and stroke do not have real meanings unless the essential argument `serialaxes.data` is missing. If so, a point visual will be displayed with corresponding shape and stroke.

See Also

`geom_polygon_glyph`, `geom_image_glyph`

Examples

```
# serial axes glyph
p <- ggplot(data = iris,
            mapping = aes(x = Sepal.Length, y = Sepal.Width, colour = Species)) +
  geom_serialaxes_glyph(serialaxes.data = iris[, -5],
                        axes.layout = "radial")
p
```

`geom_serialaxes_hist` *Histogram for "widens" data under serial axes coordinate*

Description

Computes and draws histogram on serial axes coordinate for each non-aesthetics component defined in the mapping `aes()`.

Usage

```
geom_serialaxes_hist(
  mapping = NULL,
  data = NULL,
  stat = "serialaxes_hist",
  position = "stack_",
  ...,
  axes.sequence = character(0L),
  axes.position = NULL,
  merge = TRUE,
  scale.y = c("data", "group"),
  as.mix = TRUE,
  positive = TRUE,
  prop = 0.9,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_serialaxes_hist(
  mapping = NULL,
  data = NULL,
  geom = "serialaxes_hist",
  position = "stack_",
  ...,
  axes.sequence = character(0L),
  scaling = c("data", "variable", "observation", "none"),
  axes.position = NULL,
  binwidth = NULL,
  bins = NULL,
  center = NULL,
  boundary = NULL,
  breaks = NULL,
  closed = c("right", "left"),
  pad = FALSE,
  width = NULL,
  na.rm = FALSE,
```

```
  orientation = NA,
  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)`).
`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto` `Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`axes.sequence`	A vector to define the axes sequence. In serial axes coordinate, the sequence can be either determined in `mapping` (function `aes()`) or by `axes.sequence`. The only difference is that the `mapping` aesthetics will omit the duplicated axes (check examples in `geom_serialaxes`).
`axes.position`	A numerical vector to determine the axes sequence position; the length should be the same with the length of `axes.sequence` (or mapping `aesthetics`, see examples).
`merge`	Should `axes.sequence` be merged with mapping aesthetics as a single mapping `uneval` object?
`scale.y`	one of `data` and `group` to specify.

Type	**Description**
data (default)	The density estimates are scaled by the whole data set
group	The density estimates are scaled by each group

If the `scale.y` is `data`, it is meaningful to compare the density (shape and area) across all groups; else it is only meaningful to compare the density within each group. See details.

`as.mix`	Logical. Within each group, if `TRUE`, the sum of the density estimate area is mixed and scaled to maximum 1. The area of each subgroup (in general, within each group one color represents one subgroup) is proportional to the count; if `FALSE` the area of each subgroup is the same, with maximum 1. See details.
`positive`	If `y` is set as the density estimate, where the smoothed curved is faced to, right (‘positive‘) or left (‘negative‘) as vertical layout; up (‘positive‘) or down (‘negative‘) as horizontal layout?
`prop`	adjust the proportional maximum height of the estimate (density, histogram, ...).
`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.
`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()`.
`geom`	The geometric object to use to display the data, either as a `ggproto` `Geom` subclass or as a string naming the geom stripped of the `geom_` prefix (e.g. `"point"` rather than `"geom_point"`)
`scaling`	one of `data`, `variable`, `observation` or `none` (not suggested the layout is the same with `data`) to specify how the data is scaled.
`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.
`breaks`	Alternatively, you can supply a numeric vector giving the bin boundaries. Overrides `binwidth`, `bins`, `center`, and `boundary`.

`closed`	One of `"right"` or `"left"` indicating whether right or left edges of bins are included in the bin.
`pad`	If `TRUE`, adds empty bins at either end of x. This ensures frequency polygons touch 0. Defaults to `FALSE`.
`width`	Bar width. By default, set to 90% of the `resolution()` of the data.

See Also

`geom_hist_`, `geom_serialaxes`, `geom_serialaxes_quantile`, `geom_serialaxes_density`

Examples

```
p <- ggplot(NBAstats2021,
            mapping = aes(`FG%` = `FG%`,
                          `3P%` = `3P%`,
                          `FT%` = `FT%`,
                          `OFG%` = `OFG%`,
                          `O3P%` = `O3P%`,
                          `OFT%` = `OFT%`,
                          colour = Playoff,
                          fill = Playoff)) +
            geom_serialaxes(alpha = 0.2,
                            scaling = "variable") +
            geom_serialaxes_hist(alpha = 0.5,
                                 prop = 0.7,
                                 scaling = "variable") +
            scale_x_continuous(breaks = 1:6,
                               labels = c("FG", "3P", "FT",
                                          "OFG", "O3P", "OFT")) +
            scale_y_continuous(labels = NULL) +
            xlab("variable") +
            ylab("") +
            theme(axis.text.x = element_text(angle = 45, vjust = 0.5))
p
```

`geom_serialaxes_quantile`

Quantile layer for serial axes coordinate

Description

Draw a quantile layer for serial axes coordinate. Don't be confused with `geom_quantile()` which is a quantile regression. See examples.

Usage

```
geom_serialaxes_quantile(
  mapping = NULL,
  data = NULL,
  stat = "serialaxes",
  position = "identity",
  ...,
  quantiles = seq(0, 1, 0.25),
  axes.sequence = character(0L),
  merge = TRUE,
  na.rm = FALSE,
  orientation = NA,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_serialaxes_quantile(
  mapping = NULL,
  data = NULL,
  geom = "serialaxes_quantile",
  position = "identity",
  ...,
  axes.sequence = character(0L),
  merge = TRUE,
  quantiles = seq(0, 1, 0.25),
  scaling = c("data", "variable", "observation", "none"),
  axes.position = NULL,
  na.rm = FALSE,
  orientation = NA,
  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)`).

`stat`	The statistical transformation to use on the data for this layer, either as a `ggproto` `Geom` subclass or as a string naming the stat stripped of the `stat_` prefix (e.g. `"count"` rather than `"stat_count"`)
`position`	Position adjustment, either as a string naming the adjustment (e.g. `"jitter"` to use `position_jitter`), or the result of a call to a position adjustment function. Use the latter if you need to change the settings of the adjustment.
`...`	Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
`quantiles`	numeric vector of probabilities with values in [0,1]. (Values up to 2e-14 outside that range are accepted and moved to the nearby endpoint.)
`axes.sequence`	A vector to define the axes sequence. In serial axes coordinate, the sequence can be either determined in `mapping` (function `aes()`) or by `axes.sequence`. The only difference is that the `mapping` aesthetics will omit the duplicated axes (check examples in `geom_serialaxes`).
`merge`	Should `axes.sequence` be merged with mapping aesthetics as a single mapping `uneval` object?
`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.
`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()`.
`geom`	The geometric object to use to display the data, either as a `ggproto` `Geom` subclass or as a string naming the geom stripped of the `geom_` prefix (e.g. `"point"` rather than `"geom_point"`)
`scaling`	one of `data`, `variable`, `observation` or `none` (not suggested the layout is the same with `data`) to specify how the data is scaled.
`axes.position`	A numerical vector to determine the axes sequence position; the length should be the same with the length of `axes.sequence` (or mapping `aesthetics`, see examples).

See Also

`geom_density_`, `geom_serialaxes`, `geom_serialaxes_density`, `geom_serialaxes_hist`

Examples

```
# lower quantile, median and upper quantile
```

```
p <- ggplot(iris, mapping = aes(Sepal.Length = Sepal.Length,
                                Sepal.Width = Sepal.Width,
                                Petal.Length = Petal.Length,
                                Petal.Width = Petal.Width)) +
       geom_serialaxes(stat = "dotProduct") +
       geom_serialaxes_quantile(stat = "dotProduct",
                                quantiles = c(0.25, 0.5, 0.75),
                                colour = c("red", "blue", "green"))
p
```

`get_scaledData` *scale data*

Description

It is mainly used in serial axes

Usage

```
get_scaledData(
  data,
  sequence = NULL,
  scaling = c("data", "variable", "observation", "none"),
  displayOrder = NULL,
  reserve = FALSE,
  as.data.frame = FALSE
)
```

Arguments

`data`	A data frame
`sequence`	vector with variable names that defines the axes sequence. If `NULL`, it will be set as the column names automatically.
`scaling`	one of `data`, `variable`, `observation` or `none` (not suggested the layout is the same with `data`) to specify how the data is scaled.
`displayOrder`	the order of the display
`reserve`	If `TRUE`, return the variables not shown in `sequence` as well; else only return the variables defined in `sequence`.
`as.data.frame`	Return a matrix or a data.frame

`NBAstats2021` *NBA 30 Teams Statistics in 20-21 Regular Season*

Description

A dataset containing the statistics (e.g. Points Per Game, Average Field Goals Made, etc) of 30 NBA Teams in 2020-2021 regular season

Format

A data frame with 30 rows (teams) and 42 variables:

Team Team Names.

CONF Factor; Conference of Teams (West or East).

DIV Factor; Division of Teams.

Playoff Factor; Whether Teams are in (0 or 1) Playoffs.

PTS Points Per Game.

FGM Average Field Goals Made.

FGA Average Field Goals Attempted.

FG% Field Goal Percentage.

3PM Average 3-Point Field Goals Made.

3PA Average 3-Point Field Goals Attempted.

3P% 3-Point Field Goal Percentage.

FTM Average Free Throws Made.

FTA Average Free Throws Attempted.

FT% Free Throw Percentage.

OR Offensive Rebounds Per Game.

DR Defensive Rebounds Per Game.

REB Rebounds Per Game.

AST Assists Per Game.

STL Steals Per Game.

BLK Blocks Per Game.

TO Turnovers Per Game.

PF Fouls Per Game.

OPTS Opponent Points Per Game.

OFGM Opponent Average Field Goals Made.

OFGA Opponent Average Field Goals Attempted.

OFG% Opponent Field Goal Percentage.

O3PM Opponent Average 3-Point Field Goals Made.

O3PA Opponent Average 3-Point Field Goals Attempted.

O3P% Opponent 3-Point Field Goal Percentage.

OFTM Opponent Average Free Throws Made.

OFTA Opponent Average Free Throws Attempted.

OFT% Opponent Free Throw Percentage.

OOR Opponent Offensive Rebounds Per Game.

ODR Opponent Defensive Rebounds Per Game.

OREB Opponent Rebounds Per Game.

OAST Opponent Assists Per Game.

OSTL Opponent Steals Per Game.

OBLK Opponent Blocks Per Game.

OTO Opponent Turnovers Per Game.

OPF Opponent Fouls Per Game.

Win Win Games in Regular Season.

Lose Loss Games in Regular Season.

Author(s)

Zehao Xu

Source

`https://www.espn.com/nba/stats/team/_/season/2021`

`polygon_glyph` *Polygon glyph coordinates*

Description

polygon coordinates scaled to (0, 1)

Usage

```
x_star

y_star

x_cross

y_cross

x_hexagon
```

`y_hexagon`

`x_airplane`

`y_airplane`

`x_maple`

`y_maple`

Format

An object of class `numeric` of length 10.

An object of class `numeric` of length 10.

An object of class `numeric` of length 12.

An object of class `numeric` of length 12.

An object of class `numeric` of length 6.

An object of class `numeric` of length 6.

An object of class `numeric` of length 32.

An object of class `numeric` of length 32.

An object of class `numeric` of length 26.

An object of class `numeric` of length 26.

See Also

geom_polygon_glyph

Examples

```
if(require("grid")) {
  library(grid)
  grid.newpage()
  grid.polygon(x=(x_star + 1)/2,
               y=(y_star + 1)/2)
  grid.newpage()
  grid.polygon(x=(x_cross + 1)/2,
               y=(y_cross + 1)/2)
  grid.newpage()
  grid.polygon(x=(x_hexagon + 1)/2,
               y=(y_hexagon + 1)/2)
  grid.newpage()
  grid.polygon(x=(x_airplane + 1)/2,
               y=(y_airplane + 1)/2)
  grid.newpage()
  grid.polygon(x=(x_maple + 1)/2,
               y=(y_maple + 1)/2)
}
```

`Position-ggproto` *Base Position ggproto classes for ggplot2*

Description

All `position_` functions (like `position_dodge`) return a `Position` object (like `PositionDodge`). The `Position` object is responsible for adjusting the position of overlapping geoms. The way that the `position_` functions work is slightly different from the `geom_` and `stat_` functions, because a `position_` function actually "instantiates" the `Position` object by creating a descendant, and returns that. Each of the `Position` objects is a `ggproto` object, descended from the top-level `Position`.

Usage

```
PositionDodge_

PositionDodge2_

PositionIdentity_

PositionStack_

PositionFill_
```

Format

An object of class `PositionDodge_` (inherits from `PositionDodge`, `Position`, `ggproto`, `gg`) of length 2.

An object of class `PositionDodge2_` (inherits from `PositionDodge2`, `PositionDodge`, `Position`, `ggproto`, `gg`) of length 2.

An object of class `PositionIdentity_` (inherits from `PositionIdentity`, `Position`, `ggproto`, `gg`) of length 3.

An object of class `PositionStack_` (inherits from `PositionStack`, `Position`, `ggproto`, `gg`) of length 3.

An object of class `PositionFill_` (inherits from `PositionStack_`, `PositionStack`, `Position`, `ggproto`, `gg`) of length 2.

`position_dodge_` *Dodge overlapping objects side-to-side*

Description

Dodging preserves the vertical position of an geom while adjusting the horizontal position. `position_dodge_()` dodges bars side by side but conditional on locations.

Usage

```
position_dodge_(width = NULL, preserve = c("total", "single"))

position_dodge2_(
  width = NULL,
  preserve = c("total", "single"),
  padding = 0.1,
  reverse = FALSE
)
```

Arguments

`width`	Dodging width, when different to the width of the individual elements. This is useful when you want to align narrow geoms with wider geoms. See the examples.
`preserve`	Should dodging preserve the `"total"` width of all elements at a position, or the width of a `"single"` element?
`padding`	Padding between elements at the same position. Elements are shrunk by this proportion to allow space between them. Defaults to 0.1.
`reverse`	If `TRUE`, will reverse the default stacking order. This is useful if you're rotating both the plot and legend.

Details

It is built based on `position_dodge`, but used for multiple locations, such as `geom_hist_()` or `geom_density_()`. Check examples to see the difference.

See Also

See `geom_hist_` and `geom_serialaxes_hist` for more examples.

Other position adjustments for multiple locations: `position_identity_`, `position_stack_`, `position_fill_`

Parent: `position_dodge`

Examples

```
if(require(dplyr)) {
p <- iris %>%
  tidyr::pivot_longer(cols = -Species,
                      names_to = "Outer sterile whorls",
                      values_to = "values") %>%
  ggplot(data,
         mapping = aes(x = `Outer sterile whorls`,
                       y = values,
                       fill = Species))

p + geom_hist_(position = position_dodge_())
}
```

```
# all bins are shifted on the left
p +
  geom_hist_(position = position_dodge())
```

`position_identity_` *Don't adjust position*

Description

Don't adjust position

Usage

```
position_identity_()
```

See Also

Other position adjustments for multiple locations: `position_stack_`, `position_fill_`, `position_dodge_`, `position_dodge2_`

`position_stack_` *Stack overlapping objects on top of each another*

Description

`position_stack_` stacks bars on top of each other, conditional on locations.

Usage

```
position_stack_(vjust = 1, reverse = FALSE)

position_fill_(vjust = 1, reverse = FALSE)
```

Arguments

`vjust`	Vertical adjustment for geoms that have a position (like points or lines), not a dimension (like bars or areas). Set to `0` to align with the bottom, `0.5` for the middle, and `1` (the default) for the top.
`reverse`	If `TRUE`, will reverse the default stacking order. This is useful if you're rotating both the plot and legend.

Details

It is built based on `position_stack`, but used for multiple locations, such as `geom_hist_` or `geom_density_`. Rather than stack everything on top of each other, `position_stack_` stacks bars based on locations. Check examples to see the difference.

See Also

See `geom_hist_`, `geom_density_`, `geom_serialaxes_density` and `geom_serialaxes_hist` for more examples.

Other position adjustments for multiple locations: `position_identity_`, `position_dodge_`, `position_dodge2_`

Parent: `position_stack`

Examples

```
p <- ggplot(iris,
       mapping = aes(Sepal.Length = Sepal.Length,
                     Sepal.Width = Sepal.Width,
                     Petal.Length = Petal.Length,
                     Petal.Width = Petal.Width,
                     colour = Species))
p +
 geom_serialaxes_density(position = position_stack_())


p +
  geom_serialaxes_density(position = position_stack())
```

`Stat-ggproto` *Base Stat ggproto classes for ggplot2*

Description

All `stat_` functions (like `stat_bin()`) return a layer that contains a `Stat` object (like `StatBin`). The `Stat` object is responsible for rendering the data in the plot. Each of the `Stat` objects is a `ggproto` object, descended from the top-level `Stat`, and each implements various methods and fields.

Usage

```
StatDensity_

StatHist_

StatBin_
```

`StatCount_`

`StatSerialaxesDensity`

`StatSerialaxesHist`

`StatSerialaxes`

`StatDotProduct`

Format

An object of class `StatDensity_` (inherits from `StatDensity`, `Stat`, `ggproto`, `gg`) of length 4.

An object of class `StatHist_` (inherits from `StatBin`, `Stat`, `ggproto`, `gg`) of length 4.

An object of class `StatBin_` (inherits from `StatHist_`, `StatBin`, `Stat`, `ggproto`, `gg`) of length 2.

An object of class `StatCount_` (inherits from `StatHist_`, `StatBin`, `Stat`, `ggproto`, `gg`) of length 2.

An object of class `StatSerialaxesDensity` (inherits from `StatDensity`, `Stat`, `ggproto`, `gg`) of length 4.

An object of class `StatSerialaxesHist` (inherits from `StatBin`, `Stat`, `ggproto`, `gg`) of length 4.

An object of class `StatSerialaxes` (inherits from `Stat`, `ggproto`, `gg`) of length 6.

An object of class `StatDotProduct` (inherits from `StatSerialaxes`, `Stat`, `ggproto`, `gg`) of length 4.

Index