

Package: apexcharter (via r-universe)

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Version 0.4.4

Title Create Interactive Chart with the JavaScript 'ApexCharts' Library

Description Provides an 'htmlwidgets' interface to 'apexcharts.js'.
'Apexcharts' is a modern JavaScript charting library to build interactive charts and visualizations with simple API.
'Apexcharts' examples and documentation are available here:
<<https://apexcharts.com/>>.

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<https://dreamrs.github.io/apexcharter/>

BugReports <https://github.com/dreamRs/apexcharter/issues>

VignetteBuilder knitr

Repository <https://dreamrs.r-universe.dev>

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apexcharter-package *An htmlwidget interface to the ApexCharts javascript chart library*

Description

This package allow you to use ApexCharts.js (<https://apexcharts.com/>), to create interactive and modern SVG charts.

Author(s)

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See Also

Useful links:

- <https://github.com/dreamRs/apexcharter>
- <https://dreamrs.github.io/apexcharter/>
- Report bugs at <https://github.com/dreamRs/apexcharter/issues>

 add-line

Add a line to a chart

Description

Add a line to an existing chart (bar, scatter and line types supported). On scatter charts you can also add a smooth line.

Usage

```
add_line(
  ax,
  mapping,
  data = NULL,
  type = c("line", "spline"),
  serie_name = NULL
)
```

```
add_smooth_line(
  ax,
  formula = y ~ x,
  model = c("lm", "loess"),
  n = 100,
  ...,
  type = c("line", "spline"),
  serie_name = NULL
)
```

Arguments

| | |
|------------|---|
| ax | An apexchart() htmlwidget object. |
| mapping | Default list of aesthetic mappings to use for chart. |
| data | A <code>data.frame</code> to use to add a line, if <code>NULL</code> (default), the <code>data.frame</code> provided in <code>apex()</code> will be used. |
| type | Type of line. |
| serie_name | Name for the serie displayed in tooltip and legend. |
| formula | Formula passed to the method, default to <code>y ~ x</code> from main aesthetics. |
| model | Model to use between lm or loess . |
| n | Number of points used for predictions. |
| ... | Arguments passed to <code>model</code> . |

Value

An [apexchart\(\)](#) htmlwidget object.

Examples

```

library(apexcharter)

# Bar ----

data("climate_paris")

# Add a line on a column's chart
apex(climate_paris, aes(month, precipitation), type = "column") %>%
  add_line(aes(month, temperature))

# Add secondary axis
apex(climate_paris, aes(month, precipitation), type = "column") %>%
  add_line(aes(month, temperature)) %>%
  ax_yaxis(
    title = list(text = "Precipitation (in mm)")
  ) %>%
  ax_yaxis2(
    opposite = TRUE,
    decimalsInFloat = 0,
    title = list(text = "Temperature (in degree celsius)")
  ) %>%
  ax_dataLabels(
    enabled = TRUE, enabledOnSeries = list(1)
  )

# Scatter ----

# add smooth line on scatter plot
apex(cars, aes(speed, dist), type = "scatter") %>%
  add_line(aes(x, y), data = lowess(cars), serie_name = "lowess")

# or directly
apex(cars, aes(speed, dist), type = "scatter") %>%
  add_smooth_line()

apex(cars, aes(speed, dist), type = "scatter") %>%
  add_smooth_line(model = "loess", span = 1)

apex(cars, aes(speed, dist), type = "scatter") %>%
  add_smooth_line(model = "loess", degree = 1)

apex(cars, aes(speed, dist), type = "scatter") %>%
  add_smooth_line(formula = y ~ poly(x, 2))

apex(cars, aes(speed, dist), type = "scatter") %>%
  add_smooth_line(model = "lm", serie_name = "lm") %>%

```

```
add_smooth_line(model = "loess", serie_name = "loess")
```

 add-shade

Add a shaded area to a chart

Description

add_shade() allow to add a shaded area on specified range, add_shade_weekend() add a shadow on every week-end.

Usage

```
add_shade(ax, from, to, color = "#848484", opacity = 0.2, label = NULL, ...)
```

```
add_shade_weekend(ax, color = "#848484", opacity = 0.2, label = NULL, ...)
```

Arguments

| | |
|---------|---|
| ax | An apexchart() htmlwidget object. |
| from | Vector of position to start shadow. |
| to | Vector of position to end shadow. |
| color | Color of the shadow. |
| opacity | Opacity of the shadow. |
| label | Add a label to the shade, use a character or see label for more controls. |
| ... | Additional arguments, see https://apexcharts.com/docs/options/annotations/ for possible options. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

add_shade_weekend only works if variable used for x-axis is of class Date or POSIXt.

Examples

```
library(apexcharter)
data("consumption")

# specify from and to date
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_shade(from = "2020-01-06", to = "2020-01-20")

# you can add several shadows
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_shade(from = "2020-01-06", to = "2020-01-20") %>%
  add_shade(from = "2020-02-04", to = "2020-02-10")

# or use a vector
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_shade(
    from = c("2020-01-06", "2020-02-04"),
    to = c("2020-01-20", "2020-02-10")
  )

# Add a label
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_shade(
    from = "2020-01-06", to = "2020-01-20",
    label = "interesting period"
  )

# add label with more options
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_shade(
    from = "2020-01-06", to = "2020-01-20",
    color = "firebrick",
    label = label(
      text = "something happened",
      background = "firebrick",
      color = "white",
      fontWeight = "bold",
      padding = c(3, 5, 3, 5)
    )
  )

# automatically add shadow on week-ends
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_shade_weekend()
```

add-vh-lines *Add horizontal or vertical line*

Description

Add horizontal or vertical line

Usage

```
add_hline(ax, value, color = "#000", dash = 0, label = NULL, ...)
```

```
add_vline(ax, value, color = "#000", dash = 0, label = NULL, ...)
```

Arguments

| | |
|-------|---|
| ax | An <code>apexchart()</code> htmlwidget object. |
| value | Vector of position for the line(s). |
| color | Color(s) of the line(s). |
| dash | Creates dashes in borders of SVG path. A higher number creates more space between dashes in the border. Use 0 for plain line. |
| label | Add a label to the shade, use a character or see <code>label</code> for more controls. |
| ... | Additional arguments, see https://apexcharts.com/docs/options/annotations/ for possible options. |

Value

An `apexchart()` htmlwidget object.

Examples

```
library(apexcharter)

# On a column chart
unhcr_ts %>%
  subset(year == 2017 & population_type == "Asylum-seekers") %>%
  apex(
    aes(continent_origin, n),
    "column"
  ) %>%
  add_hline(value = 5e5)

# On a scatter chart
apex(
  data = cars,
  aes(speed, dist),
  "scatter"
```



```

) %>%
  add_hline(value = mean(cars$dist)) %>%
  add_vline(value = mean(cars$speed))

# With labels
apex(
  data = cars,
  aes(speed, dist),
  "scatter"
) %>%
  add_hline(
    value = mean(cars$dist),
    label = "Mean of dist"
  ) %>%
  add_vline(
    value = mean(cars$speed),
    label = label(
      text = "Mean of speed",
      borderColor = "red"
    )
  )
)

```

add_event

Add an event to a chart

Description

Add a vertical line to mark a special event on a chart.

Usage

```
add_event(ax, when, color = "#E41A1C", dash = 4, label = NULL, ...)
```

Arguments

| | |
|-------|---|
| ax | An <code>apexchart()</code> <code>htmlwidget</code> object. |
| when | Vector of position to place the event. |
| color | Color of the line. |
| dash | Creates dashes in borders of SVG path. A higher number creates more space between dashes in the border. Use 0 for plain line. |
| label | Add a label to the shade, use a character or see label for more controls. |
| ... | Additional arguments, see https://apexcharts.com/docs/options/annotations/ for possible options. |

Value

An `apexchart()` `htmlwidget` object.

See Also

[add_event_marker](#) to add a point.

Examples

```
library(apexcharter)
data("consumption")

# specify from and to date
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_event(when = "2020-01-11")

# several events
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_event(when = c("2020-01-11", "2020-01-29"))

# Add labels on events
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_event(
    when = c("2020-01-11", "2020-01-29"),
    label = label(text = c("Am", "Ar"))
  )

# can be combined with shade
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_shade(from = "2020-01-06", to = "2020-01-20") %>%
  add_event(when = c("2020-01-11", "2020-01-29"))
```

add_event_marker

Add an event marker to a chart

Description

Add a point with a label based on a datetime.

Usage

```
add_event_marker(
  ax,
  when,
  y,
  size = 5,
  color = "#000",
  fill = "#FFF",
  width = 2,
  shape = "circle",
  radius = 2,
  label = NULL,
  ...
)
```

Arguments

| | |
|--------|---|
| ax | An <code>apexchart()</code> htmlwidget object. |
| when | Vector of position to place the event. |
| y | Coordinate(s) on the y-axis. |
| size | Size of the marker. |
| color | Stroke Color of the marker point. |
| fill | Fill Color of the marker point. |
| width | Stroke Size of the marker point. |
| shape | Shape of the marker: "circle" or "square". |
| radius | Radius of the marker (applies to square shape). |
| label | Add a label to the shade, use a character or see label for more controls. |
| ... | Additional arguments, see https://apexcharts.com/docs/options/annotations/ for possible options. |

Value

An `apexchart()` htmlwidget object.

See Also

[add_event](#) to add a vertical line.

Examples

```
library(apexcharter)
data("consumption")

# add a marker
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_event_marker(when = "2020-01-22", y = 1805)

# with a label
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_event_marker(when = "2020-01-22", y = 1805, label = "Consumption peak")

# add several markers
apex(consumption, aes(date, value, group = type), "spline") %>%
  add_event_marker(
    when = c("2020-01-02", "2020-01-06", "2020-01-13",
            "2020-01-22", "2020-01-28", "2020-02-06",
            "2020-02-13", "2020-02-19", "2020-02-27"),
    y = c(1545, 1659, 1614,
          1805, 1637, 1636,
          1597, 1547, 1631),
    size = 10,
    color = "firebrick"
  )
```

| | |
|-----------|--------------------------------|
| add_point | <i>Add an annotation point</i> |
|-----------|--------------------------------|

Description

Add an annotation point

Usage

```
add_point(  
    ax,  
    x,  
    y,  
    size = 5,  
    color = "#000",  
    fill = "#FFF",  
    width = 2,  
    shape = "circle",  
    radius = 2,  
    label = NULL,  
    ...  
)
```

Arguments

| | |
|--------|---|
| ax | An apexchart() htmlwidget object. |
| x | Coordinate(s) on the x-axis. |
| y | Coordinate(s) on the y-axis. |
| size | Size of the marker. |
| color | Stroke Color of the marker point. |
| fill | Fill Color of the marker point. |
| width | Stroke Size of the marker point. |
| shape | Shape of the marker: "circle" or "square". |
| radius | Radius of the marker (applies to square shape). |
| label | Add a label to the shade, use a character or see label for more controls. |
| ... | Additional arguments, see https://apexcharts.com/docs/options/annotations/ for possible options. |

Value

An [apexchart\(\)](#) htmlwidget object.

See Also

[add_event_marker](#) to add a point when x-axis is a datetime.

Examples

```
library(apexcharter)

# On scatter chart
apex(
  data = iris,
  aes(Sepal.Length, Sepal.Width),
  "scatter"
) %>%
  add_point(
    x = mean(iris$Sepal.Length),
    y = mean(iris$Sepal.Width)
  )

# Some options
apex(
  data = iris,
  aes(Sepal.Length, Sepal.Width),
  "scatter"
) %>%
  add_point(
    x = mean(iris$Sepal.Length),
    y = mean(iris$Sepal.Width),
    fill = "firebrick",
    color = "firebrick",
    size = 8,
    label = label(text = "Mean", offsetY = 0)
  )

# Several points
clusters <- kmeans(iris[, 1:2], 3)
apex(
  data = iris,
  aes(Sepal.Length, Sepal.Width),
  "scatter"
) %>%
  add_point(
    x = clusters$centers[, 1],
    y = clusters$centers[, 2]
  )
```

Description

Initialize a chart with three main parameters : data, mapping and type of chart.

Usage

```
apex(
  data,
  mapping,
  type = "column",
  ...,
  auto_update = TRUE,
  synchronize = NULL,
  serie_name = NULL,
  width = NULL,
  height = NULL,
  elementId = NULL
)
```

Arguments

| | |
|---------------|--|
| data | Default dataset to use for chart. If not already a data.frame, it will be coerced to with as.data.frame. |
| mapping | Default list of aesthetic mappings to use for chart |
| type | Specify the chart type. Available options: "column", "bar", "line", "step", "spline", "area", "area-step", "area-spline", "pie", "donut", "radialBar", "radar", "scatter", "heatmap", "treemap", "timeline", "dumbbell" and "slope". |
| ... | Other arguments passed on to methods. Not currently used. |
| auto_update | In Shiny application, update existing chart rather than generating new one. Can be TRUE/FALSE or use <code>config_update()</code> for more control. |
| synchronize | Give a common id to charts to synchronize them (tooltip and zoom). |
| serie_name | Name for the serie displayed in tooltip, only used for single serie. |
| width, height | A numeric input in pixels. |
| elementId | Use an explicit element ID for the widget. |

Value

An `apexchart()` `htmlwidget` object.

Examples

```
library(ggplot2)
library(apexcharter)

# make a barchart with a frequency table
data("mpg", package = "ggplot2")
apex(mpg, aes(manufacturer), type = "bar")

# timeseries
data("economics", package = "ggplot2")
```

```

apex(
  data = economics,
  mapping = aes(x = date, y = uempmed),
  type = "line"
)

# you can add option to apex result :
apex(
  data = economics,
  mapping = aes(x = date, y = uempmed),
  type = "line"
) %>%
  ax_stroke(width = 1)

# with group variable
data("economics_long", package = "ggplot2")
apex(
  data = economics_long,
  mapping = aes(x = date, y = value01, group = variable),
  type = "line"
)

```

apex-facets

Facets for ApexCharts

Description

Create matrix of charts by row and column faceting variable (`ax_facet_grid`), or by specified number of row and column for faceting variable(s) (`ax_facet_wrap`).

Usage

```

ax_facet_wrap(
  ax,
  facets,
  nrow = NULL,
  ncol = NULL,
  scales = c("fixed", "free", "free_y", "free_x"),
  labeller = label_value,
  chart_height = "300px",
  grid_width = "100%"
)

ax_facet_grid(
  ax,
  rows = NULL,
  cols = NULL,
  scales = c("fixed", "free", "free_y", "free_x"),

```

```

  labeller = label_value,
  chart_height = "300px",
  grid_width = "100%"
)

```

Arguments

| | |
|---------------------------|--|
| <code>ax</code> | An <code>apexchart()</code> htmlwidget object. |
| <code>facets</code> | Variable(s) to use for facetting, wrapped in <code>vars(...)</code> . |
| <code>nrow, ncol</code> | Number of row and column in output matrix. |
| <code>scales</code> | Should scales be fixed ("fixed", the default), free ("free"), or free in one dimension ("free_x", "free_y")? |
| <code>labeller</code> | A function with one argument containing for each facet the value of the faceting variable. |
| <code>chart_height</code> | Individual chart height, ignored if an height is defined in <code>apex()</code> or <code>apexcharter()</code> . |
| <code>grid_width</code> | Total width for the grid, regardless of the number of column. |
| <code>rows, cols</code> | A set of variables or expressions quoted by <code>vars()</code> and defining faceting groups on the rows or columns dimension. |

Value

An `apexchart()` htmlwidget object with an additional class "apex_facet".

Warning

To properly render in Shiny applications, use `apexfacetOutput()` (in UI) and `renderApexfacet()` (in Server).

Examples

```

### Wrap -----

if (interactive()) {
  library(apexcharter)

  # Scatter ----

  data("mpg", package = "ggplot2")

  # Create facets
  apex(mpg, aes(displ, cty), type = "scatter") %>%
    ax_facet_wrap(vars(drv))

  # Change number of columns
  apex(mpg, aes(displ, cty), type = "scatter") %>%
    ax_facet_wrap(vars(drv), ncol = 2)

  # Free axis
  apex(mpg, aes(displ, cty), type = "scatter") %>%

```



```

    ax_facet_wrap(vars(drv), ncol = 2, scales = "free")

# labels
apex(mpg, aes(displ, cty), type = "scatter") %>%
  ax_facet_wrap(
    vars(drv), ncol = 2,
    labeller = function(x) {
      switch(
        x,
        "f" = "front-wheel drive",
        "r" = "rear wheel drive",
        "4" = "4wd"
      )
    }
  )

# Title and subtitle are treated as global
apex(mpg, aes(displ, cty), type = "scatter") %>%
  ax_labs(
    title = "Facet wrap example",
    subtitle = "mpg data from ggplot2"
  ) %>%
  ax_facet_wrap(vars(drv), ncol = 2)

# Multiple variables
apex(mpg, aes(displ, cty), type = "scatter") %>%
  ax_facet_wrap(vars(year, drv))

apex(mpg, aes(displ, cty), type = "scatter") %>%
  ax_facet_wrap(vars(year, drv), ncol = 2, nrow = 3)

apex(mpg, aes(displ, cty), type = "scatter") %>%
  ax_chart(toolbar = list(show = FALSE)) %>%
  ax_facet_wrap(
    vars(year, drv),
    labeller = function(x) {
      paste(x, collapse = " / ")
    }
  )

# Lines ----

data("unhcr_ts")
refugees <- unhcr_ts %>%
  subset(population_type == "Refugees (incl. refugee-like situations)") %>%
  transform(date = as.Date(paste0(year, "-01-01")))

apex(refugees, aes(date, n), type = "line") %>%
  ax_yaxis(tickAmount = 5) %>%

```

```

ax_facet_wrap(vars(continent_origin))

# Free y-axis and synchronize
apex(refugees, aes(date, n), type = "line", synchronize = "my-id") %>%
  ax_yaxis(tickAmount = 5) %>%
  ax_xaxis(tooltip = list(enabled = FALSE)) %>%
  ax_tooltip(x = list(format = "yyyy")) %>%
  ax_facet_wrap(vars(continent_origin), scales = "free_y")

# Bars ----

data("unhcr_ts")
refugees <- unhcr_ts %>%
  subset(year == 2017)

apex(refugees, aes(continent_origin, n), type = "column") %>%
  ax_yaxis(
    labels = list(
      formatter = format_num("~s")
    ),
    tickAmount = 5
  ) %>%
  ax_facet_wrap(vars(population_type), ncol = 2)
}

### Grid -----
if (interactive()) {
  library(apexcharter)

  # Scatter ----

  data("mpg", package = "ggplot2")

  # Only rows
  apex(mpg, aes(displ, cty), type = "scatter") %>%
    ax_facet_grid(rows = vars(drv), chart_height = "200px")

  # Only cols
  apex(mpg, aes(displ, cty), type = "scatter") %>%
    ax_facet_grid(cols = vars(year))

  # Rows and Cols
  apex(mpg, aes(displ, cty), type = "scatter") %>%
    ax_facet_grid(rows = vars(drv), cols = vars(year))

  apex(mpg, aes(displ, cty), type = "scatter") %>%
    ax_chart(toolbar = list(show = FALSE)) %>%
    ax_facet_grid(vars(drv), vars(cyl))
}

```

```

# Labels
apex(mpg, aes(displ, cty), type = "scatter") %>%
  ax_facet_grid(
    vars(drv),
    labeller = function(x) {
      switch(
        x,
        "f" = "front-wheel drive",
        "r" = "rear wheel drive",
        "4" = "4wd"
      )
    }
  )

# Title and subtitle are treated as global
apex(mpg, aes(displ, cty), type = "scatter") %>%
  ax_labs(
    title = "Facet grid example",
    subtitle = "mpg data from ggplot2"
  ) %>%
  ax_facet_grid(rows = vars(drv), cols = vars(year))
}

```

apexchart

Create an ApexCharts widget

Description

Create an ApexCharts widget

Usage

```

apexchart(
  ax_opts = list(),
  auto_update = TRUE,
  width = NULL,
  height = NULL,
  elementId = NULL
)

```

Arguments

| | |
|-------------|--|
| ax_opts | A list in JSON format with chart parameters. |
| auto_update | In Shiny application, update existing chart rather than generating new one. Can be TRUE/FALSE or use config_update() for more control. |

width, height A numeric input in pixels.
elementId Use an explicit element ID for the widget.

Value

An `apexchart()` `htmlwidget` object.

See Also

For quickly create a chart, see `apex()`.

Examples

```
library(apexcharter)

# Use raw API by passing a list of
# parameters to the function

apexchart(ax_opts = list(
  chart = list(
    type = "bar"
  ),
  series = list(list(
    name = "Example",
    data = sample(1:100, 5)
  )),
  xaxis = list(
    categories = LETTERS[1:5]
  )
))

# Or use apexchart() to initialize the chart
# before passing parameters

apexchart() %>%
  ax_chart(type = "bar") %>%
  ax_series(
    list(
      name = "Example",
      data = sample(1:100, 5)
    )
  ) %>%
  ax_xaxis(
    categories = LETTERS[1:5]
  )
```

apexcharter-exports *apexcharter exported operators and S3 methods*

Description

The following functions are imported and then re-exported from the apexcharter package to avoid listing the magrittr as Depends of apexcharter

apexcharter-shiny *Shiny bindings for apexcharter*

Description

Output and render functions for using apexcharter within Shiny applications and interactive Rmd documents.

Usage

```
apexchartOutput(outputId, width = "100%", height = "400px")
```

```
renderApexchart(expr, env = parent.frame(), quoted = FALSE)
```

```
sparkBoxOutput(outputId, width = "100%", height = "160px")
```

```
renderSparkBox(expr, env = parent.frame(), quoted = FALSE)
```

Arguments

| | |
|---------------|--|
| outputId | Output variable to read from. |
| width, height | Must be a valid CSS unit (like 100%, 400px, auto) or a number, which will be coerced to a string and have px appended. |
| expr | An expression that generates a calendar |
| env | The environment in which to evaluate expr. |
| quoted | Is expr a quoted expression (with quote())? This is useful if you want to save an expression in a variable. |

Value

Output element that can be included in UI. Render function to create output in server.

Note

To render a chart with facets (using `ax_facet_wrap()` or `ax_facet_grid()`) in Shiny, see `apexfacetOutput()` (in UI) and `renderApexfacet()` (in Server).

Examples

```
if (interactive()) {
  library(shiny)
  library(apexcharter)

  ui <- fluidPage(
    fluidRow(
      column(
        width = 8, offset = 2,
        tags$h2("Apexchart in Shiny"),
        actionButton("redraw", "Redraw chart"),
        apexchartOutput("chart")
      )
    )
  )

  server <- function(input, output, session) {

    output$chart <- renderApexchart({
      input$redraw
      apexchart() %>%
      ax_chart(type = "bar") %>%
      ax_series(
        list(
          name = "Example",
          data = sample(1:100, 5)
        )
      ) %>%
      ax_xaxis(
        categories = LETTERS[1:5]
      )
    })

  }

  shinyApp(ui, server)
}
```

apexcharter-shiny-facets

Shiny bindings for faceting with apexcharter

Description

Output and render functions for using apexcharter faceting within Shiny applications and interactive Rmd documents.

Usage

```
apexfacetOutput(outputId)

renderApexfacet(expr, env = parent.frame(), quoted = FALSE)
```

Arguments

| | |
|----------|--|
| outputId | output variable to read from |
| expr | An expression that generates a apexcharter facet with ax_facet_wrap() or ax_facet_grid() . |
| env | The environment in which to evaluate expr. |
| quoted | Is expr a quoted expression (with quote())? This is useful if you want to save an expression in a variable. |

Value

An Apexcharts output that can be included in the application UI.

See Also

[ax_facet_wrap\(\)](#), [ax_facet_grid\(\)](#)

Examples

```
library(shiny)
library(apexcharter)

data("unhcr_ts")
refugees <- unhcr_ts %>%
  subset(
    population_type == "Refugees (incl. refugee-like situations)"
  ) %>%
  transform(date = as.Date(paste0(year, "-01-01")))

ui <- fluidPage(

  tags$h2("Apexcharts Facets Example"),

  apexfacetOutput("myfacet")

)

server <- function(input, output, session) {

  output$myfacet <- renderApexfacet({
    apex(refugees, aes(date, n), type = "column") %>%
    ax_yaxis(tickAmount = 5) %>%
    ax_facet_wrap(
      vars(continent_origin),
```

```
        scales = "free"
      )
    })
  }

  if (interactive())
    shinyApp(ui, server)
```

apexcharter-shiny-grid

Shiny bindings for grid with apexcharter

Description

Output and render functions for using apexcharter grid within Shiny applications and interactive Rmd documents.

Usage

```
apexgridOutput(outputId)
```

```
renderApexgrid(expr, env = parent.frame(), quoted = FALSE)
```

Arguments

| | |
|----------|---|
| outputId | output variable to read from |
| expr | An expression that generates a apexcharter grid. |
| env | The environment in which to evaluate expr. |
| quoted | Is expr a quoted expression (with quote())? This is useful if you want to save an expression in a variable. |

Value

An Apexcharts output that can be included in the application UI.

Examples

```
library(shiny)
library(apexcharter)

ui <- fluidPage(

  tags$h2("Apexcharts Grid Example"),

  apexgridOutput("myfacet")

)
```



```
server <- function(input, output, session) {  
  
  output$myfacet <- renderApexgrid({  
    a1 <- apex(mpg, aes(manufacturer), type = "bar")  
    a2 <- apex(mpg, aes(trans), type = "column")  
    a3 <- apex(mpg, aes(drv), type = "pie")  
  
    apex_grid(  
      a1, a2, a3,  
      grid_area = c("1 / 1 / 3 / 2", "1 / 2 / 2 / 4", "2 / 2 / 3 / 4"),  
      ncol = 3,  
      nrow = 2,  
      height = "600px"  
    )  
  })  
  
}  
  
if (interactive())  
  shinyApp(ui, server)
```

| | |
|----------------|----------------------------|
| apexchartProxy | <i>Proxy for apexchart</i> |
|----------------|----------------------------|

Description

Allow to update a chart in Shiny application.

Usage

```
apexchartProxy(shinyId, session = shiny::getDefaultReactiveDomain())
```

Arguments

| | |
|---------|---|
| shinyId | single-element character vector indicating the output ID of the chart to modify (if invoked from a Shiny module, the namespace will be added automatically) |
| session | the Shiny session object to which the chart belongs; usually the default value will suffice |

| | |
|-----------|------------------------------------|
| apex_grid | <i>Create a grid of ApexCharts</i> |
|-----------|------------------------------------|

Description

Create a grid of ApexCharts

Usage

```
apex_grid(
  ...,
  nrow = NULL,
  ncol = NULL,
  row_gap = "10px",
  col_gap = "0px",
  grid_area = NULL,
  height = NULL,
  width = NULL,
  .list = NULL
)
```

Arguments

| | |
|------------------|---|
| ... | Several apexcharts htmlwidget objects. |
| nrow, ncol | Number of rows and columns. |
| row_gap, col_gap | Gap between rows and columns. |
| grid_area | Custom grid area to make elements take more than a single cell in grid, see https://cssgrid-generator.netlify.app/ for examples. |
| height, width | Height and width of the main grid. |
| .list | A list of apexcharts htmlwidget objects. |

Value

Custom apex_grid object.

Note

You have to provide either height for the grid or individual chart height to make it work.

Examples

```
if (interactive()) {
  library(apexcharter)
  data("mpg", package = "ggplot2")

  # Two chart side-by-side
```

```

a1 <- apex(mpg, aes(manufacturer), type = "bar")

a2 <- apex(mpg, aes(trans), type = "column")

apex_grid(a1, a2, height = "400px")

# More complex layout:
a3 <- apex(mpg, aes(drv), type = "pie")

apex_grid(
  a1, a2, a3,
  grid_area = c("1 / 1 / 3 / 2", "1 / 2 / 2 / 4", "2 / 2 / 3 / 4"),
  ncol = 3, nrow = 2,
  height = "600px"
)
}

```

ax-series

Add data to a chart

Description

Add data to a chart

Usage

```
ax_series(ax, ...)
```

```
ax_series2(ax, l)
```

Arguments

| | |
|-----|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| ... | Lists containing data to plot, typically list with two items: name and data. |
| l | A list. |

Value

An `apexchart()` htmlwidget object.

Examples

```

# One serie
apexchart() %>%
  ax_series(list(
    name = "rnorm",
    data = rnorm(10)
  ))

```

```
# Two series
apexchart() %>%
  ax_series(
    list(
      name = "rnorm 1",
      data = rnorm(10)
    ),
    list(
      name = "rnorm 2",
      data = rnorm(10)
    )
  )
)
```

| | |
|----------------|-------------------------------|
| ax_annotations | <i>Annotations properties</i> |
|----------------|-------------------------------|

Description

Annotations properties

Usage

```
ax_annotations(
  ax,
  position = NULL,
  yaxis = NULL,
  xaxis = NULL,
  points = NULL,
  ...
)
```

Arguments

| | |
|----------|---|
| ax | An apexchart() htmlwidget object. |
| position | Whether to put the annotations behind the charts or in front of it. Available Options: "front" or "back". |
| yaxis | List of lists. |
| xaxis | List of lists. |
| points | List of lists. |
| ... | Additional parameters. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

See <https://apexcharts.com/docs/options/annotations/>.

Examples

```

data("economics", package = "ggplot2")

# Horizontal line
apex(
  data = tail(economics, 200),
  mapping = aes(x = date, y = uempmed),
  type = "line"
) %>%
  ax_annotations(
    yaxis = list(list(
      y = 11.897,
      borderColor = "firebrick",
      opacity = 1,
      label = list(
        text = "Mean uempmed",
        position = "left",
        textAnchor = "start"
      )
    ))
  )

# Vertical line
apex(
  data = tail(economics, 200),
  mapping = aes(x = date, y = uempmed),
  type = "line"
) %>%
  ax_annotations(
    xaxis = list(list(
      x = htmlwidgets::JS("new Date('1 Mar 2007').getTime()"),
      strokeDashArray = 0,
      borderColor = "#775DD0",
      label = list(
        text = "A label",
        borderColor = "#775DD0",
        style = list(
          color = "#fff",
          background = "#775DD0"
        )
      )
    ))
  )

# Vertical range
apex(

```

```

data = tail(economics, 200),
mapping = aes(x = date, y = uempmed),
type = "line"
) %>%
ax_annotiations(
  xaxis = list(list(
    x = htmlwidgets::JS("new Date('1 Jan 2009').getTime()"),
    x2 = htmlwidgets::JS("new Date('1 Feb 2010').getTime()"),
    fillColor = "#B3F7CA",
    opacity = 0.4,
    label = list(
      text = "A label",
      borderColor = "#B3F7CA",
      style = list(
        color = "#fff",
        background = "#B3F7CA"
      )
    )
  )
)
))
)

```

```

# Point annotation
apex(
  data = tail(economics, 200),
  mapping = aes(x = date, y = uempmed),
  type = "line"
) %>%
ax_annotiations(
  points = list(list(
    x = htmlwidgets::JS("new Date('1 Jun 2010').getTime()"),
    y = 25.2,
    marker = list(
      size = 8,
      fillColor = "#fff",
      strokeColor = "red",
      radius = 2
    ),
    label = list(
      text = "Highest",
      offsetY = 0,
      borderColor = "#FF4560",
      style = list(
        color = "#fff",
        background = "#FF4560"
      )
    )
  )
)
))
)

```

Description

Chart parameters

Usage

```
ax_chart(
  ax,
  type = NULL,
  stacked = NULL,
  stackType = NULL,
  defaultLocale = NULL,
  locales = NULL,
  animations = NULL,
  background = NULL,
  foreColor = NULL,
  dropShadow = NULL,
  events = NULL,
  offsetX = NULL,
  offsetY = NULL,
  selection = NULL,
  sparkline = NULL,
  toolbar = NULL,
  zoom = NULL,
  width = NULL,
  height = NULL,
  ...
)
```

Arguments

| | |
|---------------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| type | Specify the chart type. Available Options: "bar", "column", "line", "pie", "donut", "radialBar", "scatter", "bubble", "heatmap". |
| stacked | Logical. Enables stacked option for axis charts. |
| stackType | When stacked, should the stacking be percentage based or normal stacking. Available options: "normal" or "100%". |
| defaultLocale | Locale to use : "ca", "cs", "de", "el", "en", "es", "fi", "fr", "he", "hi", "hr", "hy", "id", "it", "ko", "lt", "nb", "nl", "pl", "pt-br", "pt", "ru", "se", "sk", "sl", "th", "tr", "ua". |
| locales | Array of custom locales parameters. |
| animations | A list of parameters. |
| background | Background color for the chart area. If you want to set background with css, use <code>.apexcharts-canvas</code> to set it. |
| foreColor | Sets the text color for the chart. Defaults to #373d3f. |
| dropShadow | A list of parameters. See https://apexcharts.com/docs/options/chart/dropshadow/ . |

| | |
|-----------|---|
| events | See events_opts . |
| offsetX | Sets the left offset for chart. |
| offsetY | Sets the top offset for chart. |
| selection | A list of parameters. |
| sparkline | List. Sparkline hides all the elements of the charts other than the primary paths. Helps to visualize data in small areas. . |
| toolbar | A list of parameters. See https://apexcharts.com/docs/options/chart/toolbar/ . |
| zoom | A list of parameters. See https://apexcharts.com/docs/options/chart/zoom/ . |
| width | Width of the chart. |
| height | Height of the chart. |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Examples

```
library(apexcharter)
data("diamonds", package = "ggplot2")

## Stack bar type
# default is dodge
apex(
  data = diamonds,
  mapping = aes(x = cut, fill = color)
)

# stack
apex(
  data = diamonds,
  mapping = aes(x = cut, fill = color)
) %>%
  ax_chart(stacked = TRUE)

# stack filled
apex(
  data = diamonds,
  mapping = aes(x = cut, fill = color)
) %>%
  ax_chart(stacked = TRUE, stackType = "100%")

# Toolbar -----
```



```
# Hide the toolbar
apex(
  data = diamonds,
  mapping = aes(x = cut, fill = color)
) %>%
  ax_chart(toolbar = list(show = FALSE))

# Hide download buttons
data("economics", package = "ggplot2")
apex(
  data = economics,
  mapping = aes(x = date, y = pce),
  type = "line"
) %>%
  ax_chart(
    toolbar = list(tools= list(download = FALSE))
  )

# Zoom -----

# Disable
apex(
  data = economics,
  mapping = aes(x = date, y = pce),
  type = "line"
) %>%
  ax_chart(
    zoom = list(enabled = FALSE)
  )

# Auto-scale Y axis
apex(
  data = economics,
  mapping = aes(x = date, y = pce),
  type = "line"
) %>%
  ax_chart(
    zoom = list(autoScaleYaxis = TRUE)
  )

# Localization -----

# Use included localization config
dat <- data.frame(
  x = Sys.Date() + 1:20,
  y = sample.int(20, 20)
)

# French
```

```

apex(dat, aes(x, y), "line") %>%
  ax_chart(defaultLocale = "fr")

# Italian
apex(dat, aes(x, y), "line") %>%
  ax_chart(defaultLocale = "it")

# Custom config
apex(dat, aes(x, y), "line") %>%
  ax_chart(locales = list(
    list(
      name = "en", # override 'en' locale
      options = list(
        toolbar = list(
          exportToSVG = "GET SVG",
          exportToPNG = "GET PNG"
        )
      )
    )
  ))

```

 ax_colors

Colors

Description

Colors

Usage

```
ax_colors(ax, ...)
```

Arguments

| | |
|-----|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| ... | Colors for the chart's series. When all colors are used, it starts from the beginning. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/colors/>

Examples

```
data("diamonds", package = "ggplot2")

# Change default color(s)
apex(
  data = diamonds,
  mapping = aes(x = cut)
) %>%
  ax_colors("#F7D358")

library(scales)
apex(
  data = diamonds,
  mapping = aes(x = cut, fill = color)
) %>%
  ax_colors(brewer_pal(palette = "Set2")(7))
```

ax_colors_manual *Set specific color's series*

Description

Set specific color's series

Usage

```
ax_colors_manual(ax, values)
```

Arguments

ax An `apexchart()` htmlwidget object.

values Named list, names represent data series, values colors to use.

Value

An `apexchart()` htmlwidget object.

Examples

```
## scatter

apex(
  data = mtcars,
  type = "scatter",
  mapping = aes(x = wt, y = mpg, fill = cyl)
) %>%
  ax_colors_manual(list(
    "4" = "steelblue",
```

```

    "6" = "firebrick",
    "8" = "forestgreen"
  ))

# If missing level, colors are recycled
apex(
  data = mtcars,
  type = "scatter",
  mapping = aes(x = wt, y = mpg, fill = cyl)
) %>%
  ax_colors_manual(list(
    "4" = "steelblue",
    "8" = "forestgreen"
  ))

# Ignore levels not present in data
apex(
  data = mtcars,
  type = "scatter",
  mapping = aes(x = wt, y = mpg, fill = cyl)
) %>%
  ax_colors_manual(list(
    "4" = "steelblue",
    "6" = "firebrick",
    "8" = "forestgreen",
    "99" = "yellow"
  ))

## Bar

tab <- table(sample(letters[1:5], 100, TRUE), sample(LETTERS[1:5], 100, TRUE))
dat <- as.data.frame(tab)

apex(
  data = dat,
  type = "column",
  mapping = aes(x = Var1, y = Freq, group = Var2)
) %>%
  ax_colors_manual(list(
    A = "steelblue",
    C = "firebrick",
    D = "forestgreen",
    B = "peachpuff",
    E = "chartreuse"
  ))

```

Description

Labels on data

Usage

```
ax_dataLabels(  
  ax,  
  enabled = NULL,  
  textAnchor = NULL,  
  offsetX = NULL,  
  offsetY = NULL,  
  style = NULL,  
  dropShadow = NULL,  
  formatter = NULL,  
  ...  
)
```

Arguments

| | |
|------------|---|
| ax | An <code>apexchart()</code> htmlwidget object. |
| enabled | To determine whether to show dataLabels or not. |
| textAnchor | The alignment of text relative to dataLabel's drawing position. Accepted values "start", "middle" or "end". |
| offsetX | Sets the left offset for dataLabels. |
| offsetY | Sets the top offset for dataLabels. |
| style | A list of parameters. |
| dropShadow | A list of parameters. |
| formatter | The formatter function takes in a single value and allows you to format the value before displaying |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/datalabels/>

Examples

```
data("diamonds", package = "ggplot2")  
  
# Add data labels  
apex(  
  data = diamonds,  
  mapping = aes(x = cut)
```

```
) %>%
  ax_dataLabels(enabled = TRUE)
```

 ax_fill

Fill property

Description

Fill property

Usage

```
ax_fill(
  ax,
  type = NULL,
  colors = NULL,
  opacity = NULL,
  gradient = NULL,
  image = NULL,
  pattern = NULL,
  ...
)
```

Arguments

| | |
|----------|--|
| ax | An apexchart() htmlwidget object. |
| type | Whether to fill the paths with solid colors or gradient. Available options: "solid", "gradient", "pattern" or "image". |
| colors | Colors to fill the svg paths.. |
| opacity | Opacity of the fill attribute. |
| gradient | A list of parameters. |
| image | A list of parameters. |
| pattern | A list of parameters. |
| ... | Additional parameters. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

See <https://apexcharts.com/docs/options/fill/>

Examples

```
data("diamonds", package = "ggplot2")

# Use a pattern to fill bars
apex(
  data = diamonds,
  mapping = aes(x = color, fill = cut)
) %>%
  ax_fill(
    type = "pattern",
    opacity = 1,
    pattern = list(
      style = c("circles", "slantedLines", "verticalLines", "horizontalLines", "squares")
    )
  )

data("economics", package = "ggplot2")

# Customise gradient
apex(
  data = economics,
  mapping = aes(x = date, y = psavert),
  type = "area"
) %>%
  ax_fill(gradient = list(
    enabled = TRUE,
    shadeIntensity = 1,
    inverseColors = FALSE,
    opacityFrom = 0,
    opacityTo = 1,
    stops = c(0, 2000)
  ))
```

ax_forecast_data_points

Forecast data points

Description

Forecast data points

Usage

```
ax_forecast_data_points(
  ax,
  count = NULL,
  fillOpacity = NULL,
  strokeWidth = NULL,
```

```

    dashArray = NULL,
    ...
  )

```

Arguments

| | |
|-------------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| count | Number of ending data-points you want to indicate as a forecast or prediction values. The ending line/bar will result into a dashed border with a distinct look to differentiate from the rest of the data-points. |
| fillOpacity | Opacity of the fill attribute. |
| strokeWidth | Sets the width of the points. |
| dashArray | Creates dashes in borders of svg path. Higher number creates more space between dashes in the border. |
| ... | Additional arguments (not used). |

Value

An `apexchart()` htmlwidget object.

Examples

```

# add 5 predictions to data then plot it
data.frame(
  time = seq_len(53),
  lh = c(
    as.vector(lh),
    as.vector(predict(arima(lh, order = c(1,0,1)), 5)$pred)
  )
) %>%
  apex(aes(time, lh), type = "line") %>%
  ax_xaxis(type = "numeric") %>%
  ax_forecast_data_points(count = 5)

```

ax_grid

Add grids on chart

Description

Add grids on chart

Usage

```
ax_grid(
  ax,
  show = NULL,
  borderColor = NULL,
  strokeDashArray = NULL,
  position = NULL,
  xaxis = NULL,
  yaxis = NULL,
  row = NULL,
  column = NULL,
  padding = NULL,
  ...
)
```

Arguments

| | |
|-----------------|---|
| ax | An apexchart() htmlwidget object. |
| show | Logical. To show or hide grid area (including xaxis / yaxis) |
| borderColor | Colors of grid borders / lines. |
| strokeDashArray | Creates dashes in borders of svg path. Higher number creates more space between dashes in the border. |
| position | Whether to place grid behind chart paths or in front. Available options for position: "front" or "back" |
| xaxis | A list of parameters. |
| yaxis | A list of parameters. |
| row | A list of parameters. |
| column | A list of parameters. |
| padding | A list of parameters. |
| ... | Additional parameters. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

See <https://apexcharts.com/docs/options/grid/>

Examples

```
data("mpg", package = "ggplot2")

# Hide Y-axis and gridlines
apex(
```

```

    data = mpg,
    mapping = aes(x = manufacturer)
  ) %>%
  ax_grid(show = FALSE)

# just grid lines
apex(
  data = mpg,
  mapping = aes(x = manufacturer)
) %>%
  ax_grid(yaxis = list(lines = list(show = FALSE)))

# both x & y
data("economics", package = "ggplot2")
apex(
  data = economics,
  mapping = aes(x = date, y = psavert),
  type = "line"
) %>%
  ax_grid(
    yaxis = list(lines = list(show = TRUE)),
    xaxis = list(lines = list(show = TRUE))
  )

```

ax_labels

Alternative axis labels

Description

Alternative axis labels

Usage

```
ax_labels(ax, ...)
```

```
ax_labels2(ax, labels)
```

Arguments

| | |
|--------|--|
| ax | An apexchart() htmlwidget object. |
| ... | Vector. In Axis Charts (line / column), labels can be set instead of setting xaxis categories option. While, in pie/donut charts, each label corresponds to value in series array. |
| labels | A vector to use as labels. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

See <https://apexcharts.com/docs/options/labels/>

Examples

```
apexchart() %>%
  ax_chart(type = "pie") %>%
  ax_series(23, 45, 56) %>%
  ax_labels("A", "B", "C")

# same as
apexchart() %>%
  ax_chart(type = "pie") %>%
  ax_series2(c(23, 45, 56)) %>%
  ax_labels2(c("A", "B", "C"))
```

 ax_labs

Modify axis, legend, and chart labels

Description

Modify axis, legend, and chart labels

Usage

```
ax_labs(ax, title = NULL, subtitle = NULL, x = NULL, y = NULL)
```

Arguments

| | |
|----------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| title | Text for the title. |
| subtitle | Text for the subtitle. |
| x | Text for the x-axis label. |
| y | Text for the y-axis label. |

Value

An `apexchart()` htmlwidget object.

Examples

```
meteo_paris <- data.frame(
  month = month.name,
  tmax = c(7, 8, 12, 15, 19, 23, 25, 25, 21, 16, 11, 8),
  tmin = c(3, 3, 5, 7, 11, 14, 16, 16, 13, 10, 6, 3)
)
```

```
apex(meteo_paris, type = "column", aes(x = month, y = tmin)) %>%
  ax_labs(
    title = "Average minimal temperature in Paris",
    subtitle = "Data from NOAA",
    x = "Month",
    y = "Temperature (\u00b0C)"
  )
```

 ax_legend

Legend properties

Description

Legend properties

Usage

```
ax_legend(
  ax,
  show = NULL,
  position = NULL,
  showForSingleSeries = NULL,
  showForNullSeries = NULL,
  showForZeroSeries = NULL,
  horizontalAlign = NULL,
  fontSize = NULL,
  textAnchor = NULL,
  offsetY = NULL,
  offsetX = NULL,
  formatter = NULL,
  labels = NULL,
  markers = NULL,
  itemMargin = NULL,
  containerMargin = NULL,
  onItemClick = NULL,
  onItemHover = NULL,
  floating = NULL,
  ...
)
```

Arguments

| | |
|---------------------|--|
| ax | An apexchart() htmlwidget object. |
| show | Logical. Whether to show or hide the legend container. |
| position | Available position options for legend: "top", "right", "bottom", "left". |
| showForSingleSeries | Show legend even if there is just 1 series. |

| | |
|-------------------|--|
| showForNullSeries | Allows you to hide a particular legend if it's series contains all null values. |
| showForZeroSeries | Allows you to hide a particular legend if it's series contains all 0 values. |
| horizontalAlign | Available options for horizontal alignment: "right", "center", "left". |
| fontSize | Sets the fontSize of legend text elements |
| textAnchor | The alignment of text relative to legend's drawing position |
| offsetY | Sets the top offset for legend container. |
| offsetX | Sets the left offset for legend container. |
| formatter | JS function. A custom formatter function to append additional text to the legend series names. |
| labels | List with two items "foreColor" (Custom text color for legend labels) and "useSeriesColors" (Logical, whether to use primary colors or not) |
| markers | List. |
| itemMargin | List with two items "horizontal" (Horizontal margin for individual legend item) and "vertical" (Vertical margin for individual legend item). |
| containerMargin | List with two items "top" (Top margin for the whole legend container) and "left" (Left margin for the whole legend container). |
| onItemClick | List with item "toggleDataSeries", logical, when clicked on legend item, it will toggle the visibility of the series in chart. |
| onItemHover | List with item "highlightDataSeries", logical, when hovered on legend item, it will highlight the paths of the hovered series in chart. |
| floating | Logical. The floating option will take out the legend from the chart area and make it float above the chart. |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/legend/>

Examples

```
data("mpg", package = "ggplot2")

# Legend position
apex(
  data = mpg,
  mapping = aes(x = manufacturer, fill = year)
) %>%
  ax_legend(position = "right")
```

```
# hide legend
apex(
  data = mpg,
  mapping = aes(x = manufacturer, fill = year)
) %>%
  ax_legend(show = FALSE)
```

 ax_markers

Markers properties

Description

Markers properties

Usage

```
ax_markers(
  ax,
  size = NULL,
  colors = NULL,
  strokeColor = NULL,
  strokeWidth = NULL,
  strokeOpacity = NULL,
  fillOpacity = NULL,
  shape = NULL,
  radius = NULL,
  offsetX = NULL,
  offsetY = NULL,
  hover = NULL,
  ...
)
```

Arguments

| | |
|---------------|---|
| ax | An apexchart() htmlwidget object. |
| size | Numeric. Size of the marker point. |
| colors | Sets the fill color(s) of the marker point. |
| strokeColor | Stroke Color of the marker. |
| strokeWidth | Stroke Size of the marker. |
| strokeOpacity | Opacity of the border around marker. |
| fillOpacity | Opacity of the marker fill color. |
| shape | Shape of the marker. Available Options for shape: "square" or "circle". |
| radius | Numeric. Radius of the marker (applies to square shape) |
| offsetX | Numeric. Sets the left offset of the marker. |

| | |
|---------|---|
| offsetY | Numeric. Sets the top offset of the marker. |
| hover | List with item size (Size of the marker when it is active). |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/markers/>

Examples

```
data("economics", package = "ggplot2")

# show points
apex(
  data = tail(economics, 20),
  type = "line",
  mapping = aes(x = date, y = uempmed)
) %>%
  ax_markers(size = 6)
```

 ax_nodata

Configuration for charts with no data

Description

Configuration for charts with no data

Usage

```
ax_nodata(
  ax,
  text = "No data",
  align = "center",
  verticalAlign = "middle",
  color = NULL,
  fontSize = NULL,
  fontFamily = NULL,
  offsetX = NULL,
  offsetY = NULL
)
```

Arguments

| | |
|------------------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| text | The text to display when no-data is available. |
| align | Horizontal alignment: "left", "center" or "right". |
| verticalAlign | Vertical alignment: "top", "middle" or "bottom". |
| color | ForeColor of the text. |
| fontSize | FontSize of the text. |
| fontFamily | FontFamily of the text. |
| offsetX, offsetY | Text offset. |

Value

An `apexchart()` htmlwidget object.

Examples

```
empty <- data.frame(
  var1 = character(0),
  var2 = numeric(0)
)
apex(empty, aes(var1, var2), "column") %>%
  ax_nodata(
    text = "Sorry no data to visualize",
    fontSize = "30px"
  )
```

ax_plotOptions

Specific options for chart

Description

Specific options for chart

Usage

```
ax_plotOptions(
  ax,
  bar = NULL,
  heatmap = NULL,
  radialBar = NULL,
  pie = NULL,
  bubble = NULL,
  boxPlot = NULL,
  ...
)
```


Arguments

| | |
|-----------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| bar | See <code>bar_opts()</code> . |
| heatmap | See <code>heatmap_opts()</code> . |
| radialBar | See <code>radialBar_opts()</code> . |
| pie | See <code>pie_opts()</code> . |
| bubble | See <code>bubble_opts()</code> . |
| boxPlot | See <code>boxplot_opts()</code> . |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Examples

```
data("diamonds", package = "ggplot2")

# Stack bar type
apex(
  data = diamonds,
  mapping = aes(x = cut)
) %>%
  ax_plotOptions(
    bar = bar_opts(endingShape = "rounded", columnWidth = "10%")
  )

# Pie
apex(
  data = diamonds,
  mapping = aes(x = cut),
  type = "pie"
) %>%
  ax_plotOptions(
    pie = pie_opts(customScale = 0.5)
  )

# Radial
apexchart() %>%
  ax_chart(type = "radialBar") %>%
  ax_plotOptions(
    radialBar = radialBar_opts(
      hollow = list(size = "70%")
    )
  ) %>%
  ax_series(70) %>%
  ax_labels("Indicator")
```

| | |
|------------------|-----------------------------------|
| ax_proxy_options | <i>Proxy for updating options</i> |
|------------------|-----------------------------------|

Description

Allows you to update the configuration object.

Usage

```
ax_proxy_options(proxy, options)
```

Arguments

| | |
|---------|-------------------------------------|
| proxy | A apexchartProxy htmlwidget object. |
| options | New options to set. |

Examples

```
if (interactive()) {
  library(shiny)

  ui <- fluidPage(
    fluidRow(
      column(
        width = 8, offset = 2,
        tags$h2("Update options"),
        apexchartOutput(outputId = "chart"),
        checkboxInput(
          inputId = "show_label_xaxis",
          label = "Show x-axis labels"
        ),
        textInput(
          inputId = "yaxis_title",
          label = "Y-axis title"
        )
      )
    )
  )
)
server <- function(input, output, session) {

  output$chart <- renderApexchart({
    apexchart() %>%
      ax_chart(type = "bar") %>%
      ax_series(list(
        name = "Example",
        data = c(23, 43, 76, 31)
      )) %>%
      ax_xaxis(
        categories = c("Label A", "Label B",
```

```
        "Label C", "Label D")
    )
  })

  observe({
    apexchartProxy("chart") %>%
      ax_proxy_options(list(
        xaxis = list(
          labels = list(show = input$show_label_xaxis)
        ),
        yaxis = list(
          title = list(text = input$yaxis_title)
        )
      ))
  })

}

shinyApp(ui, server)
}
```

ax_proxy_series

Proxy for updating series.

Description

Allows you to update the series array overriding the existing one.

Usage

```
ax_proxy_series(proxy, newSeries, animate = TRUE)
```

Arguments

| | |
|-----------|--|
| proxy | A apexchartProxy htmlwidget object. |
| newSeries | The series array to override the existing one. |
| animate | Should the chart animate on re-rendering. |

Examples

```
if (interactive()) {
  library(shiny)

  ui <- fluidPage(
    fluidRow(
      column(
        width = 8, offset = 2,
        tags$h2("Real time chart"),
```

```

    apexchartOutput(outputId = "chart")
  )
)

server <- function(input, output, session) {

  rv <- reactiveValues()
  rv$df <- data.frame(
    date = Sys.Date() + 1:20,
    values = sample(10:90, 20, TRUE)
  )

  observe({
    invalidateLater(1000, session)
    df <- isolate(rv$df)
    # Append new line of data
    df <- rbind(
      df, data.frame(
        date = df$date[length(df$date)] + 1,
        values = sample(10:90, 1, TRUE)
      )
    )
    rv$df <- df
  })

  output$chart <- renderApexchart({
    # Generate chart once
    apex(isolate(rv$df), aes(date, values), "spline") %>%
      ax_xaxis(
        range = 10 * 24 * 60 * 60 * 1000
        # Fixed range for x-axis : 10 days
        # days*hours*minutes*seconds*milliseconds
      )
  })

  observe({
    # Update chart to add new data
    apexchartProxy("chart") %>%
      ax_proxy_series(
        parse_df(rv$df),
        T
      )
  })
}

shinyApp(ui, server)
}
```

| | |
|---------------|---------------------------|
| ax_responsive | <i>Responsive options</i> |
|---------------|---------------------------|

Description

Responsive options

Usage

```
ax_responsive(ax, ...)
```

Arguments

| | |
|-----|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/responsive/>

Examples

```
data("mpg", package = "ggplot2")

# Open in browser and resize window
apex(
  data = mpg,
  mapping = aes(x = manufacturer, fill = year),
  type = "bar"
) %>%
  ax_legend(position = "right") %>%
  ax_responsive(
    list(
      breakpoint = 1000,
      options = list(
        plotOptions = list(
          bar = list(
            horizontal = FALSE
          )
        ),
        legend = list(
          position = "bottom"
        )
      )
    )
  )
)
```

`ax_states`*Charts' states*

Description

Charts' states

Usage

```
ax_states(ax, normal = NULL, hover = NULL, active = NULL, ...)
```

Arguments

| | |
|---------------------|--|
| <code>ax</code> | An <code>apexchart()</code> htmlwidget object. |
| <code>normal</code> | A list of parameters. |
| <code>hover</code> | A list of parameters. |
| <code>active</code> | A list of parameters. |
| <code>...</code> | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/states/>

Examples

```
data("mpg", package = "ggplot2")

# Inverse effect on hover
apex(
  data = mpg,
  mapping = aes(x = manufacturer),
  type = "bar"
) %>%
  ax_states(
    hover = list(
      filter = list(
        type = "darken"
      )
    )
  )
)
```

 ax_stroke

Stroke properties

Description

Stroke properties

Usage

```
ax_stroke(
  ax,
  show = NULL,
  curve = NULL,
  lineCap = NULL,
  width = NULL,
  colors = NULL,
  dashArray = NULL,
  ...
)
```

Arguments

| | |
|-----------|---|
| ax | An apexchart() htmlwidget object. |
| show | Logical. To show or hide path-stroke / line |
| curve | In line / area charts, whether to draw smooth lines or straight lines. Available Options: "smooth" (connects the points in a curve fashion. Also known as spline) and "straight" (connect the points in straight lines). |
| lineCap | For setting the starting and ending points of stroke. Available Options: "butt" (ends the stroke with a 90-degree angle), "square" (similar to butt except that it extends the stroke beyond the length of the path) and "round" (ends the path-stroke with a radius that smooths out the start and end points) |
| width | Sets the width of border for svg path. |
| colors | Colors to fill the border for paths. |
| dashArray | Creates dashes in borders of svg path. Higher number creates more space between dashes in the border. |
| ... | Additional parameters. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

See <https://apexcharts.com/docs/options/stroke/>

Examples

```
data("economics", package = "ggplot2")
apex(
  data = economics,
  mapping = aes(x = date, y = uempmed),
  type = "line"
) %>%
  ax_stroke(
    width = 1,
    dashArray = 4
  )

data("economics_long", package = "ggplot2")
apex(
  data = economics_long,
  mapping = aes(x = date, y = value01, group = variable),
  type = "line"
) %>%
  ax_stroke(
    width = c(1, 2, 3, 4, 5),
    dashArray = c(1, 2, 3, 4, 5)
  )
```

ax_subtitle

Chart's subtitle

Description

Chart's subtitle

Usage

```
ax_subtitle(
  ax,
  text = NULL,
  align = NULL,
  margin = NULL,
  offsetX = NULL,
  offsetY = NULL,
  floating = NULL,
  style = NULL,
  ...
)
```

Arguments

| | |
|------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| text | Text to display as a subtitle of chart. |

| | |
|----------|---|
| align | Alignment of subtitle relative to chart area. Possible Options: "left", "center" and "right". |
| margin | Numeric. Vertical spacing around the subtitle text. |
| offsetX | Numeric. Sets the left offset for subtitle text. |
| offsetY | Numeric. Sets the top offset for subtitle text |
| floating | Logical. The floating option will take out the subtitle text from the chart area and make it float on top of the chart. |
| style | List with two items: fontSize (Font Size of the subtitle text) and color (Fore color of the subtitle text). |
| ... | Additional parameters. |

Value

An `apexchart()` `htmlwidget` object.

Note

See <https://apexcharts.com/docs/options/subtitle/>

Examples

```
data("economics", package = "ggplot2")
apex(
  data = economics,
  mapping = aes(x = date, y = uempmed),
  type = "line"
) %>%
  ax_title(
    text = "Median duration of unemployment"
  ) %>%
  ax_subtitle(
    text = "in weeks"
  )
```

ax_theme

Theme for charts

Description

Theme for charts

Usage

```
ax_theme(ax, mode = c("light", "dark"), palette = NULL, monochrome = NULL, ...)
```

Arguments

| | |
|------------|---|
| ax | An <code>apexchart()</code> htmlwidget object. |
| mode | use light or dark theme. |
| palette | Character. Available palettes: "palette1" to "palette10". |
| monochrome | A list of parameters. |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/theme/>

Examples

```
data("mpg", package = "ggplot2")
data("diamonds", package = "ggplot2")

# Dark mode
apex(
  data = mpg,
  mapping = aes(x = manufacturer)
) %>%
  ax_theme(mode = "dark")

# Use predefined palette (1 to 10)
apex(
  data = diamonds,
  mapping = aes(x = color, fill = cut)
) %>%
  ax_theme(palette = "palette2")

# monochrome palette
apex(
  data = diamonds,
  mapping = aes(x = color, fill = cut)
) %>%
  ax_theme(monochrome = list(enabled = TRUE, color = "#0B6121"))
```

ax_title

Chart's title

Description

Chart's title

Usage

```
ax_title(
  ax,
  text = NULL,
  align = NULL,
  margin = NULL,
  offsetX = NULL,
  offsetY = NULL,
  floating = NULL,
  style = NULL,
  ...
)
```

Arguments

| | |
|----------|---|
| ax | An apexchart() htmlwidget object. |
| text | Text to display as a title of chart. |
| align | Alignment of subtitle relative to chart area. Possible Options: "left", "center" and "right". |
| margin | Numeric. Vertical spacing around the title text. |
| offsetX | Numeric. Sets the left offset for subtitle text. |
| offsetY | Numeric. Sets the top offset for subtitle text |
| floating | Logical. The floating option will take out the subtitle text from the chart area and make it float on top of the chart. |
| style | List with two items: fontSize (Font Size of the title text) and color (Fore color of the title text). |
| ... | Additional parameters. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

See <https://apexcharts.com/docs/options/title/>

Examples

```
data("economics", package = "ggplot2")
apex(
  data = economics,
  mapping = aes(x = date, y = uempmed),
  type = "line"
) %>%
  ax_title(
    text = "Median duration of unemployment, in weeks"
  )
```

 ax_tooltip

Tooltip options

Description

Tooltip options

Usage

```
ax_tooltip(
  ax,
  enabled = NULL,
  shared = NULL,
  followCursor = NULL,
  intersect = NULL,
  inverseOrder = NULL,
  custom = NULL,
  fillSeriesColor = NULL,
  onDatasetHover = NULL,
  theme = NULL,
  x = NULL,
  y = NULL,
  z = NULL,
  marker = NULL,
  items = NULL,
  fixed = NULL,
  ...
)
```

Arguments

| | |
|-----------------|---|
| ax | An apexchart() htmlwidget object. |
| enabled | Logical. Show tooltip when user hovers over chart area. |
| shared | Logical. When having multiple series, show a shared tooltip. |
| followCursor | Logical. Follow user's cursor position instead of putting tooltip on actual data points. |
| intersect | Logical. Show tooltip only when user hovers exactly over datapoint. |
| inverseOrder | Logical. In multiple series, when having shared tooltip, inverse the order of series (for better comparison in stacked charts). |
| custom | JS function. Draw a custom html tooltip instead of the default one based on the values provided in the function arguments. |
| fillSeriesColor | Logical. When enabled, fill the tooltip background with the corresponding series color. |
| onDatasetHover | A list of parameters. |

| | |
|--------|------------------------|
| theme | A list of parameters. |
| x | A list of parameters. |
| y | A list of parameters. |
| z | A list of parameters. |
| marker | A list of parameters. |
| items | A list of parameters. |
| fixed | A list of parameters. |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/tooltip/>

Examples

```
data("mpg", package = "ggplot2")

# Hide tooltip
apex(
  data = mpg,
  mapping = aes(x = manufacturer, fill = year)
) %>%
  ax_tooltip(enabled = FALSE)

# Share between series
apex(
  data = mpg,
  mapping = aes(x = manufacturer, fill = year)
) %>%
  ax_tooltip(shared = TRUE)

# Fixed tooltip
data("economics", package = "ggplot2")
apex(
  data = economics,
  mapping = aes(x = date, y = psavert),
  type = "line"
) %>%
  ax_tooltip(
    fixed = list(enabled = TRUE, position = "topLeft")
  )
```

 ax_xaxis

X-axis options

Description

X-axis options

Usage

```
ax_xaxis(
  ax,
  type = NULL,
  categories = NULL,
  labels = NULL,
  axisBorder = NULL,
  axisTicks = NULL,
  tickAmount = NULL,
  min = NULL,
  max = NULL,
  range = NULL,
  floating = NULL,
  position = NULL,
  title = NULL,
  crosshairs = NULL,
  tooltip = NULL,
  ...
)
```

Arguments

| | |
|------------|---|
| ax | An apexchart() htmlwidget object. |
| type | Character. Available Options : "categories" and "datetime". |
| categories | Categories are labels which are displayed on the x-axis. |
| labels | A list of parameters. |
| axisBorder | A list of parameters. |
| axisTicks | A list of parameters. |
| tickAmount | Number of Tick Intervals to show. |
| min | Lowest number to be set for the x-axis. The graph drawing beyond this number will be clipped off. |
| max | Highest number to be set for the x-axis. The graph drawing beyond this number will be clipped off. |
| range | Range takes the max value of x-axis, subtracts the provided range value and gets the min value based on that. So, technically it helps to keep the same range when min and max values gets updated dynamically. |

| | |
|------------|---|
| floating | Logical. Floating takes x-axis is taken out of normal flow and places x-axis on svg element directly, similar to an absolutely positioned element. Set the offsetX and offsetY then to adjust the position manually |
| position | Setting this option allows you to change the x-axis position. Available options: "top" and "bottom". |
| title | A list of parameters. |
| crosshairs | A list of parameters. |
| tooltip | A list of parameters. |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/xaxis/>

Examples

```
data("mpg", package = "ggplot2")

# X axis title
apex(
  data = mpg,
  mapping = aes(x = manufacturer)
) %>%
  ax_xaxis(title = list(text = "Car's manufacturer"))

# force labels to rotate and increase height
apex(
  data = mpg,
  mapping = aes(x = manufacturer)
) %>%
  ax_xaxis(labels = list(rotateAlways = TRUE, maxHeight = 180))

# force to not rotate
apex(
  data = mpg,
  mapping = aes(x = manufacturer)
) %>%
  ax_xaxis(labels = list(rotate = 0, trim = FALSE))

data("economics", package = "ggplot2")

# Custom crosshair
apex(
  data = tail(economics, 50),
  mapping = aes(x = date, y = psavert),
```

```
    type = "line"
  ) %>%
  ax_xaxis(
    crosshairs = list(
      opacity = 1,
      width = 2,
      fill = list(color = "red"),
      stroke = list(width = 0)
    )
  )

# Date format (zoom to see changes)
apex(
  data = tail(economics, 150),
  mapping = aes(x = date, y = psavert),
  type = "line"
) %>%
  ax_xaxis(
    labels = list(
      dateTimeFormatter = list(
        year = "yyyy-MM",
        month = "yyyy-MM-dd",
        day = "yyyy-MM-dd HH:mm"
      )
    )
  )
)
```

ax_yaxis

Y-axis options

Description

Y-axis options

Usage

```
ax_yaxis(
  ax,
  opposite = NULL,
  tickAmount = NULL,
  max = NULL,
  min = NULL,
  floating = NULL,
  labels = NULL,
  axisBorder = NULL,
  axisTicks = NULL,
  title = NULL,
  tooltip = NULL,
```



```

    crosshairs = NULL,
    ...
  )

```

Arguments

| | |
|------------|---|
| ax | An <code>apexchart()</code> htmlwidget object. |
| opposite | Logical. When enabled, will draw the yaxis on the right side of the chart. |
| tickAmount | Number of Tick Intervals to show. |
| max | Lowest number to be set for the y-axis. The graph drawing beyond this number will be clipped off. |
| min | Highest number to be set for the y-axis. The graph drawing beyond this number will be clipped off. |
| floating | Logical. Floating takes y-axis is taken out of normal flow and places y-axis on svg element directly, similar to an absolutely positioned element. Set the <code>offsetX</code> and <code>offsetY</code> then to adjust the position manually |
| labels | A list of parameters. |
| axisBorder | A list of parameters. |
| axisTicks | A list of parameters. |
| title | A list of parameters. |
| tooltip | A list of parameters. |
| crosshairs | A list of parameters. |
| ... | Additional parameters. |

Value

An `apexchart()` htmlwidget object.

Note

See <https://apexcharts.com/docs/options/yaxis/>

Examples

```

data("economics_long", package = "ggplot2")
apex(
  data = economics_long,
  mapping = aes(x = date, y = value01, group = variable),
  type = "line"
) %>%
  ax_yaxis(
    decimalsInFloat = 2, title = list(text = "Rescaled to [0,1]")
  )

# Format tick labels
temperature <- data.frame(
  month = head(month.name),

```

```

    tp = c(4, -2, 2, 7, 11, 14)
  )
  apex(temperature, aes(month, tp), "line") %>%
    ax_yaxis(
      labels = list(
        formatter = htmlwidgets::JS("function(value) {return value + '\u00b0C';}")
      )
    )
  )

```

 ax_yaxis2

Secondary Y-axis options

Description

Secondary Y-axis options

Usage

```
ax_yaxis2(ax, ...)
```

Arguments

ax An [apexchart\(\)](#) htmlwidget object.
 ... See arguments from [ax_yaxis](#).

Value

An [apexchart\(\)](#) htmlwidget object.

Examples

```

library(apexcharter)
data("economics_long", package = "ggplot2")

eco <- economics_long %>%
  subset(variable %in% c("pce", "pop")) %>%
  transform(value = round(value))

# add second y-axis
apex(eco, aes(x = date, y = value, color = variable), type = "line") %>%
  ax_yaxis(title = list(text = "Pce")) %>%
  ax_yaxis2(opposite = TRUE, title = list(text = "Pop"))

# Customize axis a bit more
apex(eco, aes(x = date, y = value, color = variable), type = "line") %>%
  ax_yaxis(
    title = list(text = "Pce"),
    axisBorder = list(
      show = TRUE,

```

```

        color = "#008FFB"
    ),
    labels = list(
        style = list(
            colors = "#008FFB"
        )
    ),
    tooltip = list(
        enabled = TRUE
    )
) %>%
ax_yaxis2(
    opposite = TRUE,
    min = 160000,
    forceNiceScale = TRUE,
    title = list(text = "Pop"),
    axisBorder = list(
        show = TRUE,
        color = "#00E396"
    ),
    labels = list(
        style = list(
            colors = "#00E396"
        )
    ),
    tooltip = list(
        enabled = TRUE
    )
)

```

bar_opts

Bar options

Description

Use these options in `ax_plotOptions()`.

Usage

```

bar_opts(
  horizontal = NULL,
  endingShape = NULL,
  columnWidth = NULL,
  barHeight = NULL,
  distributed = NULL,
  colors = NULL,
  dataLabels = NULL,
  ...
)

```

Arguments

| | |
|-------------|---|
| horizontal | Logical. This option will turn a column chart into a horizontal bar chart. |
| endingShape | Available Options: "flat" or "rounded". |
| columnWidth | In column charts, columnWidth is the percentage of the available width in the grid-rect. |
| barHeight | In horizontal bar charts, barHeight is the percentage of the available height in the grid-rect. |
| distributed | Logical. Turn this option to make the bars discrete. Each value indicates one bar per series. |
| colors | A list of parameters. |
| dataLabels | List with fields position (available options: "top", "center" or "bottom") |
| ... | Additional parameters. |

Value

A list of options that can be used in `ax_plotOptions()`.

Note

See <https://apexcharts.com/docs/options/plotoptions/bar/>.

Examples

```
data("mpg", package = "ggplot2")

apex(mpg, aes(manufacturer)) %>%
  ax_plotOptions(
    bar = bar_opts(
      endingShape = "rounded",
      columnWidth = 100,
      distributed = TRUE
    )
  )
```

 boxplot_opts

Boxplot options

Description

Use these options in `ax_plotOptions()`.

Usage

```
boxplot_opts(color.upper, color.lower, ...)
```

Arguments

color.upper Color for the upper quartile (Q3 to median) of the box plot.
 color.lower Color for the lower quartile (median to Q1) of the box plot.
 ... Additional parameters.

Value

A list of options that can be used in `ax_plotOptions()`.

Note

See <https://apexcharts.com/docs/options/plotoptions/boxplot/>.

Examples

```
data("mpg", package = "ggplot2")
apex(mpg, aes(class, hwy), "boxplot") %>%
  ax_plotOptions(
    boxPlot = boxplot_opts(color.upper = "#848484", color.lower = "#848484" )
  )
```

 bubble_opts

Bubble options

Description

Use these options in `ax_plotOptions()`.

Usage

```
bubble_opts(minBubbleRadius, maxBubbleRadius, ...)
```

Arguments

minBubbleRadius Minimum radius size of a bubble. If a bubble value is too small to be displayed, this size will be used.
 maxBubbleRadius Maximum radius size of a bubble. If a bubble value is too large to cover the chart, this size will be used.
 ... Additional parameters.

Value

A list of options that can be used in `ax_plotOptions()`.

Note

See <https://apexcharts.com/docs/options/plotoptions/bubble/>.

Examples

```
apex(  
  data = mtcars,  
  type = "scatter",  
  mapping = aes(x = wt, y = mpg, z = qsec)  
) %>%  
  ax_plotOptions(  
    bubble = bubble_opts(  
      minBubbleRadius = 1,  
      maxBubbleRadius = 20  
    )  
  )  
)
```

candles

Candlestick demo data

Description

Candlestick demo data

Usage

candles

Format

A data frame with 60 observations and the following 5 variables:

datetime Timestamp.

open Open value.

high Highest value.

low Lowest value.

close Close value.

Source

Apexcharts (<https://apexcharts.com/javascript-chart-demos/candlestick-charts/basic/>)

| | |
|---------------|----------------------|
| climate_paris | <i>Paris Climate</i> |
|---------------|----------------------|

Description

Average temperature and precipitation in Paris for the period 1971-2000.

Usage

```
climate_paris
```

Format

A data frame with 12 observations and the following 3 variables:

month Month

temperature Temperature (in degree celsius).

precipitation Precipitation (in mm).

Source

Wikipedia (https://fr.wikipedia.org/wiki/Climat_de_Paris)

| | |
|---------------|--------------------------------------|
| config_update | <i>Configuration for auto update</i> |
|---------------|--------------------------------------|

Description

Configuration for auto update

Usage

```
config_update(  
  series_animate = TRUE,  
  update_options = FALSE,  
  options_animate = TRUE,  
  options_redrawPaths = TRUE,  
  update_synced_charts = FALSE  
)
```

Arguments

- series_animate Should the chart animate on re-rendering.
- update_options Update or not global options for chart.
- options_animate
Should the chart animate on re-rendering.
- options_redrawPaths
When the chart is re-rendered, should it draw from the existing paths or completely redraw the chart paths from the beginning. By default, the chart is re-rendered from the existing paths.
- update_synced_charts
All the charts in a group should also update when one chart in a group is updated.

 consumption

Electricity consumption and forecasting

Description

Electricity consumption per day in France for january and february of year 2020.

Usage

consumption

Format

A data frame with 120 observations and the following 3 variables:

date date.

type Type of data : realized or forecast.

value Value in giga-watt per hour.

Source

Rte (Electricity Transmission Network in France) (<https://data.rte-france.com/>)

eco2mix

eco2mix data

Description

The dataset contains data about electricity consumption and production in France between 2012 and 2022.

Usage

```
eco2mix
```

Format

A data frame with 3,033 observations and 3 variables.

Source

Rte (Réseau et transport d'électricité) (<https://www.rte-france.com/eco2mix> and <https://opendata.reseaux-energies.fr/>)

events_opts

Events options

Description

Events options

Usage

```
events_opts(  
  click = NULL,  
  beforeMount = NULL,  
  mounted = NULL,  
  updated = NULL,  
  legendClick = NULL,  
  selection = NULL,  
  dataPointSelection = NULL,  
  dataPointMouseEnter = NULL,  
  dataPointMouseLeave = NULL,  
  beforeZoom = NULL,  
  zoomed = NULL,  
  scrolled = NULL,  
  ...  
)
```

Arguments

| | |
|---------------------|--|
| click | Fires when user clicks on any area of the chart. |
| beforeMount | Fires before the chart has been drawn on screen. |
| mounted | Fires after the chart has been drawn on screen. |
| updated | Fires when the chart has been dynamically updated. |
| legendClick | Fires when user clicks on legend. |
| selection | Fires when user selects rect using the selection tool. |
| dataPointSelection | Fires when user clicks on a datapoint (bar/column/marker/bubble/donut-slice). |
| dataPointMouseEnter | Fires when user's mouse enter on a datapoint (bar/column/marker/bubble/donut-slice). |
| dataPointMouseLeave | MouseLeave event for a datapoint (bar/column/marker/bubble/donut-slice). |
| beforeZoom | This function, if defined, runs just before zooming in/out of the chart allowing you to set a custom range for zooming in/out. |
| zoomed | Fires when user zooms in/out the chart using either the selection zooming tool or zoom in/out buttons. |
| scrolled | Fires when user scrolls using the pan tool. |
| ... | Additional parameters. |

Value

A list of options that can be used in [ax_chart](#).

Note

All arguments should be JavaScript function defined with `htmlwidgets::JS`.

See <https://apexcharts.com/docs/options/chart/events/>.

Examples

```
if (interactive()) {
  library(shiny)

  ui <- fluidPage(
    fluidRow(
      column(
        width = 8, offset = 2,
        tags$h2("Apexchart in Shiny"),
        apexchartOutput("chart"),
        verbatimTextOutput(outputId = "res_click")
      )
    )
  )
}
```

```
server <- function(input, output, session) {  
  
  output$chart <- renderApexchart({  
    apexchart() %>%  
    ax_chart(  
      type = "bar",  
      events = events_opts(  
        dataPointSelection = JS(  
          "function(event, chartContext, config) {"  
            Shiny.setInputValue('click', config.selectedDataPoints)  
          }"  
        )  
      )  
    ) %>%  
    ax_series(  
      list(  
        name = "Example",  
        data = sample(1:100, 5)  
      )  
    ) %>%  
    ax_xaxis(  
      categories = LETTERS[1:5]  
    )  
  })  
  
  output$res_click <- renderPrint({  
    input$click  
  })  
}  
  
shinyApp(ui, server)  
}
```

format_date

Format date in JS

Description

Format date in JS

Usage

```
format_date(x)
```

Arguments

x Date to use in JavaScript

Value

a JavaScript string

| | |
|------------|---------------------------------|
| format_num | <i>Format numbers (with D3)</i> |
|------------|---------------------------------|

Description

Format numbers (with D3)

Usage

```
format_num(format, prefix = "", suffix = "", locale = "en-US")
```

Arguments

| | |
|--------|--|
| format | Format for numbers, currency, percentage, e.g. ".0%" for rounded percentage. See online documentation : https://github.com/d3/d3-format . |
| prefix | Character string to append before formatted value. |
| suffix | Character string to append after formatted value. |
| locale | Localization to use, for example "fr-FR" for french, see possible values here: https://github.com/d3/d3-format/tree/master/locale . |

Value

a JS function

Examples

```
# Use SI prefix
dat <- data.frame(
  labels = c("apex", "charts"),
  values = c(1e4, 2e4)
)

apex(dat, aes(labels, values), "column") %>%
  ax_yaxis(labels = list(
    formatter = format_num("~s")
  ))

apex(dat, aes(labels, values * 100), "column") %>%
  ax_yaxis(labels = list(
    formatter = format_num("~s")
  ))

# Percentage
dat <- data.frame(
  labels = c("apex", "charts"),
  values = c(0.45, 0.55)
)
```

```

apex(dat, aes(labels, values), "column") %>%
  ax_yaxis(labels = list(
    formatter = format_num(".0%")
  ))

# Currency
dat <- data.frame(
  labels = c("apex", "charts"),
  values = c(570, 1170)
)

apex(dat, aes(labels, values), "column") %>%
  ax_yaxis(labels = list(
    formatter = format_num("$,.2f")
  ))

# Change locale
apex(dat, aes(labels, values), "column") %>%
  ax_yaxis(labels = list(
    formatter = format_num("$,.2f", locale = "fr-FR")
  ))

# Customize tooltip value
# Use SI prefix
dat <- data.frame(
  labels = c("apex", "charts"),
  values = c(1e4, 2e4)
)

apex(dat, aes(labels, values), "column") %>%
  ax_tooltip(y = list(
    formatter = format_num(",", suffix = " GW/h")
  ))

```

heatmap_opts

Heatmap options

Description

Use these options in `ax_plotOptions()`.

Usage

```
heatmap_opts(
  radius = NULL,
```

```

    enableShades = NULL,
    shadeIntensity = NULL,
    colorScale = NULL,
    ...
  )

```

Arguments

| | |
|----------------|--|
| radius | Numeric. Radius of the rectangle inside heatmap. |
| enableShades | Logical. Enable different shades of color depending on the value |
| shadeIntensity | Numeric [0,1]. The intensity of the shades generated for each value. |
| colorScale | List. |
| ... | Additional parameters. |

Value

A list of options that can be used in `ax_plotOptions()`.

Note

See <https://apexcharts.com/docs/options/plotoptions/heatmap/>.

Examples

```

df <- expand.grid(
  month = month.name,
  person = c("Obi-Wan", "Luke", "Anakin", "Leia")
)
df$value <- sample(0:1, nrow(df), TRUE)

apex(
  data = df,
  mapping = aes(x = month, y = person, fill = value),
  type = "heatmap"
) %>%
  ax_plotOptions(
    heatmap = heatmap_opts(
      enableShades = FALSE,
      colorScale = list(
        ranges = list(
          list(from = 0, to = 0.5, color = "#FF0000"),
          list(from = 0.5, to = 1, color = "#088A08")
        )
      )
    )
  )
)

```

| | |
|-------|------------------------------|
| label | <i>Label for annotations</i> |
|-------|------------------------------|

Description

Label for annotations

Usage

```
label(
    text = NULL,
    borderColor = NULL,
    borderWidth = NULL,
    textAnchor = NULL,
    position = NULL,
    offsetX = NULL,
    offsetY = NULL,
    background = NULL,
    color = NULL,
    fontSize = NULL,
    fontWeight = NULL,
    fontFamily = NULL,
    cssClass = NULL,
    padding = c(2, 5, 2, 5)
)
```

Arguments

| | |
|-------------|--|
| text | Text for the annotation label. |
| borderColor | Border color for the label. |
| borderWidth | Border width for the label. |
| textAnchor | The alignment of text relative to label's drawing position. |
| position | Available options: left or right. |
| offsetX | Sets the left offset for annotation label. |
| offsetY | Sets the top offset for annotation label. |
| background | Background Color for the annotation label. |
| color | ForeColor for the annotation label. |
| fontSize | FontSize for the annotation label. |
| fontWeight | Font-weight for the annotation label. |
| fontFamily | Font-family for the annotation label. |
| cssClass | A custom Css Class to give to the annotation label elements. |
| padding | Padding for the label: top, right, bottom, left. |

Value

A list that can be used in `add_shade`, `add_point`, `add_event`, `add_event_marker`.

| | |
|-------------|-----------------------------|
| life_expect | <i>Life expectancy data</i> |
|-------------|-----------------------------|

Description

The dataset contains data about life expectancy in 1972 and 2007 for 10 countries.

Usage

```
life_expect
```

Format

A data frame with 10 observations and 4 variables.

Source

gapminder package (<https://jennybc.github.io/gapminder/> and <https://www.gapminder.org/data/>)

| | |
|------------------|---|
| life_expect_long | <i>Life expectancy data (long format)</i> |
|------------------|---|

Description

The dataset contains data about life expectancy in 1972 and 2007 for 10 countries.

Usage

```
life_expect_long
```

Format

A data frame with 20 observations and 3 variables.

Source

gapminder package (<https://jennybc.github.io/gapminder/> and <https://www.gapminder.org/data/>)

| | |
|----------|---------------------------------------|
| parse_df | <i>Convert a data.frame to a list</i> |
|----------|---------------------------------------|

Description

Convert data to a format suitable for ApexCharts.js

Usage

```
parse_df(data, add_names = FALSE)
```

Arguments

| | |
|-----------|--|
| data | A data.frame or an object coercible to data.frame. |
| add_names | Use names of columns in output. Can be logical to reuse data names or a character vector of new names. |

Value

A list that can be used to specify data in [ax_series](#) for example.

Examples

```
# All iris dataset
parse_df(iris)

# Keep variables names
parse_df(iris[, 1:2], add_names = TRUE)

# Use custom names
parse_df(iris[, 1:2], add_names = c("x", "y"))
```

| | |
|----------|--------------------|
| pie_opts | <i>Pie options</i> |
|----------|--------------------|

Description

Use these options in [ax_plotOptions\(\)](#).

Usage

```
pie_opts(
  size = NULL,
  donut = NULL,
  customScale = NULL,
  offsetX = NULL,
  offsetY = NULL,
  dataLabels = NULL,
  ...
)
```

Arguments

| | |
|-------------|---|
| size | Numeric. Custom size of the pie which will override the default size calculations. |
| donut | List with two fields size (Donut / ring size in percentage relative to the total pie area.) and background (The background color of the pie). |
| customScale | Numeric. Transform the scale of whole pie/donut overriding the default calculations. |
| offsetX | Numeric. Sets the left offset of the whole pie area. |
| offsetY | Numeric. Sets the top offset of the whole pie area. |
| dataLabels | List with field offset (Numeric, Offset by which labels will move outside / inside of the donut area) |
| ... | Additional parameters. |

Value

A list of options that can be used in `ax_plotOptions()`.

Note

See <https://apexcharts.com/docs/options/plotoptions/pie/>.

Examples

```
data("mpg", package = "ggplot2")

apex(mpg, aes(cyl), type = "donut") %>%
  ax_plotOptions(
    pie = pie_opts(
      donut = list(size = "90%", background = "#BABABA")
    )
  )
```

| | |
|----------------|---------------------------|
| radialBar_opts | <i>Radial bar options</i> |
|----------------|---------------------------|

Description

Use these options in `ax_plotOptions()`.

Usage

```
radialBar_opts(  
  size = NULL,  
  inverseOrder = NULL,  
  startAngle = NULL,  
  endAngle = NULL,  
  offsetX = NULL,  
  offsetY = NULL,  
  hollow = NULL,  
  track = NULL,  
  dataLabels = NULL,  
  ...  
)
```

Arguments

| | |
|--------------|--|
| size | Numeric. Manual size of the radialBars instead of calculating automatically from default height / width. |
| inverseOrder | Logical. Whether to make the first value of series innermost or outermost. |
| startAngle | Numeric. Angle from which the radialBars should start. |
| endAngle | Numeric. Angle to which the radialBars should end. The sum of the startAngle and endAngle should not exceed 360. |
| offsetX | Numeric. Sets the left offset for radialBars. |
| offsetY | Numeric. Sets the top offset for radialBars. |
| hollow | List. |
| track | List. |
| dataLabels | List. |
| ... | Additional parameters. |

Value

A list of options that can be used in `ax_plotOptions()`.

Note

See <https://apexcharts.com/docs/options/plotoptions/radialbar/>.

Examples

```

apexchart() %>%
  ax_chart(type = "radialBar") %>%
  ax_plotOptions(
    radialBar = radialBar_opts(
      startAngle = -135,
      endAngle = 135,
      dataLabels = list(
        name = list(
          fontSize = "16px",
          # color = undefined,
          offsetY = 120
        ),
        value = list(
          offsetY = 76,
          fontSize = "22px",
          # color = undefined,
          formatter = htmlwidgets::JS("function (val) {return val + '%';}")
        )
      )
    )
  ) %>%
  ax_stroke(dashArray = 4) %>%
  ax_series(70) %>%
  ax_labels("Indicator")

```

run_demo_input

Run Shiny input events examples

Description

Run Shiny input events examples

Usage

```
run_demo_input(example = c("click", "zoom", "selection"))
```

Arguments

example Name of the example.

Examples

```

if (interactive()) {
  run_demo_input("click")
  run_demo_input("zoom")
  run_demo_input("selection")
}

```

run_demo_sparkbox *Run Shiny spark boxes example*

Description

Run Shiny spark boxes example

Usage

```
run_demo_sparkbox()
```

Examples

```
if (interactive()) {  
  run_demo_sparkbox()  
}
```

run_demo_sync *Run Shiny synchronization example*

Description

Run Shiny synchronization example

Usage

```
run_demo_sync()
```

Examples

```
if (interactive()) {  
  run_demo_sync()  
}
```

set_input_click *Retrieve click information in Shiny*

Description

According to type of chart, different values are retrieved:

- **bar and column:** retrieve category (x-axis).
- **pie and donut:** retrieve label.
- **time-series:** retrieve x-axis value, you have to display markers with size > 0 and set tooltip's options intersect = TRUE and shared = FALSE.
- **scatter:** retrieve XY coordinates.

Usage

```
set_input_click(  
  ax,  
  inputId,  
  multiple = FALSE,  
  effect_type = c("darken", "lighten", "none"),  
  effect_value = 0.35,  
  session = shiny::getDefaultReactiveDomain()  
)
```

Arguments

| | |
|--------------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| inputId | The id that will be used server-side for retrieving click. |
| multiple | Allow multiple selection: TRUE or FALSE (default). |
| effect_type | Type of effect for selected element, default is to use lightly darken color. |
| effect_value | A larger value intensifies the select effect, accept value between 0 and 1. |
| session | The Shiny session. |

Value

An `apexchart()` htmlwidget object.

Note

If x-axis is of type datetime, value retrieved is of class POSIXct.

Examples

```
library(apexcharter)

# Not in Shiny but you can still click on bars
data.frame(
  month = month.abb,
  value = sample(1:100, 12)
) %>%
  apex(aes(month, value)) %>%
  set_input_click("month_click", multiple = TRUE)

# Interactive examples:
if (interactive()) {

  run_demo_input("click")

}
```

| | |
|------------------|---|
| set_input_export | <i>Retrieve chart's base64 dataURI.</i> |
|------------------|---|

Description

Retrieve chart's base64 dataURI.

Usage

```
set_input_export(ax, inputId, session = shiny::getDefaultReactiveDomain())
```

Arguments

| | |
|---------|---|
| ax | An apexchart() htmlwidget object. |
| inputId | The id that will be used server-side for retrieving data. |
| session | The Shiny session. |

Value

An [apexchart\(\)](#) htmlwidget object.

Examples

```
library(shiny)
library(apexcharter)

ui <- fluidPage(
  fluidRow(
    column(
```

```

        width = 8, offset = 2,
        tags$h2("Export PNG"),
        actionButton("redraw", "Redraw chart"),
        apexchartOutput("chart"),
        verbatimTextOutput("result"),
        uiOutput(outputId = "image")
      )
    )
  )

server <- function(input, output, session) {

  output$chart <- renderApexchart({
    input$redraw
    apexchart() %>%
    ax_chart(type = "bar") %>%
    ax_series(
      list(
        name = "Example",
        data = sample(1:100, 5)
      )
    ) %>%
    ax_xaxis(
      categories = LETTERS[1:5]
    ) %>%
    set_input_export("export")
  })

  output$result <- renderPrint({
    input$export
  })

  output$image <- renderUI({
    tags$img(src = input$export)
  })

}

if (interactive())
  shinyApp(ui, server)

```

set_input_selection *Retrieve selection information in Shiny*

Description

Retrieve selection information in Shiny

Usage

```

set_input_selection(
  ax,
  inputId,
  type = c("x", "xy", "y"),
  fill_color = "#24292e",
  fill_opacity = 0.1,
  stroke_width = 1,
  stroke_dasharray = 3,
  stroke_color = "#24292e",
  stroke_opacity = 0.4,
  xmin = NULL,
  xmax = NULL,
  ymin = NULL,
  ymax = NULL,
  session = shiny::getDefaultReactiveDomain()
)

```

Arguments

| | |
|------------------|--|
| ax | An apexchart() htmlwidget object. |
| inputId | The id that will be used server-side for retrieving selection. |
| type | Allow selection either on x-axis, y-axis or on both axis. |
| fill_color | Background color of the selection rect which is drawn when user drags on the chart. |
| fill_opacity | Opacity of background color of the selection rectangle. |
| stroke_width | Border thickness of the selection rectangle. |
| stroke_dasharray | Creates dashes in borders of selection rectangle. Higher number creates more space between dashes in the border. |
| stroke_color | Colors of selection border. |
| stroke_opacity | Opacity of selection border. |
| xmin, xmax | Start value of x-axis. Both min and max must be provided. |
| ymin, ymax | Start value of y-axis. Both min and max must be provided. |
| session | The Shiny session. |

Value

An [apexchart\(\)](#) htmlwidget object.

Examples

```

library(apexcharter)
data("economics", package = "ggplot2")

# Not in Shiny so no events

```

```
# but you can still select an area on chart
apex(economics, aes(date, psavert), type = "line") %>%
  set_input_selection("selection")

# Default selection at start
apex(economics, aes(date, psavert), type = "line") %>%
  set_input_selection(
    inputId = "selection",
    xmin = format_date("1980-01-01"),
    xmax = format_date("1985-01-01")
  )
```

| | |
|----------------|---|
| set_input_zoom | <i>Retrieve zoom information in Shiny</i> |
|----------------|---|

Description

Retrieve zoom information in Shiny

Usage

```
set_input_zoom(ax, inputId, session = shiny::getDefaultReactiveDomain())
```

Arguments

| | |
|---------|---|
| ax | An apexchart() htmlwidget object. |
| inputId | The id that will be used server-side for retrieving zoom. |
| session | The Shiny session. |

Value

An [apexchart\(\)](#) htmlwidget object.

Note

If x-axis is of type `datetime`, value retrieved is of class `POSIXct`.

Examples

```
if (interactive()) {
  run_demo_input("zoom")
}
```

| | |
|-------------------|----------------------|
| set_tooltip_fixed | <i>Fixed tooltip</i> |
|-------------------|----------------------|

Description

Fixed tooltip

Usage

```
set_tooltip_fixed(  
  ax,  
  position = c("topLeft", "topRight", "bottomLeft", "bottomRight"),  
  offsetX = NULL,  
  offsetY = NULL  
)
```

Arguments

| | |
|----------|--|
| ax | An <code>apexchart()</code> htmlwidget object. |
| position | Predefined position: "topLeft", "topRight", "bottomLeft" or "bottomRight". |
| offsetX | Sets the left offset for the tooltip container in fixed position. |
| offsetY | Sets the top offset for the tooltip container in fixed position. |

Value

An `apexchart()` htmlwidget object.

Examples

```
library(apexcharter)  
data("economics", package = "ggplot2")  
  
apex(  
  data = tail(economics, 350),  
  mapping = aes(x = date, y = uempmed),  
  type = "line"  
) %>%  
  set_tooltip_fixed()
```

 spark_box

Create a box with a sparkline

Description

Create a box with a sparkline

Usage

```
spark_box(
  data,
  title = NULL,
  subtitle = NULL,
  color = "#2E93fA",
  background = "#FFF",
  type = c("area", "line", "spline", "column"),
  synchronize = NULL,
  title_style = NULL,
  subtitle_style = NULL,
  width = NULL,
  height = NULL,
  elementId = NULL
)
```

Arguments

| | |
|-----------------------------|--|
| data | A data.frame-like object with at least two columns, first is mapped to x-axis, second to y-axis. |
| title | Title to display in the box. |
| subtitle | Subtitle to display in the box. |
| color | Color of the chart. |
| background | Background color of the box. |
| type | Type of chart, currently type supported are : "area" (default), "line", "spline", "column". |
| synchronize | Give a common id to charts to synchronize them (tooltip and zoom). |
| title_style, subtitle_style | A list of named attributes to style the title / subtitle, possible values are fontSize, fontWeight, fontFamily, color. |
| width, height | A numeric input in pixels. |
| elementId | Use an explicit element ID for the widget. |

Value

An apexcharts htmlwidget object.

Note

In Shiny use `sparkBoxOutput / renderSparkBox` to render boxes, see example. Boxes have CSS class `"apexcharter-spark-box"` if you need more styling.

Examples

```
library(apexcharter)

spark_data <- data.frame(
  date = Sys.Date() + 1:20,
  var1 = round(rnorm(20, 50, 10)),
  var2 = round(rnorm(20, 50, 10)),
  var3 = round(rnorm(20, 50, 10))
)

spark_box(
  data = spark_data,
  title = mean(spark_data$var1),
  subtitle = "Variable 1"
)

# In Shiny
if (interactive()) {
  run_sparkbox_demo()
}
```

temperatures

Temperature data

Description

The dataset contains data about temperatures in France between 2018 and 2022.

Usage

```
temperatures
```

Format

A data frame with 365 observations and 6 variables.

Source

Enedis (<https://data.enedis.fr/explore/dataset/donnees-de-temperature-et-de-pseudo-rayonnement/>)

unhcr_ts

UNHCR data by continent of origin

Description

The dataset contains data about UNHCR's populations of concern summarised by continent of origin.

Usage

unhcr_ts

Format

A data frame with 913 observations and the following 4 variables:

year Year concerned.

population_type Populations of concern : Refugees, Asylum-seekers, Internally displaced persons (IDPs), Returned refugees, Returned IDPs, Stateless persons, Others of concern.

continent_origin Continent of residence of population.

n Number of people concerned.

Source

UNHCR (The UN Refugee Agency) (<https://data.unhcr.org/>)

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