

Package ‘qbinplots’

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Title Quantile Binned Plots

Version 0.3.3

Description Create quantile binned and conditional plots for Exploratory Data Analysis. The package provides several plotting functions that are all based on quantile binning. The plots are created with 'ggplot2' and 'patchwork' and can be further adjusted.

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URL <https://edwindj.github.io/qbinplots/>

BugReports <https://github.com/edwindj/qbinplots/issues>

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Suggests palmerpenguins, tinytest

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Description

This package creates plots using quantile binning.

Details

Quantile binning is an exploratory data analysis tool that helps to see the distribution of the variables in a dataset as a function of the variable that is binned.

A data.frame is quantile binned on a variable `x` using `qbin()` and then plotted with one of the available plot functions.

qbinplots offers various types of plots:

- `qbin_*` quantile binned plots that show the distribution of the variables in the quantile bins.
- `cond_*` conditional quantile plots that show the distribution of the variables conditional on the `x` variable.

Quantile binned plots

- `qbin_lineplot()` highlights the change in median between qbins, shows the distribution within qbins.
- `qbin_barplot()` shows the size of medians or expected value of qbins.
- `qbin_boxplot()` shows the distribution within qbins.
- `qbin_heatmap()` shows the distribution within the qbins.

Conditional (quantile binned) plots

- `cond_boxplot()` shows the distribution of the variables conditional on the `x` variable.
- `cond_barplot()` shows the expected median/mean of the variables conditional on the `x` variable.
- `funq_plot()` shows a functional view of the data, plotting the median and interquartile range of numerical variables and level frequency of the other variables as a function of the `x` variable using quantile bins.

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See Also

Useful links:

- <https://edwindj.github.io/qbinplots/>
- Report bugs at <https://github.com/edwindj/qbinplots/issues>

cond_barplot

Conditional quantile barplot

Description

`cond_barplot()` conditions all variables on `x` by quantile binning and shows the median or mean of the other variables for each `x`.

Usage

```
cond_barplot(
  data,
  x = NULL,
  n = 100,
  min_bin_size = NULL,
  overlap = NULL,
  ncols = NULL,
  fill = "#2f4f4f",
  auto_fill = FALSE,
  show_bins = FALSE,
  type = c("median", "mean"),
  ...
)
```

Arguments

<code>data</code>	a <code>data.frame</code> to be binned
<code>x</code>	character variable name used for the quantile binning
<code>n</code>	integer number of quantile bins.
<code>min_bin_size</code>	integer minimum number of rows/data points that should be in a quantile bin. If <code>NULL</code> it is initially <code>sqrt(nrow(data))</code>
<code>overlap</code>	logical if <code>TRUE</code> the quantile bins will overlap. Default value will be <code>FALSE</code> .

<code>ncols</code>	The number of column to be used in the layout.
<code>fill</code>	The color to use for the bars.
<code>auto_fill</code>	If TRUE, use a different color for each category
<code>show_bins</code>	If TRUE, show the bins on the x-axis.
<code>type</code>	The type of statistic to use for the bars.
<code>...</code>	Additional arguments to pass to the plot functions

Value

A list of ggplot objects.

See Also

Other conditional quantile plotting functions: [cond_boxplot\(\)](#), [cond_heatmap\(\)](#), [funq_plot\(\)](#)

Examples

```
# plots the expected median conditional on Sepal.Width
cond_barplot(iris, "Sepal.Width", n = 12)

# plots the expected median
cond_barplot(iris, "Sepal.Width", n = 12, show_bins = TRUE)

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

cond_barplot(diamonds[c(1:4, 7)], "carat", auto_fill = TRUE)

if (require(palmerpenguins)) {
  p <- cond_barplot(penguins[1:7], "body_mass_g", auto_fill = TRUE)
  print(p)

  # compare with qbin_boxplot
  p <- cond_boxplot(penguins[1:7], "body_mass_g", auto_fill = TRUE)
  print(p)
}
```

cond_boxplot

Conditional quantile boxplot

Description

[cond_boxplot\(\)](#) conditions all variables on x by quantile binning and shows the boxplots for the other variables for each value of qbinned x.

Usage

```
cond_boxplot(
  data,
  x = NULL,
  n = 100,
  min_bin_size = NULL,
  color = "#002f2f",
  fill = "#2f4f4f",
  auto_fill = FALSE,
  ncols = NULL,
  xmarker = NULL,
  qmarker = NULL,
  show_bins = FALSE,
  xlim = NULL,
  connect = FALSE,
  ...
)
```

Arguments

<code>data</code>	a <code>data.frame</code> to be binned
<code>x</code>	character variable name used for the quantile binning
<code>n</code>	integer number of quantile bins.
<code>min_bin_size</code>	integer minimum number of rows/data points that should be in a quantile bin. If <code>NULL</code> it is initially <code>sqrt(nrow(data))</code>
<code>color</code>	The color to use for the line charts
<code>fill</code>	The fill color to use for the areas
<code>auto_fill</code>	If <code>TRUE</code> , use a different color for each category
<code>ncols</code>	The number of column to be used in the layout
<code>xmarker</code>	numeric, the x marker.
<code>qmarker</code>	numeric, the quantile marker to use that is translated in a x value.
<code>show_bins</code>	if <code>TRUE</code> a rug is added to the plot
<code>xlim</code>	numeric, the limits of the x-axis.
<code>connect</code>	if <code>TRUE</code> subsequent medians are connected.
<code>...</code>	Additional arguments to pass to the plot functions

Details

`cond_boxplot` is the same function as `funq_plot()` but with different defaults, namely `connect = FALSE` and `auto_fill = FALSE`. `funq_plot` highlights the functional relationship between x and the y-variables, by connecting the medians of the quantile bins.

`qbin_boxplot()` shows the boxplots of the quantile bins on a quantile scale.

Value

A list of ggplot objects.

See Also

Other conditional quantile plotting functions: [cond_barplot\(\)](#), [cond_heatmap\(\)](#), [funq_plot\(\)](#)

Examples

```
cond_boxplot(
  iris, x = "Petal.Length"
)
```

cond_heatmap

Conditional heatmap

Description

cond_heatmap shows the conditional distribution of the y of variables for each quantile bin of x. It is an alternative to [cond_boxplot\(\)](#), fine graining the distribution per [qbin\(\)](#). [cond_barplot\(\)](#) highlights the median/mean of the quantile bins, while [funq_plot\(\)](#) highlights the functional dependency of the median.

Usage

```
cond_heatmap(
  data,
  x = NULL,
  n = 100,
  min_bin_size = NULL,
  overlap = NULL,
  bins = c(n, 25),
  ncols = NULL,
  auto_fill = FALSE,
  show_bins = FALSE,
  fill = "#2f4f4f",
  low = "#eeeeee",
  high = "#2f4f4f",
  ...
)
```

Arguments

data	a data.frame to be binned
x	character variable name used for the quantile binning
n	integer number of quantile bins.

min_bin_size	integer minimum number of rows/data points that should be in a quantile bin. If NULL it is initially <code>sqrt(nrow(data))</code>
overlap	logical if TRUE the quantile bins will overlap. Default value will be FALSE.
bins	integer vector with the number of bins to use for the x and y axis.
ncols	The number of column to be used in the layout.
auto_fill	If TRUE, use a different color for each category.
show_bins	If TRUE, show the bin boundaries on the x-axis.
fill	The color used for categorical variables.
low	The color used for low values in the heatmap.
high	The color used for high values in the heatmap.
...	Additional arguments to pass to the plot functions

Value

A list of ggplot objects.

See Also

Other conditional quantile plotting functions: [cond_barplot\(\)](#), [cond_boxplot\(\)](#), [funq_plot\(\)](#)

Examples

```
cond_heatmap(
  iris,
  x = "Petal.Length",
  n = 12
)
```

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

```
cond_heatmap(
  diamonds,
  x = "carat",
  bins <- c(100,100)
)[6:8]
```

funq_plot

Functional quantile plot

Description

[funq_plot\(\)](#) conditions on variable x with quantile binning and plots the median and interquartile range of numerical variables and level frequency of the other variables as a function the x variable.

Usage

```

funq_plot(
  data,
  x = NULL,
  n = 100,
  min_bin_size = NULL,
  overlap = NULL,
  color = "#002f2f",
  fill = "#2f4f4f",
  auto_fill = TRUE,
  ncols = NULL,
  xmarker = NULL,
  qmarker = NULL,
  show_bins = FALSE,
  xlim = NULL,
  connect = TRUE,
  ...
)

```

Arguments

<code>data</code>	a <code>data.frame</code> to be binned
<code>x</code>	character variable name used for the quantile binning
<code>n</code>	integer number of quantile bins.
<code>min_bin_size</code>	integer minimum number of rows/data points that should be in a quantile bin. If <code>NULL</code> it is initially <code>sqrt(nrow(data))</code>
<code>overlap</code>	logical if <code>TRUE</code> the quantile bins will overlap. Default value will be <code>FALSE</code> .
<code>color</code>	The color to use for the line charts
<code>fill</code>	The fill color to use for the areas
<code>auto_fill</code>	If <code>TRUE</code> , use a different color for each category
<code>ncols</code>	The number of column to be used in the layout
<code>xmarker</code>	numeric, the x marker.
<code>qmarker</code>	numeric, the quantile marker to use that is translated in a x value.
<code>show_bins</code>	if <code>TRUE</code> a rug is added to the plot
<code>xlim</code>	numeric, the limits of the x-axis.
<code>connect</code>	if <code>TRUE</code> subsequent medians are connected.
<code>...</code>	Additional arguments to pass to the plot functions

Details

By highlighting and connecting the median values it creates a functional view of the data. What is the (expected) median given a certain value of `x`?

It `qbins` the `x` variable and plots the medians of the `qbins` vs the other variables, thereby creating a functional view of `x` to the rest of the data, calculating the statistics for each bin, hence the name `funq_plot`.

Value

A ggplot object with the plots

See Also

Other conditional quantile plotting functions: [cond_barplot\(\)](#), [cond_boxplot\(\)](#), [cond_heatmap\(\)](#)

Examples

```
funq_plot(iris, "Sepal.Length", xmarker=5.5)
```

```
funq_plot(
  iris,
  x = "Sepal.Length",
  xmarker=5.5,
  overlap = TRUE
)
```

```
data("diamonds", package="ggplot2")
funq_plot(diamonds[1:7], "carat", xlim=c(0,2))
```

```
if (require(palmerpenguins)){
  funq_plot(
    penguins[1:7],
    x = "body_mass_g",
    xmarker=4650,
    ncol = 3
  )
}
```

qbin

Bin a data.frame into quantile bins

Description

Bins a data.frame into quantile bins for variable x in data.

Usage

```
qbin(data, x = NULL, n = 100, min_bin_size = NULL, overlap = NULL, ...)
```

Arguments

<code>data</code>	a <code>data.frame</code> to be binned
<code>x</code>	character variable name used for the quantile binning
<code>n</code>	integer number of quantile bins.
<code>min_bin_size</code>	integer minimum number of rows/data points that should be in a quantile bin. If <code>NULL</code> it is initially <code>sqrt(nrow(data))</code>
<code>overlap</code>	logical if <code>TRUE</code> the quantile bins will overlap. Default value will be <code>FALSE</code> .
<code>...</code>	reserved for future use

Details

Each numeric variable in the `data.frame` is binned into `n` quantile bins, for which the `fivenum()` and `mean()` is calculated.

When `n/nrow(data)` is less than `min_bin_size`, `qbin` gives a warning and `n` is adjusted to `nrow(data)/min_bin_size`. Each categorical variable is binned into `n` quantile bins, for which the level frequency is calculated.

Value

a `qbin` object with:

- `$x` the variable name used for binning
- `$bin` a vector of bin numbers
- `$n` the number of bins
- `$num_cols` a vector of numeric column names
- `$cat_cols` a vector of categorical column names
- `$data` a list of `data.tables` with the collected information

qbin_barplot

Quantile binned bar plot

Description

`qbin_barplot()` shows the median or mean for each quantile bin, thereby focusing on the expected value per `qbin()`. For a conditional plot, see `cond_barplot()`.

Usage

```
qbin_barplot(
  data,
  x = NULL,
  n = 100,
  min_bin_size = NULL,
  overlap = NULL,
  ncols = NULL,
```

```

    fill = "#2f4f4f",
    type = c("median", "mean"),
    ...
)

table_plot(data, x = NULL, n = 100, ncols = ncol(data), fill = "#555555", ...)

```

Arguments

data	a data.frame to be binned
x	character variable name used for the quantile binning
n	integer number of quantile bins.
min_bin_size	integer minimum number of rows/data points that should be in a quantile bin. If NULL it is initially <code>sqrt(nrow(data))</code>
overlap	logical if TRUE the quantile bins will overlap. Default value will be FALSE.
ncols	The number of column to be used in the layout.
fill	The color to use for the bars.
type	The type of statistic to use for the bars.
...	Additional arguments to pass to the plot functions

Details

The `table_plot` is a specific form of `qbin_barplot` with `ncols` set to `ncol(data)`.

Value

A list of ggplot objects.

See Also

Other qbin plotting functions: [qbin_boxplot\(\)](#), [qbin_heatmap\(\)](#), [qbin_lineplot\(\)](#)

Examples

```

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

table_plot(diamonds[c(1:4, 7)], "carat")

qbin_barplot(iris, "Sepal.Length", n = 12)

table_plot(iris, "Sepal.Length", n=12)
table_plot(
  iris,
  x = "Sepal.Length",
  min_bin_size=20,
  overlap=TRUE
)

```

```
if (require(palmerpenguins)) {
  table_plot(penguins[1:7], "body_mass_g", 19)
}
```

qbin_boxplot

Quantile binned boxplot

Description

qbin_boxplot creates quantile binned boxplots from data using x as the binning variable. It focuses on the change of median between qbins. It is a complement to [qbin_heatmap\(\)](#) which focuses on the distribution within the qbins.

Usage

```
qbin_boxplot(
  data,
  x = NULL,
  n = 100,
  min_bin_size = NULL,
  ncols = NULL,
  overlap = NULL,
  connect = FALSE,
  color = "#002f2f",
  fill = "#2f4f4f",
  auto_fill = FALSE,
  qmarker = NULL,
  xmarker = NULL,
  ...
)
```

Arguments

data	a data.frame to be binned
x	character variable name used for the quantile binning
n	integer number of quantile bins.
min_bin_size	integer minimum number of rows/data points that should be in a quantile bin. If NULL it is initially <code>sqrt(nrow(data))</code>
ncols	The number of column to be used in the layout
overlap	logical if TRUE the quantile bins will overlap. Default value will be FALSE.
connect	if TRUE subsequent boxplots are connected
color	The color to use for the lines
fill	The color to use for the bars
auto_fill	If TRUE, use a different color for each category

qmarker	numeric, the quantile marker to use.
xmarker	numeric the x marker, i.e. the value for x that is translated into a q value.
...	Additional arguments to pass to the plot functions

Details

The data is binned by the x and a boxplot is created for each bin. The median of the subsequent boxplots are connected to highlight jumps in the data. It hints at the dependency of the variable on the binning variable.

Value

A list of ggplot objects.

See Also

Other qbin plotting functions: [qbin_barplot\(\)](#), [qbin_heatmap\(\)](#), [qbin_lineplot\(\)](#)

Examples

```
qbin_boxplot(
  iris,
  x = "Sepal.Length",
)

qbin_boxplot(
  iris,
  x = "Sepal.Length",
  connect = TRUE,
  overlap = TRUE
)

qbin_boxplot(
  iris,
  x = "Sepal.Length",
  connect = TRUE,
  xmarker = 5.5,
  auto_fill = TRUE
)

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

qbin_boxplot(
  diamonds[1:7],
  "carat",
  auto_fill = TRUE
)

qbin_boxplot(
  diamonds[1:7],
```

```

    "price",
    auto_fill = TRUE,
  )

```

qbin_heatmap

Quantile binned heatmap

Description

qbin_heatmap shows the distribution of the y of variables for each quantile bin of x. It is an alternative to [qbin_boxplot\(\)](#), fine graining the distribution per [qbin\(\)](#). [qbin_barplot\(\)](#) highlights the median/mean of the quantile bins, while

Usage

```

qbin_heatmap(
  data,
  x = NULL,
  n = 25,
  min_bin_size = NULL,
  overlap = NULL,
  bins = c(n),
  type = c("gradient", "size"),
  ncols = NULL,
  auto_fill = FALSE,
  fill = "#2f4f4f",
  low = "#eeeeee",
  high = "#2f4f4f",
  ...
)

```

Arguments

data	a data.frame to be binned
x	character variable name used for the quantile binning
n	integer number of quantile bins.
min_bin_size	integer minimum number of rows/data points that should be in a quantile bin. If NULL it is initially <code>sqrt(nrow(data))</code>
overlap	logical if TRUE the quantile bins will overlap. Default value will be FALSE.
bins	integer vector with the number of bins to use for the x and y axis.
type	The type of heatmap to use. Either "gradient" or "size".
ncols	The number of column to be used in the layout.
auto_fill	If TRUE, use a different color for each category.
fill	The color used for categorical variables.

low	The color used for low values in the heatmap.
high	The color used for high values in the heatmap.
...	Additional arguments to pass to the plot functions

Value

A list of ggplot objects.

See Also

Other qbin plotting functions: [qbin_barplot\(\)](#), [qbin_boxplot\(\)](#), [qbin_lineplot\(\)](#)

Examples

```
qbin_heatmap(  
  iris,  
  "Sepal.Length",  
  auto_fill = TRUE  
)  
  
qbin_heatmap(  
  iris,  
  "Sepal.Length",  
  auto_fill = TRUE,  
  type = "size"  
)  
  
qbin_heatmap(  
  iris,  
  "Sepal.Length",  
  overlap = TRUE,  
  auto_fill = TRUE  
)  
  
data("diamonds", package="ggplot2")  
  
qbin_heatmap(  
  diamonds[c(1,7:9)],  
  x = "price",  
  n = 150  
)
```

qbin_lineplot

*Quantile binned lineplot***Description**

qbin_lineplot creates quantile binned boxplots from data using x as the binning variable and connects the medians: it focuses on the change of median between qbins.

Usage

```
qbin_lineplot(
  data,
  x = NULL,
  n = 100,
  min_bin_size = NULL,
  ncols = NULL,
  connect = TRUE,
  color = "#002f2f",
  fill = "#2f4f4f",
  auto_fill = FALSE,
  qmarker = NULL,
  xmarker = NULL,
  ...
)
```

Arguments

data	a data.frame to be binned
x	character variable name used for the quantile binning
n	integer number of quantile bins.
min_bin_size	integer minimum number of rows/data points that should be in a quantile bin. If NULL it is initially <code>sqrt(nrow(data))</code>
ncols	The number of column to be used in the layout
connect	if TRUE subsequent boxplots are connected
color	The color to use for the lines
fill	The color to use for the bars
auto_fill	If TRUE, use a different color for each category
qmarker	numeric, the quantile marker to use.
xmarker	numeric the x marker, i.e. the value for x that is translated into a q value.
...	Additional arguments to pass to the plot functions

Details

The data is binned by the x and a boxplot is created for each bin. The median of the subsequent boxplots are connected to highlight jumps in the data. It hints at the dependency of the variable on the binning variable.

Value

A list of ggplot objects.

See Also

Other qbin plotting functions: [qbin_barplot\(\)](#), [qbin_boxplot\(\)](#), [qbin_heatmap\(\)](#)

Examples

```
qbin_lineplot(  
  iris,  
  x = "Sepal.Length",  
)
```

```
qbin_lineplot(  
  iris,  
  x = "Sepal.Length",  
  xmarker = 5.5,  
  auto_fill = TRUE  
)
```

```
qbin_lineplot(  
  iris,  
  x = "Sepal.Length",  
  overlap=TRUE,  
  xmarker = 5.5,  
  auto_fill = TRUE  
)
```

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

```
qbin_lineplot(  
  diamonds[1:7],  
  "carat",  
  auto_fill = TRUE  
)
```

```
qbin_lineplot(  
  diamonds[1:7],  
  "price",  
  auto_fill = TRUE,  
)
```


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