Package 'gghinton'

April 1, 2026

Type Package

Title Hinton Diagrams for 'ggplot2'

Version 0.1.0

Description Provides a 'ggplot2' extension for drawing Hinton diagrams, a visualisation technique for numerical matrices in which the area of each square is proportional to the magnitude of the corresponding entry. For signed data, white squares indicate positive values and black squares indicate negative values on a grey background. Hinton diagrams are especially useful for visualising PCA weight matrices, correlation matrices, and transition matrices.

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URL https://github.com/robin-foster-rf/gghinton

BugReports https://github.com/robin-foster-rf/gghinton/issues

Language en-GB

Depends R (>= 4.1.0)

Imports cli (>= 3.4.0), ggplot2 (>= 3.4.0), rlang (>= 1.1.0)

Suggests knitr, Matrix, patchwork, grid, scales (>= 1.3.0), rmarkdown, testthat (>= 3.0.0), tibble, vdiffr

VignetteBuilder knitr

Encoding UTF-8

RoxygenNote 7.3.3

Config/testthat/edition 3

LazyData true

NeedsCompilation no

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Repository CRAN

Date/Publication 2026-04-01 19:50:02 UTC

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`alice_bigrams` *English character bigram counts from Alice's Adventures in Wonderland*

Description

A 27x27 integer matrix of character-pair (bigram) counts computed from the full text of *Alice's Adventures in Wonderland* by Lewis Carroll (1865). The source text is Project Gutenberg item 11 (public domain).

Usage

```
alice_bigrams
```

Format

A 27 x 27 integer matrix. Row names and column names are `c(letters, " ")`.

Details

The 27 characters are the 26 lower-case letters `a-z` plus a space character (represented as `" "`). Non-letter characters in the original text (punctuation, digits, newlines) are ignored, and runs of multiple spaces are collapsed to one before counting.

`alice_bigrams[x, y]` gives the number of times character `x` is immediately followed by character `y` in the processed text.

Source

Project Gutenberg, https://www.gutenberg.org/ebooks/11. Downloaded and processed by `data-raw/alice_bigrams.R`.

Examples

```
# Most common bigrams
tail(sort(alice_bigrams), 10)

# "th" count
alice_bigrams["t", "h"]

# Visualise as a Hinton diagram
df <- matrix_to_hinton(alice_bigrams / sum(alice_bigrams))

ggplot2::ggplot(df, ggplot2::aes(x = col, y = row, weight = weight)) +
  geom_hinton() +
  scale_fill_hinton() +
  ggplot2::coord_fixed() +
  theme_hinton()
```

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as_hinton_df *Convert an object to a tidy data frame for* geom_hinton()

Description

Generic function that dispatches to a method appropriate for `x`. Built-in methods exist for `matrix`, `data.frame`, and `table`.

Usage

```
as_hinton_df(x, ...)

## S3 method for class 'matrix'
as_hinton_df(x, ...)

## S3 method for class 'data.frame'
as_hinton_df(
  x,
  rowname_col = "row",
  colname_col = "col",
  value_col = "weight",
  ...
)

## S3 method for class 'table'
as_hinton_df(x, ...)

## Default S3 method:
as_hinton_df(x, ...)
```

Arguments

x	An object to convert.
...	Additional arguments passed to the method.
rowname_col	Name of the column that holds the row index. Default "row".
colname_col	Name of the column that holds the column index. Default "col".
value_col	Name of the column that holds the matrix values. Default "weight".

Value

A data frame suitable for use with geom_hinton().

Examples

```
m <- matrix(c(1, -2, 3, -4), 2, 2)
as_hinton_df(m)

t <- table(c("a","b","a"), c("x","y","x"))
as_hinton_df(t)
```

GeomHinton *Hinton diagrams for ggplot2*

Description

geom_hinton() draws a Hinton diagram: a grid of squares whose area is proportional to the magnitude of each value. For signed data, positive values are shown as white squares and negative values as black squares on a grey background. For unsigned (non-negative) data the background is omitted and squares are drawn in black.

Usage

```
geom_hinton(
  mapping = NULL,
  data = NULL,
  stat = "hinton",
  position = "identity",
  ...,
  scale_by = c("panel", "global"),
  background = TRUE,
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE
)

stat_hinton(
```

```
  mapping = NULL,
  data = NULL,
  geom = "hinton",
  position = "identity",
  ...,
  scale_by = c("panel", "global"),
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE
)
```

Arguments

mapping	Set of aesthetic mappings created by ggplot2::aes().
data	The data to be displayed in this layer.
stat	The statistical transformation to use. For geom_hinton() the default is "hinton".
position	Position adjustment.
...	Other arguments passed on to ggplot2::layer().
scale_by	"panel" (default) normalises each panel independently so the largest value in a panel fills its cell. "global" uses the largest value across all panels, enabling cross-panel magnitude comparison.
background	Logical. Draw a grey background rectangle for signed data? Default TRUE. Set to FALSE to suppress the background.
na.rm	If TRUE, rows where weight is NA are silently dropped before computing square sizes. If FALSE (default), they are dropped without a warning (ggplot2 will not render rectangles whose required aesthetics are NA).
show.legend	Logical. Should this layer be included in the legend?
inherit.aes	If FALSE, overrides the default aesthetics rather than combining with them.
geom	The geometric object to use when drawing. For stat_hinton() the default is "hinton".

Value

A ggplot2 layer that can be added to a ggplot2::ggplot() object.

Aesthetics

geom_hinton() understands the following aesthetics (required aesthetics are in **bold**):

- x: column position (numeric or factor)
- y: row position (numeric or factor)
- weight: the value to display; determines square size and colour
- alpha
- colour (border colour; NA by default, no border)
- fill (overrides the automatic sign-based colour)
- linewidth
- linetype

Computed variables

`stat_hinton()` adds the following columns to the data:

`xmin`, `xmax`, `ymin`, `ymax` Rectangle bounds for each square.

`fill` `"positive"`, `"negative"`, or `"unsigned"`.

`hinton_signed` Logical; `TRUE` when the panel contains any negative values. Read by `GeomHinton` to decide whether to draw the grey background (after `scale_fill_hinton()` has already replaced the fill labels, making `fill == "negative"` checks unreliable).

`cell_w`, `cell_h` Inferred cell spacing used to size the background.

Aspect ratio

For squares to appear as squares on screen, add `coord_fixed()` to your plot. Without it, the cells may appear rectangular if the plot's x and y axes have different scales.

Examples

```
library(ggplot2)
m <- matrix(c(0.8, -0.3, 0.5, -0.9, 0.1, 0.6, 0.4, -0.7, 0.2), 3, 3)
df <- matrix_to_hinton(m)

ggplot(df, aes(x = col, y = row, weight = weight)) +
  geom_hinton() +
  scale_fill_hinton() +
  coord_fixed() +
  theme_hinton()
```

`matrix_to_hinton` *Convert a matrix to a tidy data frame for use with* `geom_hinton()`

Description

Reshapes a numeric matrix into a long-form data frame with one row per matrix entry. Row 1 of the matrix is placed at the *top* of the resulting plot (highest y value), matching the visual convention of matrix notation.

Usage

```
matrix_to_hinton(
  x,
  rowname_col = "row",
  colname_col = "col",
  value_col = "weight"
)
```

Arguments

x	A numeric matrix.
rowname_col	Name of the column that will hold the row index. Default "row".
colname_col	Name of the column that will hold the column index. Default "col".
value_col	Name of the column that will hold the matrix values. Default "weight".

Value

A data frame with columns named by rowname_col, colname_col, and value_col. If x has row or column names, additional columns row_label and col_label are included.

Examples

```
m <- matrix(c(0.8, -0.3, 0.5, -0.9, 0.1, 0.6), nrow = 2)
matrix_to_hinton(m)

# Named matrix
rownames(m) <- c("a", "b")
colnames(m) <- c("x", "y", "z")
matrix_to_hinton(m)
```

---

scale_fill_hinton *Colour scale for Hinton diagrams*

Description

Maps the sign-encoding produced by stat_hinton() to the conventional Hinton colour scheme: white for positive values, black for negative values. For unsigned data (all non-negative), all squares are drawn in black.

Usage

```
scale_fill_hinton(..., values = NULL, guide = "none")
```

Arguments

...	Additional arguments passed on to ggplot2::scale_fill_manual().
values	Named character vector of colours for "positive", "negative", and "unsigned" fill values. Override individual colours by passing a partial named vector, e.g. values = c(negative = "grey50") merges with the defaults.
guide	Legend guide. Defaults to "none" (no legend).

Details

This scale is a thin wrapper around ggplot2::scale_fill_manual() with the default legend suppressed. Pass guide = "legend" to restore the legend, or override the values argument to use custom colours.

Value

A ggplot2 scale object.

Examples

```
library(ggplot2)
m <- matrix(c(0.8, -0.3, 0.5, -0.9, 0.1, 0.6), 2, 3)
df <- matrix_to_hinton(m)

ggplot(df, aes(x = col, y = row, weight = weight)) +
  geom_hinton() +
  scale_fill_hinton() +
  theme_hinton()
```

---

theme_hinton *A clean ggplot2 theme for Hinton diagrams*

Description

Removes grid lines, axis ticks, and panel background, all of which visually interfere with the squares in a Hinton diagram. The grey background for signed diagrams is drawn by `geom_hinton()` itself and is not affected by this theme.

Usage

```
theme_hinton(base_size = 11, base_family = "")
```

Arguments

`base_size`	Base font size, in pts. Default 11.
`base_family`	Base font family. Default `""` (the ggplot2 default).

Value

A ggplot2 theme object.

Examples

```
library(ggplot2)
m <- matrix(c(0.8, -0.3, 0.5, -0.9, 0.1, 0.6), 2, 3)
df <- matrix_to_hinton(m)

ggplot(df, aes(x = col, y = row, weight = weight)) +
  geom_hinton() +
  scale_fill_hinton() +
  theme_hinton()
```

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