Package 'schemr'

June 25, 2024

Type Package

Title Convert Images to Usable Color Schemes

Version 0.3.0

BugReports https://github.com/stuart-morrison/schemr/issues

Description A fast and adaptable tool to convert photos and images into usable colour schemes for data visualisation. Contains functionality to extract colour palettes from images, as well for the conversion of images between colour spaces.

License GPL-3

Encoding UTF-8

Imports dplyr, stringr, magrittr, purrr, apcluster, OpenImageR, methods

RoxygenNote 7.3.1

Suggests testthat

NeedsCompilation no

Author Stuart Morrison [aut, cre]

Maintainer Stuart Morrison <smorrison@ucdavis.edu>

Repository CRAN

Date/Publication 2024-06-25 02:30:02 UTC

Contents

`hex_to_lab` *Convert hex RGB values to Lab space.*

Description

Convert hex RGB values to Lab space.

Usage

```
hex_to_lab(hex, transformation = "sRGB", linear_func = NULL)
```

Arguments

`hex`	A character vector containing hex representations of RGB colours.
`transformation`	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
`linear_func`	A function to convert RGB colour space into non-linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of L, a and b colour space values.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
hex_to_lab(rgb_to_hex(data.frame(r = red, g = green, b = blue)))
```

---

hex_to_rgb *Convert hexadecimal colours to RGB colour channels.*

Description

Convert hexadecimal colours to RGB colour channels.

Usage

```
hex_to_rgb(hex)
```

Arguments

hex	A character vector containing hex representations of RGB colours.

Value

A `tibble` of red, green and blue colour channels.

Examples

```
hex_to_rgb(c("#5f9e3a"))
```

---

hex_to_xyz *Convert hex RGB values to XYZ space.*

Description

Convert hex RGB values to XYZ space.

Usage

```
hex_to_xyz(hex, transformation = "sRGB", linear_func = NULL)
```

Arguments

hex	A character vector containing hex representations of RGB colours.
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into non-linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of X, Y and Z colour space values.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
hex_to_xyz(rgb_to_hex(data.frame(r = red, g = green, b = blue)))
```

---

hsl_to_hsv *Convert HSL to HSV*

Description

Convert HSL to HSV

Usage

```
hsl_to_hsv(hsl)
```

Arguments

`hsl`	A dataframe or matrix with H, S and L colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]

Value

A `tibble` of H, S and V colour channels. Hue is constant between colour spaces, while saturation differs.

Examples

```
H <- sample(x = 0:360, size = 10, replace = TRUE)
S <- runif(n = 10)
L <- runif(n = 10)
hsl_to_hsv(data.frame(h = H, s = S, l = L))
```

hsl_to_lab *Convert HSL to Lab*

Description

Convert HSL to Lab

Usage

```
hsl_to_lab(hsl, transformation = "sRGB", linear_func = NULL)
```

Arguments

hsl	A dataframe or matrix with H, S and L colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of L, a and b colour space values.

hsl_to_rgb *Convert HSL space into RGB space*

Description

Convert HSL space into RGB space

Usage

```
hsl_to_rgb(hsl)
```

Arguments

hsl	A dataframe or matrix with H, S and L colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]

Value

A `tibble` of red, green and blue colour channels.

Examples

```
H <- sample(x = 0:360, size = 10, replace = TRUE)
S <- runif(n = 10)
L <- runif(n = 10)
hsl_to_rgb(data.frame(h = H, s = S, l = L))
```

`hsl_to_xyz` *Convert HSL to XYZ*

Description

Convert HSL to XYZ

Usage

```
hsl_to_xyz(hsl, transformation = "sRGB", linear_func = NULL)
```

Arguments

`hsl`	A dataframe or matrix with H, S and L colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]
`transformation`	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
`linear_func`	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of X, Y and Z colour channels.

`hsv_to_hsl` *Convert HSV to HSL*

Description

Convert HSV to HSL

Usage

```
hsv_to_hsl(hsv)
```

Arguments

`hsv`	A dataframe or matrix with H, S and V colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]

Value

A tibble of H, S and L colour channels. Hue is constant between colour spaces, while saturation differs.

Examples

```
H <- sample(x = 0:360, size = 10, replace = TRUE)
S <- runif(n = 10)
V <- runif(n = 10)
hsv_to_hsl(data.frame(h = H, s = S, v = V))
```

---

hsv_to_lab *Convert HSV to Lab*

Description

Convert HSV to Lab

Usage

```
hsv_to_lab(hsv, transformation = "sRGB", linear_func = NULL)
```

Arguments

hsv	A dataframe or matrix with H, S and V colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]
transformation	An option in c("sRGB", "Adobe") for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A tibble of L, a and b colour space values.

hsv_to_rgb *Convert HSV to RGB*

Description

Convert HSV to RGB

Usage

```
hsv_to_rgb(hsv)
```

Arguments

hsv	A dataframe or matrix with H, S and V colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]

Value

A `tibble` of red, green and blue colour channels.

hsv_to_xyz *Convert HSV to XYZ*

Description

Convert HSV to XYZ

Usage

```
hsv_to_xyz(hsv, transformation = "sRGB", linear_func = NULL)
```

Arguments

hsv	A dataframe or matrix with H, S and V colour channels located in the columns 1 to 3, respectively. H in degrees in [0, 360], S and L in [0, 1]
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of X, Y and Z colour channels.

`image_to_pallette` *Develop a usable colour palette form an image.*

Description

Develop a usable colour palette form an image.

Usage

```
image_to_pallette(
  image_path,
  resize_factor = NULL,
  colour_space = "sRGB",
  rgb_to_linear_func = NULL,
  rgb_to_nonlinear_func = NULL,
  method = "slic",
  superpixel = 200,
  compactness = 20,
  verbose = TRUE,
  s = negDistMat(r = 2),
  summary_method = mean,
  ...
)
```

Arguments

`image_path`	A character path to the image to cluster. Reads images of type .png, .jpeg, .jpg, .tiff.
`resize_factor`	A numeric scalar that reduces (or increases) the size of the image before any processing.
`colour_space`	The colour space of the original image. The clustering is undertaken in the Lab space. This is an an option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
`rgb_to_linear_func`	The clustering is undertaken in the Lab space. This is a function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.
`rgb_to_nonlinear_func`	The clustering is undertaken in the Lab space. This is a function to convert linear RGB colour space into non-linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.
`method`	From `OpenImageR::superpixels`. A character string specifying the method to use. Either "slic" or "slico".

superpixel	From OpenImageR::superpixels. A numeric value specifying the number of superpixels to use.
compactness	From OpenImageR::superpixels. A numeric value specifying the compactness parameter. The compactness parameter is needed only if method is "slic". The "slico" method adaptively chooses the compactness parameter for each superpixel differently.
verbose	From OpenImageR::superpixels. A boolean. If TRUE then information will be printed in the R session.
s	From apcluster::apcluster. An l x l similarity matrix or a similarity function either specified as the name of a package-provided similarity function as character string or a user provided function object. s may also be a sparse matrix according to the Matrix package. Internally, apcluster uses the dgTMatrix class; all other sparse matrices are cast to this class (if possible, otherwise the function quits with an error). If s is any other object of class Matrix, s is cast to a regular matrix internally (if possible, otherwise the function quits with an error).
summary_method	Function to summarise colours in clustered superpixels. Defaults to mean.
...	Other arguments to be passed to the apcluster algorithm. For the methods with signatures character,ANY and function,ANY, all other arguments are passed to the selected similarity function as they are; for the methods with signatures Matrix,missing and sparseMatrix,missing, further arguments are passed on to the apcluster methods with signatures Matrix,missing and dgTMatrix,missing, respectively.

Value

A schemr object containing colour scheme colours and image properties and clusters.

---

lab_to_hex *Convert from Lab space into hex RGB colour values.*

Description

Convert from Lab space into hex RGB colour values.

Usage

```
lab_to_hex(lab, transformation = "sRGB", linear_func = NULL)
```

Arguments

lab	A dataframe or matrix with L, a and b colour channels located in the columns 1 to 3, respectively.
transformation	An option in c("sRGB", "Adobe") for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into non-linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A character vector with hex representations of RGB colour channels.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
lab_to_hex(rgb_to_lab(data.frame(r = red, g = green, b = blue)))
```

---

lab_to_hsl *Convert Lab to HSL*

Description

Convert Lab to HSL

Usage

```
lab_to_hsl(lab, transformation = "sRGB", linear_func = NULL)
```

Arguments

lab	A dataframe or matrix with L, a and b colour channels located in the columns 1 to 3, respectively.
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of H, S and L colour channels.

lab_to_hsv *Convert Lab to HSv*

Description

Convert Lab to HSv

Usage

```
lab_to_hsv(lab, transformation = "sRGB", linear_func = NULL)
```

Arguments

lab	A dataframe or matrix with L, a and b colour channels located in the columns 1 to 3, respectively.
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of H, S and V colour channels.

lab_to_rgb *Convert from Lab space into RGB colour channels.*

Description

Convert from Lab space into RGB colour channels.

Usage

```
lab_to_rgb(lab, transformation = "sRGB", linear_func = NULL)
```

Arguments

lab	A dataframe or matrix with L, a and b colour channels located in the columns 1 to 3, respectively.
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into non-linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of red, green and blue colour channels.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
lab_to_rgb(rgb_to_lab(data.frame(r = red, g = green, b = blue)))
```

---

lab_to_xyz *Convert from Lab space to XYZ colour channels.*

Description

Convert from Lab space to XYZ colour channels.

Usage

```
lab_to_xyz(lab)
```

Arguments

`lab`	A dataframe or matrix with L, a and b colour channels located in the columns 1 to 3, respectively.

Value

A `tibble` of X, Y and Z colour channels.

Examples

```
l <- sample(x = 40:60, size = 10, replace = TRUE)
a <- sample(x = -128:128, size = 10, replace = TRUE)
b <- sample(x = -128:128, size = 10, replace = TRUE)
lab_to_xyz(data.frame(l = l, a = a, b = b))
```

`palette,schemr-method` *Plot the colour palette*

Description

Plot the colour palette

Usage

```
## S4 method for signature 'schemr'
palette(value)
```

Arguments

`value`	A schemr class object

Value

No return value, calls a barplot of the colour pallette.

`plot,schemr,ANY-method`
Plot the clustered image data

Description

Plot the clustered image data

Usage

```
## S4 method for signature 'schemr,ANY'
plot(x, y = NULL, ...)
```

Arguments

`x`	A schemr class object
`y`	Not used, NULL
`...`	Other arguments to pass onto ‘plot‘

Value

No return value, calls a raster plot of the clustered image data.

rgb_to_hex *Convert RGB colour channels to hex colour codes.*

Description

Convert RGB colour channels to hex colour codes.

Usage

```
rgb_to_hex(rgb)
```

Arguments

rgb	A dataframe or matrix with red, green and blue colour channels located in the columns 1 to 3, respectively. Colour channel values should be between 0 and 255, inclusive.

Value

A character vector with hex representations of RGB colour channels.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
rgb_to_hex(data.frame(r = red, g = green, b = blue))
```

rgb_to_hsl *Convert RGB space into HSL space*

Description

Convert RGB space into HSL space

Usage

```
rgb_to_hsl(rgb)
```

Arguments

rgb	A dataframe or matrix with red, green and blue colour channels located in the columns 1 to 3, respectively. Colour channel values should be between 0 and 255, inclusive.

Value

a tibble of H, S and L colour channels.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
rgb_to_hsl(data.frame(r = red, g = green, b = blue))
```

---

rgb_to_hsv *Convert RGB to HSV*

Description

Convert RGB to HSV

Usage

```
rgb_to_hsv(rgb)
```

Arguments

rgb	A dataframe or matrix with red, green and blue colour channels located in the columns 1 to 3, respectively. Colour channel values should be between 0 and 255, inclusive.

Value

A tibble of H, S and V colour channels.

---

rgb_to_lab *Convert from RGB colour channels to Lab space.*

Description

Convert from RGB colour channels to Lab space.

Usage

```
rgb_to_lab(rgb, transformation = "sRGB", linear_func = NULL)
```

Arguments

rgb	A dataframe or matrix with red, green and blue colour channels located in the columns 1 to 3, respectively. Colour channel values should be between 0 and 255, inclusive.
transformation	An option in c("sRGB", "Adobe") for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A tibble of L, a and b colour space values.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
rgb_to_lab(data.frame(r = red, g = green, b = blue), transformation = "Adobe")
```

---

rgb_to_xyz *Convert from RGB colour channels to XYZ space.*

Description

Convert from RGB colour channels to XYZ space.

Usage

```
rgb_to_xyz(rgb, transformation = "sRGB", linear_func = NULL)
```

Arguments

rgb	A dataframe or matrix with red, green and blue colour channels located in the columns 1 to 3, respectively. Colour channel values should be between 0 and 255, inclusive.
transformation	An option in c("sRGB", "Adobe") for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A tibble of X, Y and Z colour channels.

Examples

```
red <- sample(x = 1:255, size = 10, replace = TRUE)
green <- sample(x = 1:255, size = 10, replace = TRUE)
blue <- sample(x = 1:255, size = 10, replace = TRUE)
rgb_to_xyz(data.frame(r = red, g = green, b = blue), transformation = "Adobe")
```

---

schemr-class *Create the schemr class, which holds the palette and image data*

Description

Create the schemr class, which holds the palette and image data

Fields

`image` An array of dimension (Image width) by (Image height) by (3 colour channels) that contains the data of the original image

`clustered_image` An array of dimension (Image width) by (Image height) by (3 colour channels) that contains the data of the image with clustered colour blocks

`palette` A character vector that contains the colours of the resulting colour palette

Methods

`print(x)` Print the colour palette.

---

xyz_to_hex *Convert from XYZ space into hex RGB colour values.*

Description

Convert from XYZ space into hex RGB colour values.

Usage

```
xyz_to_hex(xyz, transformation = "sRGB", linear_func = NULL)
```

Arguments

`xyz`	A dataframe or matrix with X, Y and Z colour channels located in the columns 1 to 3, respectively.
`transformation`	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
`linear_func`	A function to convert RGB colour space into non-linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A character vector with hex representations of RGB colour channels.

Examples

```
x <- sample(x = 40:60, size = 10, replace = TRUE)
y <- sample(x = 40:60, size = 10, replace = TRUE)
z <- sample(x = 40:60, size = 10, replace = TRUE)
xyz_to_hex(data.frame(x = x, y = y, z = z))
```

---

xyz_to_hsl *Convert XYZ to HSL*

Description

Convert XYZ to HSL

Usage

```
xyz_to_hsl(xyz, transformation = "sRGB", linear_func = NULL)
```

Arguments

xyz	A dataframe or matrix with X, Y and Z colour channels located in the columns 1 to 3, respectively.
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of H, S and L colour channels.

xyz_to_hsv *Convert XYZ to HSV*

Description

Convert XYZ to HSV

Usage

```
xyz_to_hsv(xyz, transformation = "sRGB", linear_func = NULL)
```

Arguments

xyz	A dataframe or matrix with X, Y and Z colour channels located in the columns 1 to 3, respectively.
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert RGB colour space into linear RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of H, S and V colour channels.

xyz_to_lab *Convert from XYZ colour channels to Lab space.*

Description

Convert from XYZ colour channels to Lab space.

Usage

```
xyz_to_lab(xyz)
```

Arguments

xyz	A dataframe or matrix with X, Y and Z colour channels located in the columns 1 to 3, respectively.

Value

A `tibble` of L, a and b colour space values.

Examples

```
x <- sample(x = 40:60, size = 10, replace = TRUE)
y <- sample(x = 40:60, size = 10, replace = TRUE)
z <- sample(x = 40:60, size = 10, replace = TRUE)
xyz_to_lab(data.frame(x = x, y = y, z = z))
```

---

xyz_to_rgb *Convert from RGB colour channels to XYZ space.*

Description

Convert from RGB colour channels to XYZ space.

Usage

```
xyz_to_rgb(xyz, transformation = "sRGB", linear_func = NULL)
```

Arguments

xyz	A dataframe or matrix with X, Y and Z colour channels located in the columns 1 to 3, respectively.
transformation	An option in `c("sRGB", "Adobe")` for a built-in transformation or, alternatively, a custom 3x3 transformation matrix.
linear_func	A function to convert linear RGB colour space into RGB space. Used only if a custom transformation matrix is provided. Transformation skips if no function is provided under a user-defined transformation matrix. See: https://en.wikipedia.org/wiki/SRGB.

Value

A `tibble` of red, green and blue colour channels.

Examples

```
x <- sample(x = 40:60, size = 10, replace = TRUE)
y <- sample(x = 40:60, size = 10, replace = TRUE)
z <- sample(x = 40:60, size = 10, replace = TRUE)
xyz_to_rgb(data.frame(x = x, y = y, z = z))
```

Index