Package 'aRtsy'

August 9, 2021

Title Generative Art with 'ggplot2'

Description Provides various algorithms for creating artworks in the ggplot2 language that incorporate some form of randomness.

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R topics documented:

`aRtsy-package` *aRtsy — Generative Art using* `ggplot2`

Description

`aRtsy` is an attempt at making generative art available for the masses in a simple and standardized format. The package provides various algorithms for creating artworks in ggplot2 that incorporate some form of randomness (depending on the set `seed`). Each type of artwork is implemented in a separate function.

For documentation on `aRtsy` itself, including the manual and user guide for the package, worked examples, and other tutorial information visit the package website.

Author(s)

Koen Derks (maintainer, author) <koen-derks@hotmail.com>

Please use the citation provided by R when citing this package. A BibTex entry is available from `citation("aRtsy")`.

See Also

Useful links:

- The twitter feeed to check the artwork of the day.
- The issue page to submit a bug report or feature request.

`canvas_ant` *Paint Langton's Ant on a Canvas*

Description

This function paints Langton's Ant. Langton's ant is a two-dimensional universal Turing machine with a very simple set of rules but complex emergent behavior.

Usage

```
canvas_ant(colors, background = '#fafafa', iterations = 1e7,
           width = 200, height = 200)
```

Arguments

`colors`	a character (vector) specifying the colors for the ant.
`background`	a character specifying the color of the background.
`iterations`	the number of iterations of the ant.
`width`	the width of the artwork in pixels.
`height`	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

References

https://en.wikipedia.org/wiki/Langton%27s_ant

Examples

```
canvas_ant(colors = '#000000', background = '#fafafa')
```

---

canvas_arcs *Paint Arcs on a Canvas*

Description

Inspired by the work of @ijeamaka_a, this type of artwork mimics her beautiful Arc Series. For private use only.

Usage

```
canvas_arcs(colors, background = '#fdf5e6', n = 1, nrow = NULL, ncol = NULL,
            dir = 'right', starts = 'clockwise')
```

Arguments

colors	a character vector specifying the 3 colors used for the arcs.
background	a character string specifying the color used for the background.
n	an integer specifying how many arcs should be put on the canvas.
nrow	an (optional) integer specifying the number of rows on the canvas.
ncol	an (optional) integer specifying the number of columns on the canvas.
dir	a character string specifying which direction the arcs turn. Can be one of "right" (default) or "left".
starts	a character sting specifying where the arcs should start. Can be one of "clockwise" (default) or "random".

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
aRtsy:::canvas_arcs(colors = c('darkgreen', 'goldenrod', 'firebrick'), n = 9)
```

canvas_circlemap *Paint a Circle Map on a Canvas*

Description

This function is my attempt at a circle map.

Usage

```
canvas_circlemap(colors, x_min = 0, x_max = 12.56, y_min = 0, y_max = 1,
                 iterations = 10, width = 1500, height = 1500)
```

Arguments

colors	a character specifying the color used for the function shape.
x_min	a numeric value specifying the minimum value for the x-axis.
x_max	a numeric value specifying the maximum value for the x-axis.
y_min	a numeric value specifying the minimum value for the y-axis.
y_max	a numeric value specifying the maximum value for the y-axis.
iterations	the number of iterations.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

References

https://linas.org/art-gallery/circle-map/circle-map.html

Examples

```
canvas_circlemap(colors = colorPalette('tuscany2'))
```

canvas_diamonds *Paint A Diamond on Canvas*

Description

This function draws many diamonds on the canvas and places two lines behind them. The diamonds can be transparent or have a random color sampled from the input.

Usage

```
canvas_diamonds(colors, background = '#fafafa', col.line = 'black',
                radius = 10, alpha = 1, p = 0.2,
                width = 500, height = 500)
```

Arguments

colors	a character (vector) specifying the colors used for the strokes.
background	a character specifying the color used for the background.
col.line	color of the lines.
radius	radius of the diamonds.
alpha	transparency of the diamonds. If NULL, added layers become increasingly more transparent.
p	takeover probability.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
set.seed(1)
canvas_diamonds(colors = colorPalette('house'), radius = 10)
```

canvas_function *Paint Functions on a Canvas*

Description

This function paints functions with random parameters and mimics the functionality of the `generativeart` package.

Usage

```
canvas_function(color, background = '#fafafa')
```

Arguments

`color`	a character specifying the color used for the function shape.
`background`	a character specifying the color used for the background.

Value

A `ggplot` object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

References

https://github.com/cutterkom/generativeart

Examples

```
set.seed(10)
canvas_function(color = '#000000', background = '#fafafa')
```

canvas_mandelbrot *Paint the Mandelbrot Set on Canvas*

Description

This function draws the Mandelbrot set on the canvas.

Usage

```
canvas_mandelbrot(colors, n = 100, xmin = -1.7, xmax = -0.2, ymin = -0.2999,
                  ymax = 0.8001, zoom = 1, width = 500, height = 500)
```

Arguments

colors	a character (vector) specifying the colors used for the artwork.
n	the number of iterations.
xmin	the minimum x value.
xmax	the maximum x value.
ymin	the minimum y value.
ymax	the maximum y value.
zoom	the amount of zoom to apply.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
set.seed(1)
canvas_mandelbrot(colors = colorPalette('dark'), n = 100)
```

---

canvas_planet *Paint a Planet on a Canvas*

Description

This function paints one or multiple planets.

Usage

```
canvas_planet(colors, threshold = 4, iterations = 200,
              starprob = 0.01, fade = 0.2,
              radius = NULL, center.x = NULL, center.y = NULL,
              light.right = TRUE, width = 1500, height = 1500)
```

Arguments

colors	a character specifying the colors used for the planet(s). Can also be a list where each entry is a vector of colors for each planet.
threshold	a character specifying the threshold for a color take.
iterations	the number of iterations of the planets
starprob	the probability of drawing a star in outer space.
fade	the fading factor.
radius	a numeric (vector) specifying the radius of the planet(s).

center.x	the x-axis coordinate(s) for the center(s) of the planet(s).
center.y	the y-axis coordinate(s) for the center(s) of the planet(s).
light.right	whether to draw the light from the right or the left.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
# Sun behind Earth and Moon
set.seed(1)
colors <- list(c("khaki1", "lightcoral", "lightsalmon"),
               c("dodgerblue", "forestgreen", "white"),
               c("gray", "darkgray", "beige"))
canvas_planet(colors, radius = c(800, 400, 150),
              center.x = c(1, 500, 1100),
              center.y = c(1400, 500, 1000),
              starprob = 0.005)
```

---

canvas_polylines *Paint Polygons and Lines on Canvas*

Description

This function draws many points on the canvas and connects these points into a polygon. After repeating this for all the colors, the edges of all polygons are drawn on top of the artwork.

Usage

```
canvas_polylines(colors, background = '#fafafa', ratio = 0.5, iterations = 1000,
                 alpha = NULL, size = 0.1, width = 500, height = 500)
```

Arguments

colors	a character (vector) specifying the colors used for the strokes.
background	a character specifying the color used for the borders.
ratio	width of the polygons. Larger ratios cause more overlap.
iterations	the number of points for each polygon.
alpha	transparency of the polygons. If NULL, added layers become increasingly more transparent.
size	size of the borders.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
set.seed(1)
canvas_polylines(colors = colorPalette('retro2'))
```

---

canvas_ribbons *Paint Ribbons on a Canvas*

Description

This function paints ribbons and (optionally) a triangle in the middle.

Usage

```
canvas_ribbons(colors, background = '#fdf5e6', triangle = TRUE)
```

Arguments

colors	a character (vector) specifying the colors for the ribbons. Colors determine the number of ribbons.
background	a character specifying the color of the background.
triangle	logical. Whether to draw the triangle that breaks the ribbon polygons.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
set.seed(1)
canvas_ribbons(colors = colorPalette('tuscany1'))
```

canvas_segments *Paint Line Segments on Canvas*

Description

This function draws many line segments on the canvas.

Usage

```
canvas_segments(colors, background = '#fafafa', n = 100,
                p = 0.5, H = 0.1, size = 0.2)
```

Arguments

colors	a character (vector) specifying the colors used for the line segments.
background	a character specifying the color used for the background.
n	the number of line segments to draw.
p	probability of drawing a vectical line segment.
H	scaling factor for the line segments.
size	line width of the segments.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
set.seed(1)
canvas_segments(colors = 'black', background = '#fafafa')
```

canvas_squares *Paint Squares on a Canvas*

Description

This function paints a squares. It works by repeatedly cutting into the canvas at random locations and coloring the area that these cuts create.

Usage

```
canvas_squares(colors, background = '#000000', cuts = 50, ratio = 1.618,
               width = 100, height = 100)
```

Arguments

colors	a character vector specifying the colors used in the squares.
background	a character specifying the color used for the background (borders).
cuts	the number of cuts to make.
ratio	the 1:1 ratio for each cut.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
set.seed(6)
canvas_squares(colors = colorPalette('tuscany1'))
```

---

canvas_strokes *Paint Strokes on a Canvas*

Description

This function creates an artwork that resembles paints strokes. The algorithm is based on the simple idea that each next point on the grid has a chance to take over the color of an adjacent colored point but also has a change of generating a new color.

Usage

```
canvas_strokes(colors, neighbors = 1, p = 0.01, iterations = 1,
               width = 500, height = 500, side = FALSE)
```

Arguments

colors	a character (vector) specifying the colors used for the strokes.
neighbors	the number of neighbors a block considers when taking over a color. More neighbors fades the artwork.
p	the probability of selecting a new color at each block. A higher probability adds more noise to the artwork.
iterations	the number of iterations on the artwork. More iterations fade the artwork.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.
side	whether to turn the artwork on its side.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

Examples

```
set.seed(1)
canvas_strokes(colors = colorPalette('tuscany3'))
```

---

canvas_turmite *Paint a Turmite on a Canvas*

Description

This function paints a turmite. A turmite is a Turing machine which has an orientation in addition to a current state and a "tape" that consists of a two-dimensional grid of cells. The algorithm is simple: 1) turn on the spot (left, right, up, down) 2) change the color of the square 3) move forward one square.

Usage

```
canvas_turmite(color, background = '#fafafa', p = 0.5, iterations = 1e7,
               width = 1500, height = 1500)
```

Arguments

color	a character specifying the color used for the turmite.
background	a character specifying the color used for the background.
p	the probability of a state switch within the turmite.
iterations	the number of iterations of the turmite.
width	the width of the artwork in pixels.
height	the height of the artwork in pixels.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

References

https://en.wikipedia.org/wiki/Turmite

Examples

```
set.seed(1)
canvas_turmite(color = "#000000", background = "#fafafa")
```

`colorPalette` *Color palette generator.*

Description

This function creates a random color palette, or allows the user to select a pre-implemented palette.

Usage

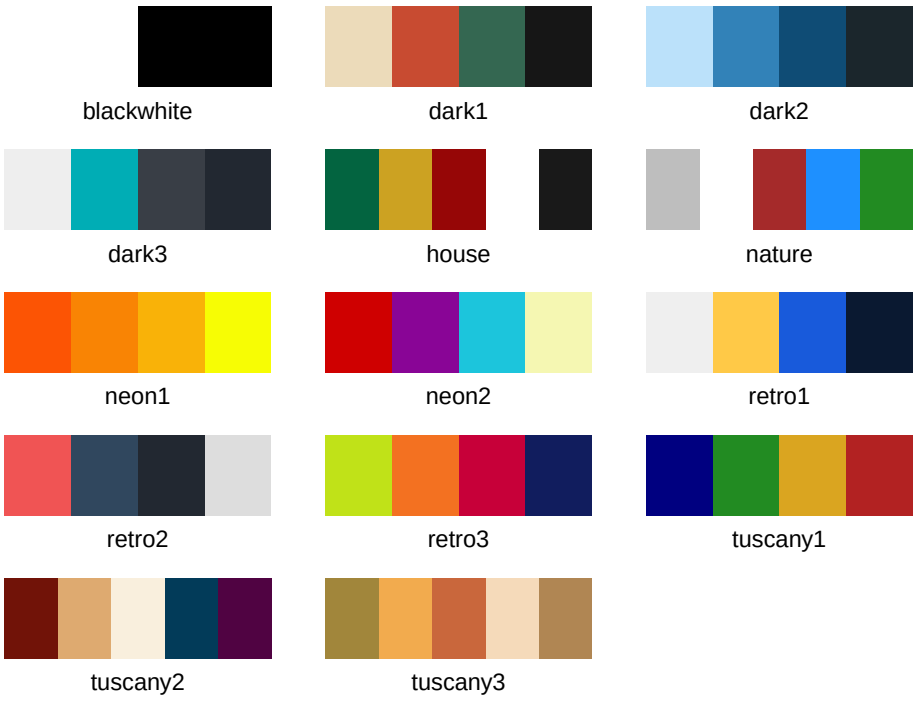
```
colorPalette(name, n = NULL)
```

Arguments

`name`	name of the color palette. Can be `random` for random colors, but can also be the name of a pre-implemented palette. See the `details` section for a list of pre-implemented palettes.
`n`	the number of colors to select from the palette. Required if `name = 'random'`. Otherwise, if `NULL`, automatically selects all colors from the chosen palette.

Details

The following color palettes are implemented:



Value

A vector of colors.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

`saveCanvas` *Save a canvas to an external device.*

Description

This function is a wrapper around `ggplot2::ggsave`. It provides a suggested export with square dimensions for a canvas created using the `aRtsy` package.

Usage

```
saveCanvas(plot, filename, resolution)
```

Arguments

`plot`	a ggplot2 object to be saved.
`filename`	the filename of the export.
`resolution`	the `dpi` of the export.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

`themeCanvas` *Canvas theme for ggplot2 objects*

Description

Add a canvas theme to the plot. The canvas theme by default has no margins and fills any empty canvas with a background color.

Usage

```
themeCanvas(x, background = '#fafafa', margin = -1.25)
```

Arguments

`x`	a ggplot2 object.
`background`	a character specifying the color used for the empty canvas.
`margin`	margins of the plot.

Value

A ggplot object containing the artwork.

Author(s)

Koen Derks, <koen-derks@hotmail.com>

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