Package ‘woylier’

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**Title**  Alternative Tour Frame Interpolation Method

**Version**  0.0.5

**Description**  This method generates a tour path by interpolating between d-D frames in p-D using Givens rotations. The algorithm arises from the problem of zeroing elements of a matrix. This interpolation method is useful for showing specific d-D frames in the tour, as opposed to d-D planes, as done by the geodesic interpolation. It is useful for projection pursuit indexes which are not s invariant. See Buja et al (2005) <doi:10.1016/S0169-7161(04)24014-7>.

**Depends**  R (>= 4.1)

**Imports**  tourr, geozoo, dplyr, tibble

**License**  MIT + file LICENSE

**Encoding**  UTF-8

**RoxygenNote**  7.2.1

**Suggests**  knitr, rmarkdown, purrr, ggplot2, ash, testthat (>= 3.0.0)

**Config/testthat/edition**  3

**VignetteBuilder**  knitr

**NeedsCompilation**  no

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add_path

Overlay paths of interpolation on the sphere

Usage

add_path(proj_space, path)

Arguments

proj_space n number of points on the surface of sphere
path interpolated path

Value
data frame with interpolated path and points on sphere surface

Examples

p <- 4
base1 <- tourr::basis_random(p, d=1)
base2 <- tourr::basis_random(p, d=1)
path <- givens_full_path(base1, base2, nsteps=10)
sp <- generate_space_view(p=p)
sp_path <- add_path(sp, path)
tourr::animate_xy(sp_path[,1:4], col=sp_path$type)

generate_space_view

Generate the background sphere or torus

Usage

generate_space_view(n = 1000, p = 3, d = 1)
**givens_full_path**

**Arguments**

n  
number of points on the sphere

p  
dimension of data

d  
dimension of projection

**Value**

n number of points on the surface of sphere

**Examples**

```r
p <- 4
sp <- generate_space_view(p=p)
```

---

**givens_full_path**  
*Construct full interpolated frames*

**Description**

Construct full interpolated frames

**Usage**

```r
givens_full_path(Fa, Fz, nsteps)
```

**Arguments**

Fa  
starting pxd frame

Fz  
target pxd frame

nsteps  
number of steps of interpolation

**Value**

array with nsteps matrix. Each matrix is interpolated frame in between starting and target frames.

**Examples**

```r
p <- 4
base1 <- tourr::orthonormalise(tourr::basis_random(p, d=1))
base2 <- tourr::orthonormalise(tourr::basis_random(p, d=1))
path <- givens_full_path(base1, base2, nsteps=10)
```
grand_tour_givens  
Create a grand tour with Givens interpolation

Description
Create a grand tour with Givens interpolation

Usage
grand_tour_givens(d = 2, ...)

Arguments
  
d  
dimension of projection

  
...  
additional parameters to pass through

Value
creates grand tour

Examples

data(sine_curve)
tourr::animate(sine_curve, grand_tour_givens(), tourr::display_xy())

guided_tour_givens  
Create a guided tour with Givens interpolation

Description
Create a guided tour with Givens interpolation

Usage
guided_tour_givens(
  index_f,  
  d = 2,  
  alpha = 0.5,  
  cooling = 0.99,  
  max.tries = 25,  
  max.i = Inf,  
  optim = "search_geodesic",  
  n_sample = 100,  
  ...  
)

planned_tour_givens

Arguments

- `index_f` the index function to optimize.
- `d` target dimensionality
- `alpha` the initial size of the search window, in radians
- `cooling` the amount the size of the search window should be adjusted by after each step
- `max.tries` the maximum number of unsuccessful attempts to find a better projection before giving up
- `max.i` the maximum index value, stop search if a larger value is found
- `optim` character indicating the search strategy to use: `search_geodesic`, `search_better`, `search_better_random`, `search_polish`. Default is `search_geodesic`.
- `n_sample` number of samples to generate if `search_f` is `search_polish`
- `...` arguments sent to the search_f

Value

creates guided tour

Examples

data(sine_curve)
tourr::animate_xy(sine_curve, guided_tour_givens(tourr::splines2d()), sphere=FALSE)

Description

The planned tour takes you from one basis to the next in a set order. Once you have visited all the planned bases, you either stop or start from the beginning once more (if `cycle = TRUE`).

Usage

`planned_tour_givens(basis_set, cycle = FALSE)`

Arguments

- `basis_set` the set of bases as a list of projection matrices or a 3d array
- `cycle` cycle through continuously (TRUE) or stop after first pass (FALSE)

Details

Usually, you will not call this function directly, but will pass it to a method that works with tour paths like `animate`, `save_history` or `render`. 
sine_curve measurements

Value
creates planned tour path

See Also
The little_tour, a special type of planned tour which cycles between all axis parallel projections.

Examples
library(tourr)
twod <- save_history(flea[, 1:3], max = 5)
str(twod)
animate_xy(flea[, 1:3], planned_tour_givens(twod))
animate_xy(flea[, 1:3], planned_tour_givens(twod, TRUE))

oned <- save_history(flea[, 1:6], grand_tour(1), max = 3)
animate_dist(flea[, 1:6], planned_tour_givens(oned))

sine_curve measurements
Simulated 6D data with a sine curve

Description
The data has 6 columns, labelled V1-V6, where the sine curve is in V5, V6. The other columns are normal samples.

Format
A 500x6 data frame

Examples
library(woylier)
data(sine_curve)
plot(sine_curve$V5, sine_curve$V6)
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