Package `belg`

August 31, 2020

**Title**  Boltzmann Entropy of a Landscape Gradient

**Version**  1.4.1

**Description**  Calculates the Boltzmann entropy of a landscape gradient.

This package uses the analytical method created by Gao, P., Zhang, H. and Li, Z., 2018 (<doi:10.1111/tgis.12315>) and by Gao, P. and Li, Z., 2019 (<doi:10.1007/s10980-019-00854-3>). It also extend the original ideas by allowing calculations on data with missing values.

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**Encoding**  UTF-8

**LazyData**  true

**ByteCompile**  true

**RoxygenNote**  7.1.1

**Depends**  R (>= 3.3.0)

**LinkingTo**  Rcpp, RcppArmadillo

**Imports**  raster, Rcpp

**Suggests**  testthat, sf, sp, stars, covr, knitr, markdown, ggplot2, rasterVis

**URL**  https://r-spatialecology.github.io/belg/

**BugReports**  https://github.com/r-spatialecology/belg/issues

**VignetteBuilder**  knitr

**NeedsCompilation**  yes

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**Repository**  CRAN

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R topics documented:

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complex_land  Complex landscape (small)

Description

A dataset containing small artificial complex landscape

Usage

complex_land

Format

An object of class RasterLayer of dimension 6 x 8 x 1.

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get_boltzmann  Boltzmann entropy of a landscape gradient

Description

Calculates the Boltzmann entropy of a landscape gradient

Usage

get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = TRUE,
  base = "log10",
  relative = FALSE
)

## Default S3 method:
get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = TRUE,
  base = "log10",
  relative = FALSE
)
get_boltzmann

base = "log10",
relative = FALSE
)

## S3 method for class 'matrix'
get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = TRUE,
  base = "log10",
  relative = FALSE
)

## S3 method for class 'array'
get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = TRUE,
  base = "log10",
  relative = FALSE
)

## S3 method for class 'RasterLayer'
get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = TRUE,
  base = "log10",
  relative = FALSE
)

## S3 method for class 'RasterStack'
get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = TRUE,
  base = "log10",
  relative = FALSE
)

## S3 method for class 'RasterBrick'
get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = FALSE,
  base = "log10",
  relative = FALSE
)
get_boltzmann

## S3 method for class 'stars'
get_boltzmann(
  x,
  method = "aggregation",
  na_adjust = TRUE,
  base = "log10",
  relative = FALSE
)

**Arguments**

- **x**: stars, RasterLayer, RasterStack, RasterBrick, matrix, or array.
- **method**: A method used. Either "hierarchy" for the hierarchy-based method (Gao et al., 2017) or "aggregation" (default) for the aggregation-based method (Gao et al., 2019).
- **na_adjust**: Should the output value be adjusted to the proportion of not missing cells? Either TRUE (default) or FALSE.
- **base**: A logarithm base ("log", "log2" or "log10").
- **relative**: Should a relative or absolute entropy be calculated? TRUE or FALSE (default).

**Details**

The method for computing the Boltzmann entropy of a landscape gradient works on integer values that are either positive or equals to zero. This function automatically rounds values to the nearest integer value (rounding halfway cases away from zero) and negative values are shifted to positive values.

**Value**

a numeric vector

**References**


**Examples**

```r
new_c = c(56, 86, 98, 50, 45, 56, 96, 25,
          15, 55, 85, 69, 12, 52, 25, 56,
          32, 25, 68, 98, 58, 66, 56, 58)
```
land_gradient1

```r
lg = matrix(new_c, nrow = 3, ncol = 8, byrow = TRUE)
get_boltzmann(lg, relative = FALSE, method = "hierarchy", base = "log10")
get_boltzmann(lg, relative = TRUE, method = "hierarchy", base = "log2")
get_boltzmann(lg, relative = TRUE, method = "hierarchy", base = "log")
```

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land_gradient1  Complex landscape

Description

A dataset containing artificial complex landscape

Usage

land_gradient1

Format

An object of class RasterLayer of dimension 512 x 512 x 1.

---

land_gradient2  Simple landscape

Description

A dataset containing artificial simple landscape

Usage

land_gradient2

Format

An object of class RasterLayer of dimension 512 x 512 x 1.
simple_land

| simple_land | Simple landscape (small) |

**Description**
A dataset containing small artificial simple landscape

**Usage**
simple_land

**Format**
An object of class RasterLayer of dimension 6 x 8 x 1.
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