Package 'lconnect'

March 22, 2019

Title Simple tools to derive landscape connectivity metrics

Version 0.1.0

Description Simple tools to derive landscape connectivity
metrics. The objective of this package is to
provide the simplest possible approach to derive
landscape connectivity metrics.

Depends R (>= 3.4.4)

License GPL-3

Encoding UTF-8

LazyData true

Imports sf,
igraph

RoxygenNote 6.1.1

R topics documented:

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con_metric | *Landscape connectivity metrics*

Description

Calculates several landscape connectivity metrics

Usage

```
con_metric(landscape, metric)
```

Arguments

landscape   landscape object produced by upload.landscape

metric   vector of landscape metrics to be computed. Can be one or more of the metrics currently available: "NC", "LNK", "SLC", "MSC", "CCP", "LCP", "CPL", "ECS", "AWF" and "IIC".

Details

con_metric

Value

vector with the selected metrics.

Author(s)

Frederico Mestre

Bruno Silva

References

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Minor, E. S., and Urban, D. L. (2008). A Graph-Theory Framework for Evaluating Landscape Connectivity and Conservation Planning. Conservation Biology, 22(2): 297-307.

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Pascual-Hortal, L., and Saura, S. (2006). Comparison and development of new graph-based landscape connectivity indices: towards the priorization of habitat patches and corridors for conservation. Landscape Ecology, 21(7): 959-967.

Saura, S., and Pascual-Hortal, L. (2007). A new habitat availability index to integrate connectivity in landscape conservation planning: comparison with existing indices and application to a case study. Landscape and Urban Planning, 83(2): 91-103.

Saura, S., Estreguil, C., Mouton, C. & Rodriguez-Freire, M. (2011a). Network analysis to assess landscape connectivity trends: application to European forests (1990-2000). Ecological Indicators 11: 407-416.

Saura, S., Gonzalez-Avila, S. & Elena-Rossello, R. (2011b). Evaluacion de los cambios en la conectividad de los bosques: el indice del area conexa equivalente y su aplicacion a los bosques de Castilla y Leon. Montes, Revista de Ambito Forestal 106: 15-21

Urban, D., and Keitt, T. (2001). Landscape connectivity: a graph-theoretic perspective. Ecology, 82(5): 1205-1218.

Examples

```
vec_path <- system.file("extdata/vec_projected.shp", package = "lconnect")
landscape <- upload_land(vec_path, bound_path = NULL,
habitat = 1, max_dist = 500)
metrics <- con_metric(landscape, metric = c("NC", "LCP"))
```

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is.lconnect   *Test for class lconnect*

Description

Tests if an object belongs to lconnect class

Usage

```
is.lconnect(x)
```

Arguments

x   object to test

Details

is.lconnect

Value

TRUE/FALSE

Author(s)

Bruno Silva

Frederico Mestre

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is.pimp   *Test for class pimp*

Description

Tests if an object belongs to pimp class

Usage

```
is.pimp(x)
```

Arguments

x   object to test

Details

is.pimp

Value

TRUE/FALSE

Author(s)

Bruno Silva

Frederico Mestre

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patch_imp   *Prioritization of patches according to individual contribution*

Description

Prioritization of patches according to individual contribution to overall connectivity. Each patch is removed at a time and connectivity metrics are calculated without that specific patch. The current version only allows the use of IIC.

Usage

```
patch_imp(landscape, metric, vector_out = F)
```

Arguments

`landscape`	lconnect object produced by upload_land()
`metric`	string indicating the landscape metric to use in the
`vector_out`	TRUE/FALSE

Details

patch_imp

Value

Returns a vector depicting each patch's importance to overall connectivity.

Author(s)

Frederico Mestre

Bruno Silva

References

#' Saura, S., Pascual-Hortal, L. (2007). A new habitat availability index to integrate connectivity in landscape conservation planning: Comparison with existing indices and application to a case study. Landscape and Urban Planning, 83(2-3):91-103.

Examples

```
vec_path <- system.file("extdata/vec_projected.shp", package = "lconnect")
landscape <- upload_land(vec_path, bound_path = NULL,
                         habitat = 1, max_dist = 500)
importance <- patch_imp(landscape, metric = "IIC")
plot(importance)
```

`plot.lconnect`	*Plot lconnect object*

Description

Plot lconnect object with clusters indicated by different colors. Aditional arguments accepted by plot() or plot.sf() can be included.

Usage

```
## S3 method for class 'lconnect'
plot(x, ...)
```

Arguments

x	lconnect object generated by upload_land()
...	other options passed to plot().

Details

plot.lconnect

Value

Nothing. Side-effect: plots graphs.

Author(s)

Bruno Silva

Frederico Mestre

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plot.pimp   *Plot pimp object*

Description

Plot pimp object patch importance indicated by different colors. Aditional arguments accepted by plot() or plot.sf() can be included.

Usage

```
## S3 method for class 'pimp'
plot(x, ..., main)
```

Arguments

x	pimp object generated by patch_imp()
...	other options passed to plot().
main	character with plot title

Details

plot.pimp

Value

Nothing. Side-effect: plots graphs.

Author(s)

Bruno Silva

Frederico Mestre

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upload_land   *Import and convert a shapefile to a lconnect object*

Description

Import and convert a shapefile to a lconnect object. Some landscape and patch metrics which are the core of landscape connectivity metrics are calculated. The shapefile must be projected, i.e., in planar coordinates and the first field must be contain the habitat categories.

Usage

```
upload_land(land_path, bound_path = NULL, habitat, max_dist = NULL)
```

Arguments

land_path	string, indicating the full path of the landscape shapefile.
bound_path	string, indicating the full path of the boundary shapefile. If NULL (default option) a convex hull will be created and used as boundary.
habitat	vector with habitat categories. The categories can be numeric or character.
max_dist	numeric indicating the maximum distance between patches in the same cluster.

Details

upload_land

Value

returns an object of class "lconnect". This object is a list with the following values:

landscape	spatial polygon object of class "sf" with cluster identity of each polygon
max_dist	numeric indicating the maximum distance between patches of the same cluster
clusters	numeric vector indicating cluster identity of each polygon
distance	object of class "dist" with eucledian distances between all pairs of polygons
boundary	spatial polygon of class "sfc" representing the boundary of the landscape
area_l	numeric with the total area of the boundary, in square units of landscape units

Author(s)

Bruno Silva

Frederico Mestre

Examples

```
vec_path <- system.file("extdata/vec_projected.shp", package = "lconnect")
landscape <- upload_land(vec_path, bound_path = NULL,
habitat = 1, max_dist = 500)
plot(landscape)
```

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