Package: comat (via r-universe)

September 7, 2024

Title Creates Co-Occurrence Matrices of Spatial Data

Version 0.9.5

Description Builds co-occurrence matrices based on spatial raster data. It includes creation of weighted co-occurrence matrices (wecoma) and integrated co-occurrence matrices (incoma; Vadivel et al. (2007) <doi:10.1016/j.patrec.2007.01.004>).

License MIT + file LICENSE

Encoding UTF-8

LazyData false

Roxygen list(markdown = TRUE)

RoxygenNote 7.2.3

Depends R (>= 2.10)

LinkingTo Rcpp, RcppArmadillo

Imports Rcpp

Suggests tinytest, covr, knitr, rmarkdown

URL https://jakubnowosad.com/comat/

BugReports https://github.com/Nowosad/comat/issues

VignetteBuilder knitr

Repository https://nowosad.r-universe.dev

RemoteUrl https://github.com/nowosad/comat

RemoteRef HEAD

RemoteSha 1d0c988c33f2f8a281e2585bff2010929bb98c9b

Contents

`get_cocoma` *Create a co-located co-occurrence matrix (cocoma)*

Description

Create a co-located co-occurrence matrix (cocoma)

Usage

```
get_cocoma(x, y, neighbourhood = 4, classes = NULL)
```

Arguments

`x`	A matrix with categories
`y`	A matrix with categories
`neighbourhood`	The number of directions in which cell adjacencies are considered as neighbours: 4 (rook's case) or 8 (queen's case). The default is 4.
`classes`	A list of length 2 with the values of selected classes from the `x` and `y` objects. It is used to calculate cocoma only for selected classes.

Value

A co-located co-occurrence matrix

Examples

```
library(comat)
data(raster_x, package = "comat")
data(raster_x_na, package = "comat")

coom = get_cocoma(raster_x, raster_x_na)
coom

get_cocoma(raster_x, raster_x_na, classes = list(c(1, 2), 3))
```

get_cocove *Create a co-located co-occurrence vector (cocove)*

Description

Converts a co-located co-occurrence matrix (cocoma) to a co-located co-occurrence vector (cocove)

Usage

```
get_cocove(x, ordered = TRUE, normalization = "none")
```

Arguments

x	A matrix - an output of the get_cocoma() function
ordered	The type of pairs considered. Either "ordered" (TRUE) or "unordered" (FALSE). The default is TRUE.
normalization	Should the output vector be normalized? Either "none" or "pdf". The "pdf" option normalizes a vector to sum to one. The default is "none".

Value

A co-located co-occurrence vector

Examples

```
library(comat)
data(raster_x, package = "comat")
data(raster_x_na, package = "comat")

coom = get_cocoma(raster_x, raster_x_na)
coom

coov = get_cocove(coom)
coov
```

get_coma *Create a co-occurrence matrix (coma)*

Description

Create a co-occurrence matrix (coma)

Usage

```
get_coma(x, neighbourhood = 4, classes = NULL)
```

Arguments

x	A matrix with categories
neighbourhood	The number of directions in which cell adjacencies are considered as neighbours: 4 (rook's case) or 8 (queen's case). The default is 4.
classes	A vector or a list with the values of selected classes from the x object. It is used to calculate coma only for selected classes.

Value

A co-occurrence matrix

Examples

```
#library(comat)
data(raster_x, package = "comat")

com = get_coma(raster_x)
com

com2 = get_coma(raster_x, classes = c(1, 3))
com2

data(raster_x_na, package = "comat")
com3 = get_coma(raster_x_na, classes = c(0:3, NA))
com3
```

---

get_cove *Create a co-occurrence vector (cove)*

Description

Converts a co-occurrence matrix (coma) to a co-occurrence vector (cove)

Usage

```
get_cove(x, ordered = TRUE, normalization = "none")
```

Arguments

x	A matrix - an output of the get_coma() function
ordered	The type of pairs considered. Either "ordered" (TRUE) or "unordered" (FALSE). The default is TRUE.
normalization	Should the output vector be normalized? Either "none" or "pdf". The "pdf" option normalizes a vector to sum to one. The default is "none".

Value

A co-occurrence vector

Examples

```
library(comat)
data(raster_x, package = "comat")

com = get_coma(raster_x)
com

cov = get_cove(com)
cov

cov = get_cove(com, normalization = "pdf")
cov
```

`get_incoma` *Create an integrated co-occurrence matrix (incoma)*

Description

Create an integrated co-occurrence matrix (incoma)

Usage

```
get_incoma(x, neighbourhood = 4, classes = NULL)
```

Arguments

`x`	A list object containing categorical matrices with categories
`neighbourhood`	The number of directions in which cell adjacencies are considered as neighbours: 4 (rook's case) or 8 (queen's case). The default is 4.
`classes`	A list of the same length as `x` with the values of selected classes from all of the objects in `x`. It is used to calculate incoma only for selected classes.

Value

An integrated co-occurrence matrix

Examples

```
data(raster_x, package = "comat")
data(raster_w, package = "comat")
x = list(raster_x, raster_w, raster_x)

get_incoma(x)

get_incoma(x, classes = list(1:2, 2:4, 1))
```

get_incove *Create an integrated co-occurrence vector (incove)*

Description

Converts an integrated co-occurrence matrix (incoma) to an integrated co-occurrence vector (incove)

Usage

```
get_incove(x, ordered = TRUE, repeated = TRUE, normalization = "none")
```

Arguments

x	A matrix - an output of the get_incoma() function
ordered	The type of pairs considered. Either "ordered" (TRUE) or "unordered" (FALSE). The default is TRUE. See details for more explanation.
repeated	Should the repeated co-located co-occurrence matrices be used? Either "repeated" (TRUE) or "unrepeated" (FALSE). The default is TRUE. See details for more explanation.
normalization	Should the output vector be normalized? Either "none" or "pdf". The "pdf" option normalizes a vector to sum to one. The default is "none".

Details

All values are kept when ordered = TRUE and repeated = TRUE. When ordered = TRUE and repeated = FALSE all values from cocoma (but only one cocoma for each pair) and all coma values are kept. ordered = FALSE and repeated = TRUE keeps all values from cocoma, but divides coma values by 2. ordered = FALSE and repeated = FALSE keeps all values from cocoma (but only one cocoma for each pair), and divides coma values by 2.

Value

An integrated co-occurrence vector

Examples

```
library(comat)

data(raster_x, package = "comat")
data(raster_w, package = "comat")
x = list(raster_x, raster_w, raster_x)

incom = get_incoma(x)
incom

incov1 = get_incove(incom)
```

```
incov1

incov2 = get_incove(incom, ordered = FALSE)
incov2

incov3 = get_incove(incom, ordered = FALSE, normalization = "pdf")
incov3
```

`get_wecoma` *Create a weighted co-occurrence matrix (wecoma)*

Description

Create a weighted co-occurrence matrix (wecoma)

Usage

```
get_wecoma(
  x,
  w,
  neighbourhood = 4,
  classes = NULL,
  fun = "mean",
  na_action = "replace"
)
```

Arguments

`x`	A matrix with categories
`w`	A matrix with weights
`neighbourhood`	The number of directions in which cell adjacencies are considered as neighbours: 4 (rook's case) or 8 (queen's case). The default is 4.
`classes`	A vector or a list with the values of selected classes from the `x` object. It is used to calculate wecoma only for selected classes.
`fun`	Function to calculate values from adjacent cells to contribute to output matrix, `"mean"` - calculate average values from adjacent cells of weight matrix, `"geometric_mean"` - calculate geometric mean values from adjacent cells of weight matrix, or `"focal"` assign value from the focal cell.
`na_action`	Decides on how to behave in the presence of missing values in `w`. Possible options are `"replace"`, `"omit"`, `"keep"`. The default, `"replace"`, replaces missing values with 0, `"omit"` does not use cells with missing values, and `"keep"` keeps missing values.

Value

A weighted co-occurrence matrix

Examples

```
library(comat)
data(raster_x, package = "comat")
data(raster_w, package = "comat")

wom = get_wecoma(raster_x, raster_w)
wom

get_wecoma(raster_x, raster_w, classes = list(c(1, 3)))
```

`get_wecove` *Create a weighted co-occurrence vector (wecove)*

Description

Converts a weighted co-occurrence matrix (wecoma) to a weighted co-occurrence vector (wecove)

Usage

```
get_wecove(x, ordered = TRUE, normalization = "none")
```

Arguments

`x`	A matrix - an output of the `get_wecoma()` function
`ordered`	The type of pairs considered. Either "ordered" (TRUE) or "unordered" (FALSE). The default is TRUE.
`normalization`	Should the output vector be normalized? Either "none" or "pdf". The "pdf" option normalizes a vector to sum to one. The default is "none".

Value

A weighted co-occurrence vector

Examples

```
library(comat)
data(raster_x, package = "comat")
data(raster_w, package = "comat")

wom = get_wecoma(raster_x, raster_w)
wom

wov = get_wecove(wom)
wov
```

it_metric *Calculates an Information Theory-based metric*

Description

Calculates a selected Information Theory-based metric based on a provided co-occurrence matrix

Usage

```
it_metric(x, metric, base = "log2", ordered = TRUE)
```

Arguments

x	A matrix - an output of the get_coma() function
metric	One of the following: "ent" (Marginal entropy), "joinent" (Joint entropy), "condent" (Conditional entropy), "mutinf" (Mutual information), or "relmutinf" (Relative mutual information)
base	The unit in which entropy is measured. The default is "log2", which compute entropy in "bits". "log" and "log10" can be also used.
ordered	The type of pairs considered. Either "ordered" (TRUE) or "unordered" (FALSE). The default is TRUE.

Value

A single numeric value

References

Nowosad J., TF Stepinski. 2019. Information theory as a consistent framework for quantification and classification of landscape patterns. https://doi.org/10.1007/s10980-019-00830-x

Examples

```
library(comat)
data(raster_x, package = "comat")

com = get_coma(raster_x)
com

it_metric(com, metric = "ent")
it_metric(com, metric = "joinent")
it_metric(com, metric = "condent")
it_metric(com, metric = "mutinf")
it_metric(com, metric = "relmutinf")
```

raster_w *A matrix with weights*

Description

A matrix with weights

Usage

```
data(raster_w)
```

Format

A matrix

raster_w_na *A matrix with weights and missing values*

Description

A matrix with weights and missing values

Usage

```
data(raster_w_na)
```

Format

A matrix

raster_x *A matrix with categories*

Description

A matrix with categories

Usage

```
data(raster_x)
```

Format

A matrix

raster_x_na *A matrix with categories and missing values*

Description

A matrix with categories and missing values

Usage

```
data(raster_x_na)
```

Format

A matrix

raster_y *A matrix with categories*

Description

A matrix with categories

Usage

```
data(raster_y)
```

Format

A matrix

Index