Package ‘adehabitatMA’

October 12, 2022

Version 0.3.14
Date 2020-01-11
Depends R (>= 2.10.0), sp, methods
Suggests maptools, tkrplot, MASS
Imports utils, graphics, grDevices, stats, filehash
Title Tools to Deal with Raster Maps
Author Clement Calenge, contributions from Mathieu Basille
Maintainer Clement Calenge <clement.calenge@ofb.gouv.fr>
Description A collection of tools to deal with raster maps.
License GPL (>= 2)
NeedsCompilation yes
Repository CRAN
Date/Publication 2020-01-13 19:20:08 UTC

R topics documented:

adeoptions ........................................... 2
ascgen ................................................. 3
buffer .................................................. 4
calcperimeter ........................................ 6
count.points ........................................ 7
distfacmap .......................................... 8
explore ............................................... 9
getcontour .......................................... 10
hist.SpatialPixelsDataFrame .......................... 11
join .................................................. 12
kasc2spixdf ........................................ 13
labcon ................................................. 14
lowres ............................................... 15
lynxjura ............................................. 16
mimage ............................................... 17
morphology ....................................... 18
adeoptions

Setting options for the adehabitat* package

Description

The function adeoptions defines the options for the package adehabitatMA, and more generally, for all brother packages (adehabitatHR, adehabitatHS and adehabitatLT).

Usage

adeoptions(...)

Arguments

... a list of named elements giving the value of options for the package adehabitatMA

Details

This function sets the value of components of the internal list .adeoptions, which contains the values of the options. Two options are currently implemented:

epsilon: the smallest significant distance between two points above which we should consider to deal with two separate locations

shortprint: logical. Defines whether special show methods should be used when printing objects belonging to classes of the package sp

Value

a list of options for the package adehabitatMA

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

Examples

## load the data
data(lynxjura)

## short printing method
oldopt <- adeoptions(shortprint=TRUE)

lynxjura$map
ascgen

## 'sp' print method for Spatial objects
adeoptions(shortprint=FALSE)

 lynxjura$map

## original options
adeoptions(olddopt)
lynxjura$map

<table>
<thead>
<tr>
<th>ascgen</th>
<th>Making Raster Maps From SpatialPoints Objects</th>
</tr>
</thead>
</table>

Description

ascgen creates an object of class SpatialPixelsDataFrame using a set of points contained in an object of class SpatialPointsDataFrame.

Usage

ascgen(xy, cellsize = NULL, nrcol = NULL, count = TRUE)

Arguments

xy       an object inheriting the class SpatialPoints
cellsize  the cell size (resolution) of the object of class SpatialPixelsDataFrame to be built
nrcol    the size of the square raster map to be created (number of rows/columns)
count    logical. If TRUE, the resulting object contains the number of points in each cell. If FALSE, all the cells are set to zero

Value

Returns an object of class SpatialPixelsDataFrame.

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

See Also

SpatialPixelsDataFrame-class for additional information on objects of class SpatialPixelsDataFrame and SpatialPoints-class for additional information on objects of class SpatialPoints.
Examples

```r
## generates a random sample of points
xy <- matrix(runif(1000), ncol=2)

## coerce them to SpatialPoints
xy <- SpatialPoints(xy)
plot(xy)

## generate a SpatialPixelsDataFrame
## (and count the number of points)
spd <- ascgen(xy, cellsize=0.1)
image(spd)
```

---

buffer | Compute Buffers Regions

Description

buffer computes buffers regions from spatial objects belonging to the following classes:

- `SpatialPoints` (all pixels located within a specified distance of a point take the value one)
- `SpatialPointsDataFrame` with one column (this column is considered to be a factor, and the buffer is computed for each level of this factor)
- `SpatialLines` to compute buffers from lines.
- `SpatialPolygons` to compute buffers from polygons.

Usage

```r
buffer(xy, x, dist)
```

Arguments

- `xy` an object of class `SpatialPoints`, `SpatialPointsDataFrame` with one column (a factor considered to be the identity of the points), `SpatialLines`, or `SpatialPolygons`.
- `x` an object inheriting the class `SpatialPixels` with the same attributes (resolution, size) as those desired for the output.
- `dist` a value of distance

Value

An object of class `SpatialPixelsDataFrame`. 
data(lynxjura)

# locs is the SpatialPointsDataFrame containing the
# locations of lynx indices in the Jura mountains
locs <- lynxjura$locs
head(locs)

## just for the sake of illustration: sample 100 points
suppressWarnings(RNGversion("3.5.0"))
set.seed(233)
locs <- locs[sample(1:nrow(locs), 100),]

# sa is the SpatialPixelsDataFrame object containing
# maps of the study area
sa <- lynxjura$map

# Buffer of 2000 m from all points
bu <- buffer(locs, sa, 2000)
image(bu)

# displays all the pixels of the study area within 2000 m
# of a point, for each type of indices (see ?lynxjura)
buani <- buffer(locs[,2], sa, 2000)

par(mar=c(0,0,2,0))
opar<-par(mfrow=c(3,4))
lapply(1:11, function(i) {
  image(buani[,i])
  title(main = names(slot(buani, "data"))[i])
})
par(opar)

## buffer from a polygon
sa2 <- sa[,4]
image(sa2)

## gets the contour line
gc <- getcontour(sa2)
plot(gc, add=TRUE)

## a buffer of 2000 metres
calcperimeter

Compute Perimeters of Objects of Class "SpatialPolygonsDataFrame" and "PolyLinesDataFrame"

Description

calcperimeter computes the perimeters of polygons in objects of class SpatialPolygonsDataFrame and PolyLinesDataFrame.

Usage

calcperimeter(x)

Arguments

x object of class SpatialPolygonsDataFrame or PolyLinesDataFrame

Value

an object of class SpatialPolygonsDataFrame or PolyLinesDataFrame with an additional column containing the perimeter of the polygons/polylines.

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

See Also

SpatialPolygonsDataFrame-class for additional information on objects of class SpatialPolygonsDataFrame.

Examples

data(meuse.grid)
a <- SpatialPixelsDataFrame(points = meuse.grid[,c("x", "y")],
data = meuse.grid)

## the contour of the map
gc <- getcontour(a[,1])
plot(gc)

## Transforms the SpatialPolygons into SpatialPolygonsDataFrame
gc <- SpatialPolygonsDataFrame(gc, data.frame(x=1))

image(buffer(gc, sa, 2000))
plot(gc, add=TRUE)
## The perimeter of this map (in units of the data):

```r
ii <- calcperimeter(gc)
as.data.frame(ii)
```

---

### count.points

**Number of Points in Each Pixel of a Raster Map**

#### Description

count.points counts the number of points in each pixel of a raster map inheriting the class SpatialPixels.

#### Usage

```r
count.points(xy, w)
```

#### Arguments

- `xy` an object of class SpatialPoints, or SpatialPointsDataFrame with one column. In the latter case, the column is considered as a factor giving, for each point, the membership of the point to a set.
- `w` an object inheriting the class SpatialPixels.

#### Value

an object of class SpatialPixelsDataFrame containing the number of points in each cell of the raster map. If `xy` is a SpatialPointsDataFrame with one column (a factor), the resulting object contains one column per level of this factor.

#### Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

#### See Also

SpatialPixelsDataFrame-class for additional information on objects of class SpatialPixelsDataFrame.

#### Examples

```r
data(lynxjura)

# locs is the SpatialPointsDataFrame containing the
# locations of presence indices of Lynx in the Jura mountains (France)
locs <- lynxjura$locs
```
head(locs)

# sa is the SpatialPixelsDataFrame object containing
# maps of the study area
sa <- lynxjura$map

# Count all points
cp <- count.points(locs, sa)
image(cp)

# count the points per type of lynx presence indices:
cp <- count.points(locs[,2], sa)
cp

---

**distfacmap**

*Compute distances to the different levels of a factor map*

**Description**

This function computes maps of distances to patches belonging to the different levels of a factor variable (mapped in an object of class SpatialPixelsDataFrame).

**Usage**

```r
distfacmap(x, lev = NULL)
```

**Arguments**

- `x`  
  an object of class SpatialPixelsDataFrame with one column (considered as a factor by the function)

- `lev`  
  a vector of character strings giving the labels of the levels of the factor.

**Value**

An object of class SpatialPixelsDataFrame.

**Author(s)**

Clement Calenge <clement.calenge@ofb.gouv.fr>

**See Also**

`SpatialPixelsDataFrame-class` for additional information on objects of class SpatialPixelsDataFrame.
## Load meuse.grid data set and converts it to SpatialPixelsDataFrame
```r
data(meuse.grid)
m <- SpatialPixelsDataFrame(points = meuse.grid[, c("x", "y")],
data = meuse.grid)
```

## look at the soil type
```r
image(m[,6])
```

## compute the distance to each soil type
```r
sor <- distfacmap(m[,6], lev = c("type1","type2", "type3"))
```

## The results
```r
sor
mimage(sor)
```

---

### explore

**Interactive Exploration of Maps of Class 'SpatialPixelsDataFrame'**

(requires the package tkrplot)

---

### Description

This interface allows to explore distances, values, etc. on a map of class `SpatialPixelsDataFrame`.

### Usage

```r
explore(ka, coltxt="black",
hscale = 1, vscale = 1,
panel.last = NULL, ...)
```

### Arguments

- **ka**: An object of class `kasc`
- **coltxt**: character, the color of the text to be printed
- **hscale**: passed to tkrplot
- **vscale**: passed to tkrplot
- **panel.last**: an expression to be evaluated after plotting has taken place
- **...**: additional parameters to be passed to the function `image`

### Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>
getcontour

Description

getcontour computes the contour polygon of a raster object of class SpatialPixelsDataFrame. When the object is made of several parts, the function returns one polygon per part.

Usage

getcontour(sp)

Arguments

sp           an object of class SpatialPixelsDataFrame

Value

Returns an object of class SpatialPolygons.

Warning

Holes in the polygons are not taken into account by the function.

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>
**hist.SpatialPixelsDataFrame**

**See Also**

`SpatialPixelsDataFrame-class` for additional information on objects of class `SpatialPixelsDataFrame`.

**Examples**

data(meuse.grid)
a <- SpatialPixelsDataFrame(points = meuse.grid[c("x", "y")],
data = meuse.grid)

## the contour of the map
gc <- getcontour(a[,1])
plot(gc)

---

**hist.SpatialPixelsDataFrame**

_Histograms of Mapped Variables_

**Description**

`hist.SpatialPixelsDataFrame` performs histograms of the variables mapped in objects of class `SpatialPixelsDataFrame`.

**Usage**

```r
## S3 method for class 'SpatialPixelsDataFrame'
hist(x, type = c("h", "l", "b"),
      adjust = 1, col, border,
      lwd = 1, ...)
```

**Arguments**

- `x` a raster map of class `SpatialPixelsDataFrame`
- `type` what type of plot should be drawn. Possible types are:
  * "h" for histograms,
  * "l" for kernel density estimates (see `density`).
  * "b" for both histograms and kernel density estimates (see `density`).
  By default, `type = "h"` is used. If `type = "l"` is used, the position of the mean of each distribution is indicated by dotted lines.
- `adjust` if `type = "l"`, a parameter used to control the bandwidth of the density estimate (see `density`)
- `col` color for the histogram
- `border` color for the border of the histogram
join

Find the Value of Mapped Variables at some Specified Locations (Spatial Join)

Description

join finds the value of a mapped variable at some specified locations.

Usage

```r
join(xy, x)
```

Arguments

- **x**: an object of class `SpatialPixelsDataFrame`
- **xy**: an object of class `SpatialPointsDataFrame`

Value

If only one variable is mapped in x, a vector with length equals to the number of points in xy.

If only several variables are mapped in x, a `data.frame` with a number of columns equal to the number of variables in the object of class `SpatialPixelsDataFrame`, and with each row corresponding to the rows of xy.

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>
**See Also**

*SpatialPixelsDataFrame-class* for additionnal information on objects of class `SpatialPixelsDataFrame`.  
*SpatialPoints-class* for additionnal information on objects of class `SpatialPoints`.

**Examples**

data(lynxjura)

```r
## show the data
image(lynxjura$map)
points(lynxjura$locs)

## join the data to the maps:
res <- join(lynxjura$locs, lynxjura$map)
head(res)
```

**kasc2spixdf**  
Conversion of old classes (adehabitat) to new classes (sp.adehabitatMA)

**Description**

These functions convert maps of classes available in adehabitat toward classes available in the package sp and conversely.

- `kasc2spixdf` converts an object of class `kasc` into an object of class `SpatialPixelsDataFrame`.
- `asc2spixdf` converts an object of class `asc` into an object of class `SpatialGridDataFrame`.
- `area2spol` converts an object of class `area` into an object of class `SpatialPolygons`.
- `spol2area` converts an object of class `SpatialPolygons` or `SpatialPolygonsDataFrame` into an object of class `area`.
- `attpol2area` gets the data attribute of an object of class `SpatialPolygonsDataFrame` and stores it into a data frame.

**Usage**

`kasc2spixdf(ka)`
`asc2spixdf(a)`
`area2spol(ar)`
`spol2area(sr)`
`attpol2area(srdf)`
Arguments

ka  an object of class kasc.
a  an object of class asc.
ar  an object of class area.
sr  an object of class SpatialPolygons or SpatialPolygonsDataFrame.
srdf  an object of class SpatialPolygonsDataFrame.

Details

We describe here more in detail the functions spol2area and attpol2area. Objects of class area
do not deal with holes in the polygons, whereas the objects of class SpatialPolygons do. There-
fore, when holes are present in the SpatialPolygons object passed as argument, the function
spol2area ignore them and returns only the external contour of the polygon (though a warning is
returned).

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

labcon  Labelling Connected Features

Description

This function attributes unique labels to pixels belonging to connected features on a map of class
SpatialPixelsDataFrame.

Usage

labcon(x)

Arguments

x  an object of class SpatialPixelsDataFrame with one column

Value

Returns a matrix of class asc, of type "factor", with a number of levels equals to the number of
connected components

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

See Also

SpatialPixelsDataFrame-class for further information on the class SpatialPixelsDataFrame
**Examples**

```r
data(lynxjura)
sa <- lynxjura$map[,1]

## build an image with separate components

## show the connected components
image(sa)
image(labcon(sa))
```

---

**lowres**  
*Reducing the Resolution of a Map*

**Description**

lowres is used to reduce the resolution of maps of class SpatialPixelsDataFrame.

**Usage**

```r
lowres(x, np = 2, which.fac=NULL, ...)
```

**Arguments**

- `x` an object of class SpatialPixelsDataFrame
- `np` a number giving the number of pixels to merge together (see below)
- `which.fac` a vector containing the indices of the columns of `x`, which should be considered as a factor
- `...` further arguments passed to or from other methods

**Details**

The function merges together squares of `np * np` pixels. For variables of type "numeric", the function averages the value of the variable. For maps of type "factor", the function gives the most frequent level in the square of `np * np` pixels. When several levels are equally represented in the square of `np * np` pixels, the function randomly samples one of these levels.

**Value**

Returns an object of class SpatialPixelsDataFrame.

**Author(s)**

Clement Calenge <clement.calenge@ofb.gouv.fr>
See Also

SpatialPixelsDataFrame-class for further information on objects of class SpatialPixelsDataFrame.

Examples

data(meuse.grid)
m <- SpatialPixelsDataFrame(points = meuse.grid[c("x", "y")],
   data = meuse.grid)
m
m <- m[,3:6]

## The initial image
image(m,3)

## The transformed image
m2 <- lowres(m, np = 4)
image(m2, 3)

lynxjura Monitoring of Lynx

Description

This data set stores the results of the monitoring of lynx in the French Jura between 1980 and 1999. These data have been collected by the Lynx Network of the french wildlife management office (Office national de la chasse et de la faune sauvage).

Usage

data(lynxjura)

Format

The list lynxjura has two components: map is an object of class SpatialPixelsDataFrame (see help(SpatialPixelsDataFrame)) that describes several variables on the study area: forets is the density of forests, hydro is the density of rivers, routes is the density of roads and artif is the distance from urbanized areas.

locs is an object of class SpatialPointsDataFrame containing the locations of presence indices of the lynx. X and Y are the x and y coordinates, Date is the date of the collection of the indice and Type represents the type of data (C: alive lynx captured, D: attacks on livestock, E: prints or tracks, F: feces, J: hairs, L: corpse of lynx, O: sightings and P: attacks on wild prey).
mimage

Source


mimage

Displaying Multi-layer Raster Maps

Description

This function allows to display the whole content of an object of class SpatialPixelsDataFrame

Usage

mimage(x, var = names(slot(x, "data")), col = gray((240:1)/256), mfrow = NULL)

Arguments

x an object of class SpatialPixelsDataFrame
var The names or index of the variables to be plotted
col a vector of colors to be used for plotting
mfrow The parameter mfrow for the resulting graph (see help(par)

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

See Also

par for information about mfrow, and SpatialPixelsDataFrame-class for additionnal information on objects of class SpatialPixelsDataFrame.

Examples

data(lynxjura)
lynxjura$map
mimage(lynxjura$map)

mimage(lynxjura$map, c("forets", "routes"),
col=grey(seq(0,1, length=100)))
Morphology: Erosion or Dilatation of Features on a Raster Map

Description

morphology performs morphological operations on images of class SpatialPixelsDataFrame.

Usage

morphology(x, operation = c("erode", "dilate"), nt = 5)

Arguments

x
  a matrix of class SpatialPixelsDataFrame with one column
operation
  a character string indicating the operation to be processed: either "erode" or "dilate"
nt
  the number of times that the operation should be processed

Value

Returns an object of class SpatialPixelsDataFrame with one column, containing 1 when the pixel belong to one feature of the image and NA otherwise (see examples).

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>

See Also

SpatialPixelsDataFrame-class for further information on objects of class SpatialPixelsDataFrame.

Examples

data(meuse.grid)
a <- SpatialPixelsDataFrame(points = meuse.grid[c("x", "y")],
data = meuse.grid)

## dilatation
toto1 <- morphology(a, operation = "dilate", nt = 1)
toto2 <- morphology(a, operation = "dilate", nt = 2)
toto3 <- morphology(a, operation = "dilate", nt = 3)
toto5 <- morphology(a, operation = "dilate", nt = 5)
colo <- grey((1:5)/6)
image(toto5, col = colo[1])
image(toto3, add = TRUE, col = colo[2])
image(toto2, add = TRUE, col = colo[3])
puechabonsp

Radio-Tracking Data of Wild Boar

Description

This data set stores the results of the monitoring of 4 wild boars at Puechabon (Mediterranean habitat, South of France). These data have been collected by Daniel Maillard (Office national de la chasse et de la faune sauvage).

Usage

data(puechabonsp)

Details

The list puechabonsp has two components:

- puechabonsp$map is an object of class SpatialPixelsDataFrame that describes several variables on the study area.
- puechabonsp$relocs is an object of class SpatialPointsDataFrame containing the relocations of the wild boar resting sites in summer. Information on wild boars is provided by factors Name, Sex, Age.

References

Print Functions for Objects of the Package 'sp' Used in 'adehabitatMA'

Description

These are functions allowing a shorter print of the content of objects of class `SpatialPolygonsDataFrame`, `SpatialPixelsDataFrame`, `SpatialPixels`, and `SpatialGridDataFrame`. Original printing methods can be recovered by setting `adeoptions(shortprint=FALSE)`.

Methods

- **object = "SpatialGridDataFrame"**  show function for the class `SpatialGridDataFrame`.
- **object = "SpatialPixels"**  show function for the class `SpatialPixels`.
- **object = "SpatialPixelsDataFrame"**  show function for the class `SpatialPixelsDataFrame`.
- **object = "SpatialPolygonsDataFrame"**  show function for the class `SpatialPolygonsDataFrame`.

subsetmap  

Storing a Part of a Map

Description

subsetmap is used to store a part of any given map of class `SpatialPixelsDataFrame` into another object.

Usage

```r
subsetmap(x, xlim = NULL, ylim = NULL, ...)
```

Arguments

- **x**  an object of class `SpatialPixelsDataFrame`
- **xlim**  numerical vector of length 2. The x limits of the rectangle including the new map
- **ylim**  numerical vector of length 2. The y limits of the rectangle including the new map
- **...**  further arguments passed to or from other methods

Details

If `xlim` or `ylim` are not provided, the function asks the user to click on the map to delimit the lower left corner and the higher right corner of the new map (see Examples).
Value

Returns an object of class SpatialPixelsDataFrame

Author(s)

Clement Calenge <clement.calenge@ofb.gouv.fr>, improvements by Jon Olav Vik

Examples

data(lynxjura)
map <- lynxjura$map

## limits of the new map:
xl <- c(839938.7, 858990.8)
yl <- c(2149019, 2168761)

## computation of the new map:
su <- subsetmap(map, xlim = xl, ylim = yl)
su

## Display
opar <- par(mar = c(0,0,0,0))
layout(matrix(c(1,1,1,1,1,1,1,1,2), byrow = TRUE, ncol = 3))
image(map, axes = FALSE)
polygon(c(xl[1], xl[2], xl[2], xl[1]),
c(yl[1], yl[1], yl[2], yl[2]))
image(su, axes = FALSE)
box()

par(opar)
par(mfrow = c(1,1))

## Not run:
## Interactive example
su <- subsetmap(map)

image(su)

## End(Not run)
Index

* datasets
  lynxjura, 16
  puechabonsp, 19
* environment
  adeoptions, 2
* hplot
  calcperimeter, 6
  explore, 9
  getcontour, 10
  hist.SpatialPixelsDataFrame, 11
  join, 12
  kasc2spixdf, 13
* methods
  show-methods, 20
* programming
  getcontour, 10
  join, 12
* spatial
  ascgen, 3
  buffer, 4
  count.points, 7
  distfacmap, 8
  explore, 9
  labcon, 14
  lowres, 15
  mimage, 17
  morphology, 18
  subsetmap, 20
  adeoptions, 2
  area2spol (kasc2spixdf), 13
  asc2spixdf (kasc2spixdf), 13
  ascgen, 3
  attpol2area (kasc2spixdf), 13
  buffer, 4
  calcperimeter, 6
  count.points, 7
  distfacmap, 8
  explore, 9
  getcontour, 10
  hist.SpatialPixelsDataFrame, 11
  join, 12
  kasc2spixdf, 13
  labcon, 14
  lowres, 15
  lynxjura, 16
  mimage, 17
  morphology, 18
  par, 17
  puechabonsp, 19
  show, SpatialGridDataFrame-method
  (show-methods), 20
  show, SpatialPixels-method
  (show-methods), 20
  show, SpatialPixelsDataFrame-method
  (show-methods), 20
  show, SpatialPolygonsDataFrame-method
  (show-methods), 20
  show-methods, 20
  spol2area (kasc2spixdf), 13
  subsetmap, 20