

Package ‘ShapePattern’

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Type Package

Title Tools for Analyzing Planar Shape and Associated Patterns

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Description

An evolving and growing collection of tools for the quantification, assessment, and comparison of planar shape and pattern. The current flagship functionality is in the spatial decomposition of planar shapes using 'ShrinkShape' to incrementally shrink shapes to extinction while computing area, perimeter, and number of parts at each iteration of shrinking. The spectra of results are returned in graphic and tabular formats. Additional utility tools for handling data are provided and this package will be added to as more tools are created, cleaned-up, and documented.

License GPL-2

LazyData yes

LazyDataCompression xz

Depends R (>= 2.14), rgdal, sp, rgeos

NeedsCompilation no

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ShapePattern-package *Tools for Analyzing Planar Shape and Associated Patterns*

Description

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Details

The DESCRIPTION file:

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Index of help topics:

```
ShapePattern-package  Tools for Analyzing Planar Shape and Associated
                      Patterns
batchssr              Calls ShrinkShape (ssr) in batch mode
data                  Two imported shapefiles are provided. One is
                      the perimeter of a pond, the second is the same
                      pond but with the internal islands (holes)
                      included.
shpsplitter          Shapefile splitting function to produce a
                      unique shapefile for each unique shape
                      identified by GRIDCODE
ssr                   Decompose a planar shape (polygon) to produce
                      area, perimeter, and number of parts spectra
```

Perform ShrinkShape, a spatial decomposition by iterative shrinking of planar shapes (ploysgons).

Author(s)

Tarmo K. Remmel

Maintainer: Tarmo K. Remmel <remmelt@yorku.ca>

References

Remmel, T.K. 2015. ShrinkShape2: a FOSS toolbox for computing rotation-invariant shape spectra for characterizing and comparing polygons. *The Canadian Geographer* 59(4):532-547.

Examples

```
# Something to be completed.
```

batchssr	<i>Calls ShrinkShape (ssr) in batch mode</i>
----------	--

Description

When multiple shapes need to be processed with ShrinkShape, then having this batch utility process all files in a folder can be useful (e.g., if a shapefile with multiple unique polygons was initially split with shpsplitter). Processes all .shp files in the working directory.

Usage

```
batchssr(outfile = "out.csv", START = 1)
```

Arguments

outfile	This is the name of a .csv text file to which the output results are written (it is continually added to as the batch processing continues). The path and file-name can be specified here and later be used external to the R environment if necessary.
START	At times it is necessary to begin processing a batch of files from a specific point (not necessarily the beginning); specifying this parameter as an integer will start processing a list of files from this specific point. The default is 1, the first file. This option is included in case of a crash (which initially happened due to a power failure) and then the processing could be restarted easily from where it was terminated.

Value

The output is simply a sequential .csv text file that contains the area, perimeter, and number of parts decomposition information for each iteration and each shape processed by the batch function. The columns in the output file also identify the unique shape id, the iteration number on each row, and the cumulative shrinking distance associated with each iteration.

Note

This function works nicely on the output generated by the function `shpsplitter`, such that each shapefile to be processed will contain exactly one unique shape (as identified by the attribute `GRIDCODE`). Projection units must be meters and not an angular unit (e.g., decimal degrees).

Author(s)

Tarmo K. Remmel

References

Remmel, T.K. 2016. Classifying boreal wildfires by clustering ShrinkShape spectra of internal unburned vegetation patches. US-IALE 2016 Annual Meeting: Landscape Change, 3-7 April, Asheville, North Carolina, USA.

See Also

See Also [shpsplitter](#), [ssr](#)

Examples

```
# Simply calls ssr for each instance of a .shp file in the working directory.  
# Functionality is the same as for ssr, this is just a wrapper function.
```

data	<i>Two imported shapefiles are provided. One is the perimeter of a pond, the second is the same pond but with the internal islands (holes) included.</i>
------	--

Description

These two shapefile imports can be used to test the functionality of the ShrinkShape function and to become familiar with its use. The two versions of the shapefile illustrate the handling of islands (holes) in the data.

Usage

```
data("data")
```

Format

These are in imported shapefile format. They were imported using `rgdal::readOGR`.

Details

These are simple single-shape shapefiles.

Source

These pond perimeters were digitized in-house by Connie Ko at York University.

References

There are no references for these data elements.

Examples

```
data(data)
plot(data$p4no)
plot(data$p4is)
```

shpsplitter	<i>Shapefile splitting function to produce a unique shapefile for each unique shape identified by GRIDCODE</i>
-------------	--

Description

While shapefiles can contain multiple polygons, ShrinkShape (ssr) can only process a single shape at a time and thus shapefiles with multiple polygon features need to be split into independent shapefiles prior to processing them with ShrinkShape. This function splits a shapefile into multiple shapefiles by unique values in the GRIDCODE attribute.

Usage

```
shpsplitter(SHAPEFILE = "f09uqresids64", CODE = "f09_R64_")
```

Arguments

SHAPEFILE	The name of the shapefile without ".shp" that will be subjected to splitting.
CODE	This parameter allows all of the output shapefiles to have this same filename start (to help group like files).

Details

The output filenames (shapefiles) will all begin with the string provided by CODE and then the unique GRIDCODE value will be appended to this to keep the lineage of the data clean. Select a CODE that makes sense.

Value

Outputs from this function are shapefiles, one for each unique GRIDCODE attribute in the input SHAPEFILE. The shapefiles are written to the workspace on the computer in preparation for processing with ssr (individually) or sequentially with batchssr.

Note

In future releases, the attribute for splitting will be made a parameter, but for now it must be GRIDCODE. This tool requires libraries `sp` and `rgdal`.

Author(s)

Tarmo K. Remmel

References

Remmel, T.K. 2016. Classifying boreal wildfires by clustering ShrinkShape spectra of internal unburned vegetation patches. US-IALE 2016 Annual Meeting: Landscape Change, 3-7 April, Asheville, North Carolina, USA.

See Also

See Also as [ssr](#), [batchssr](#)

Examples

```
## Not run:
# The functionality is provided by the library rgdal, and specifically readOGR.
# Depending on the number of unique GRIDCODE values in the shapefile, this function
# has the potential to produce a large number of output files.

shpsplitter(SHAPEFILE="f09uqresids64", CODE="f09_R64_")

## End(Not run)
```

ssr

Decompose a planar shape (polygon) to produce area, perimeter, and number of parts spectra

Description

Given a single- or multi-part polygon (imported from a shapefile), `ssr` decomposes the shape by iteratively shrinking it by a specified distance until it becomes extinct. At each iteration of shrinking, the area, perimeter, and number of parts forming the resultant polygon are stored. Graphic plots and maps along with a tabular result are returned. This version works fully within R and no longer requires RSAGA GIS installed, making it more streamlined and faster.

Usage

```
ssr(DIST = 25, shp = data$4no, colours = c("LightGreen", "Tan"), PLOT = TRUE)
```

Arguments

DIST	The specified distance (in meters) by which to incrementally shrink the shape internally.
shp	The shape (polygon) to be processed by ssr. This must be a single shape (although it can be multi-part and contain holes). This object needs to be imported by readOGR and saved as an object prior to calling ssr.
colours	An option to provide a vector of two colours that will be used alternately when creating graphic outputs. This is implemented only if PLOT = TRUE.
PLOT	This is a Boolean (TRUE FALSE) flag that governs whether graphic output is produced and presented at the conclusion of the decomposition. When ssr is called in batch mode (with batchssr), it is advised that this be set to FALSE as it dramatically slows processing and will continue to overplot itself.

Value

If PLOT = TRUE, the function returns to the display maps of the decomposed polygon shape along with plots of the area, perimeter, and number of parts spectra. The function by default returns the tabular data from which the spectra can be plotted at any time.

Note

The shapefile must already be imported (e.g. with readOGR) and have only one unique shape (although it may be multi-part and contain holes). The projection must be rectangular with units in meters (not decimal degrees or other angular unit)

Author(s)

Tarmo K. Rimmel

References

Rimmel, T.K. 2015. ShrinkShape2: a FOSS toolbox for computing rotation-invariant shape spectra for characterizing and comparing polygons. *The Canadian Geographer* 59(4):532-547.

See Also

See Also [readOGR](#)

Examples

```
data$out <- ssr(DIST=25, shp=data$sp4is, PLOT=TRUE, colours=c("LightGreen", "Tan"))
print(data$out)
```

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