

Package ‘ssmooth’

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Title Smooth Raster Time Series

Version 0.1.0

Description Smooth a sequence of 'terra' rasters using various algorithms (currently moving average, weighted moving average, and exponential smoothing). Also includes wrappers to smooth a vector time-series using these same algorithms. All smoothers use 'Rcpp' implementations for performance.

Imports terra, Rcpp

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Encoding UTF-8

RoxygenNote 8.0.0

LinkingTo Rcpp

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

URL <https://github.com/Biodiversity-Futures-Lab/ssmooth>

BugReports <https://github.com/Biodiversity-Futures-Lab/ssmooth/issues>

NeedsCompilation yes

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Contents

SmoothRasterTS	2
SmoothTS	3
Index	5

SmoothRasterTS

*Smooth Raster Time Series***Description**

Applies a smoothing operation to each pixel's time series in a multi-layer raster using one of three methods: mean (moving average), weighted moving average, or exponential moving average.

Usage

```
SmoothRasterTS(
  rast,
  ...,
  cores = 1L,
  filename = "",
  overwrite = FALSE,
  wopt = list()
)
```

Arguments

<code>rast</code>	SpatRaster. A multi-layer raster object where each layer represents a time point in the series.
<code>...</code>	Additional arguments passed to the SmoothTS function, such as <code>method</code> , <code>n</code> , <code>weights</code> , <code>alpha</code> , and <code>n_init</code> .
<code>cores</code>	Integer. Number of CPU cores to use for parallel processing. Default is 1. Don't change this unless you know what you're doing.
<code>filename</code>	Character. Optional filename for writing the output raster. If provided, the output raster will be written to this file.
<code>overwrite</code>	Logical. If TRUE and <code>filename</code> is provided, allows overwriting the existing file; optional.
<code>wopt</code>	List. Optional list of additional arguments to pass to <code>terra::writeRaster</code> .

Details

Assumes that the input raster has multiple layers, where each layer represents a time point in the series. The function applies the specified smoothing method to the time series of each pixel across the layers and returns a new raster with the smoothed time series for each pixel.

Value

SpatRaster. A multi-layer raster object with smoothed time series for each pixel.

Examples

```
rast <- terra::rast(nrow = 1, ncol = 2, nlyrs = 5)
terra::values(rast) <- matrix(rep(1:5, each = 2), nrow = 2)
out <- SmoothRasterTS(rast, method = "mean", n = 3)
```

SmoothTS

*Smooth Time Series Data***Description**

Applies a smoothing operation to a numeric vector (time series data) using one of three methods: mean (moving average), weighted moving average, or exponential moving average.

Usage

```
SmoothTS(
  x,
  method = "exponential",
  n = 3,
  weights = rep(1, 3),
  alpha = 0.3,
  n_init = 5
)
```

Arguments

x	Numeric vector. The time series data to be smoothed.
method	Character. Smoothing method to use. Options are "mean", "weighted", or "exponential". Default is "exponential".
n	Integer. Number of points for the moving average (used in "mean" method). Default is 3.
weights	Numeric vector. Weights for the weighted moving average (used in "weighted" method). Default is a vector of 1's (i.e., simple moving average).
alpha	Numeric. Smoothing factor for exponential moving average (used in "exponential" method). Default is 0.3.
n_init	Integer. Number of initial points to use for the first smoothed value in the exponential moving average (used in "exponential" method). Default is 5.

Details

For the "mean" method, a simple moving average is computed over a specified window size. For the "weighted" method, a weighted moving average is computed using a specified set of weights. For the "exponential" method, an exponential moving average is computed using a specified smoothing factor (alpha) and a specified number of initial points to use for the first smoothed value.

If you use a windowing method (mean or weighted), the function pads the input vector with the mean of the non-NA values at the beginning and end to ensure that the output vector has the same length as the input.

Value

Numeric vector of smoothed values.

Examples

```
x <- 1:10
SmoothTS(x, method = "mean", n = 3)
SmoothTS(x, method = "weighted", n = 3, weights = c(0.1, 0.5, 0.4))
SmoothTS(x, method = "exponential", alpha = 0.5, n_init = 3)
```

Index

SmoothRasterTS, [2](#)
SmoothTS, [3](#)