

Package ‘spemd’

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Title A Bi-Dimensional Implementation of the Empirical Mode
Decomposition for Spatial Data

Version 0.1-1

Description This implementation of the Empirical Mode Decomposition (EMD) works in 2 dimensions simultaneously, and can be applied on spatial data. It can handle both gridded or un-gridded datasets.

URL <https://github.com/pierrerroudier/spemd>

BugReports <https://github.com/pierrerroudier/spemd/issues>

Depends R (>= 3.2.3)

License GPL-3

LazyData true

Collate 'create_neig.r' 'extract_extrema.r' 'extrema_irr.r'
'mean_enveloppe.r' 'spemd.r'

Imports sp, spdep, MBA

Suggests gstat

RoxygenNote 6.0.1

NeedsCompilation no

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Repository CRAN

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`create.neig`*create.neig*

Description

Internal function, initiates the neighbourhood relationships between the points in the processed data set.

Usage

```
create.neig(data.set, nb.nn = 4, duplicate = "remove", verbose = FALSE)
```

Arguments

<code>data.set</code>	Data set to create neighbourhood from.
<code>nb.nn</code>	Number of nearest neighbours. Defaults to 4.
<code>duplicate</code>	Ignored.
<code>verbose</code>	Prints progress information messages. Defaults to FALSE.

Author(s)

Pierre Roudier

`extract.extrema`*extract.extrema*

Description

Internal function, explicitly returns a list with the tri objects of the extrema.

Usage

```
extract.extrema(tri.obj, n.extrema.min = 1)
```

Arguments

<code>tri.obj</code>	.
<code>n.extrema.min</code>	.

Author(s)

Pierre Roudier

extrema.irr	<i>extrema.irr</i>
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Description

Internal function, finds regional extrema on a irregularly sampled data set

Usage

```
extrema.irr(data.set, gridded.data, neig = NULL, zcol = "z",
  duplicate = "remove", nb.nn = 4, thresh.extrema = 1, verbose = FALSE)
```

Arguments

data.set	.
gridded.data	.
neig	Neighbourhood object.
zcol	Name of the column containing the data.
duplicate	What to do with duplicates. Defaults to 'remove'.
nb.nn	Number of nearest neighbours to take into account if data is on a grid. Defaults to 4.
thresh.extrema	Significative threshold for the extrema. Defaults to 1.
verbose	Prints progress information messages. Defaults to FALSE.

Author(s)

Pierre Roudier

return.mean.enveloppe	<i>return.mean.enveloppe</i>
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Description

Internal function, returns the mean envelope of a spatial dataset.

Usage

```
return.mean.enveloppe(extrema, data, zcol = "z", method = "splines",
  n.pts.spline = 3, verbose = TRUE)
```

Arguments

extrema	.
data	.
zcol	Name of the column containing the data.
method	Interpolation method. Currently only 'splines' is supported.
n.pts.spline	.
verbose	Prints progress information messages. Defaults to TRUE.

Author(s)

Pierre Roudier

spEMD

spEMD

Description

2D EMD for spatial objects

Usage

```
spEMD(data, zcol = "z", method = "splines", n.imf.max = 10,
       n.sp.max = 5, n.extrema.min = 1, stoprule = "mean.imf",
       stoprule.extrema = TRUE, thresh.extrema = 1, tol = 0,
       diff.nb.extrema = 0.05, abs.nb.extrema = 5, nb.nn = 4,
       n.pts.spline = 4, neig = NULL, save_neig = TRUE, verbose = TRUE)
```

Arguments

data	Input dataset, either a 'data.frame' or a 'Spatial*DataFrame'
zcol	Name of the column containing the attribute of interest.
method	Interpolation method. Currently only 'splines' is supported.
n.imf.max	Maximum depth of decomposition (maximum number of IMF).
n.sp.max	Number of iterations in the sifting process.
n.extrema.min	Minimum number of extrema.
stoprule	Rule used to stop the EMD process. Currently only 'mean.imf' is implemented.
stoprule.extrema	Should 'spEMD' checks for the number of extrema to be similar? Defaults to 'TRUE'.
thresh.extrema	Significative threshold for the extrema. Defaults to 1.
tol	Value that the average of the IMF candidate need to reach so to be considered as a valid IMF.

<code>diff.nb.extrema</code>	Percentage limit difference maxima/minima. If smaller, more permissive on the mean of the IMF candidate.
<code>abs.nb.extrema</code>	Absolute difference between number of extrema.
<code>nb.nn</code>	Number of nearest neighbours to take into account (when data is on a regular grid).
<code>n.pts.spline</code>	Number of points to locally interpolate IMFs.
<code>neig</code>	Option the re-use a formerly existing neig object in order to save time.
<code>save_neig</code>	Option to save the neig object as a .RData file once created.
<code>verbose</code>	Prints progress information messages. Defaults to TRUE.

Value

.

Author(s)

Pierre Roudier

Examples

```
# Getting sample data from the gstat package
if (require(gstat)) {
  library(sp)

  # Example for gridded data
  data(ncp.grid, package = 'gstat')
  coordinates(ncp.grid) <- ~x+y
  gridded(ncp.grid) <- TRUE
  res.ncp <- spEMD(ncp.grid, zcol = "depth", thresh.extrema = 0.1, verbose = FALSE)

  # Plot results
  spplot(res.ncp[, c('imf1', "imf2", "imf3")])
}

#
```

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