Package 'spemd'

October 14, 2022

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/pierreroudier/spemd

BugReports https://github.com/pierreroudier/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

Author Pierre Roudier [aut, cre]

Maintainer Pierre Roudier <pierre.roudier@gmail.com>

Repository CRAN

Date/Publication 2018-07-01 14:40:03 UTC

R topics documented:

1

---

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

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

Author(s)

Pierre Roudier

---

extract.extrema   *extract.extrema*

Description

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

Usage

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

Arguments

tri.obj	.
n.extrema.min	.

Author(s)

Pierre Roudier

---

extrema.irr   *extrema.irr*

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 *return.mean.enveloppe*

Description

Internal function, returns the mean enveloppe 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 avergae of the IMF candidate need to reach so to be considered as a valid IMF.

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

#
```

Index