

# Package ‘spemd’

July 1, 2018

**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

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**Repository** CRAN

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create.neig	<i>create.neig</i>
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**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

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extract.extrema	<i>extract.extrema</i>
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**Description**

Internal function, explicitly 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



**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

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spEMD

*spEMD*

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**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.

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")])
}

#
```

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