

Package ‘spEDM’

January 14, 2025

Title Spatial Empirical Dynamic Modeling

Version 1.2

Description Integrates empirical dynamic modeling (EDM) with geospatial cross-sectional data to analyze causality via geographical convergent cross mapping (GCCM) described in Gao et al. (2023) <[doi:10.1038/s41467-023-41619-6](https://doi.org/10.1038/s41467-023-41619-6)>.

License GPL-3

Encoding UTF-8

RoxygenNote 7.3.2

URL <https://stsc1.github.io/spEDM/>, <https://github.com/stsc1/spEDM>

BugReports <https://github.com/stsc1/spEDM/issues>

Depends R (>= 4.1.0)

LinkingTo Rcpp, RcppThread

Imports dplyr, ggplot2, methods, sdsfun (>= 0.7.0), terra

Suggests knitr, Rcpp, RcppThread, rmarkdown, sf, spdep

VignetteBuilder knitr

NeedsCompilation yes

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Repository CRAN

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`gccm`*geographical convergent cross mapping*

Description

geographical convergent cross mapping

Usage

```
## S4 method for signature 'sf'  
gccm(  
  data,  
  cause,  
  effect,  
  libsizes,  
  E = 3,  
  tau = 1,  
  k = E + 1,  
  nb = NULL,  
  trendRM = TRUE,  
  progressbar = TRUE  
)  
  
## S4 method for signature 'SpatRaster'  
gccm(  
  data,  
  cause,  
  effect,  
  libsizes,  
  E = 3,  
  tau = 1,  
  k = E + 3,  
  RowCol = NULL,  
  trendRM = TRUE,  
  progressbar = TRUE  
)
```

Arguments

<code>data</code>	The observation data.
<code>cause</code>	Name of causal variable.
<code>effect</code>	Name of effect variable.
<code>libsizes</code>	A vector of library sizes to use.
<code>E</code>	(optional) The dimensions of the embedding.
<code>tau</code>	(optional) The step of spatial lags.

k	(optional) Number of nearest neighbors to use for prediction.
nb	(optional) The neighbours list.
trendRM	(optional) Whether to remove the linear trend.
progressbar	(optional) whether to print the progress bar.
RowCol	(optional) Matrix of selected row and cols numbers.

Value

A list.

xmap cross-mapping prediction outputs

varname names of causal and effect variable

Examples

```
columbus = sf::read_sf(system.file("shapes/columbus.gpkg", package="spData")[1],
                        quiet=TRUE)

g = gccm(columbus, "HOVAL", "CRIME", libsizes = seq(5,45,5))
g
plot(g, ylimits = c(0,0.65))
```

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`gccm`, `SpatRaster`-method (`gccm`), [2](#)