

Package: sesp (via r-universe)

November 26, 2024

Title Spatially Explicit Stratified Power

Version 1.0-0

Description Assesses spatial associations between variables through an equivalent geographical detector (q-statistic) within a regression framework and incorporates a spatially explicit stratified power model by integrating spatial dependence and spatial stratified heterogeneity, facilitating the modeling of complex spatial relationships.

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Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.2

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

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

Depends R (>= 4.1.0)

Imports dplyr, forcats, ggplot2, GWmodel3, magrittr, parallel, patchwork, purrr, sdsfun (>= 0.6.0), sf, spatialreg, spdep, stats, tibble, tidyr, utils

Suggests gdverse (>= 1.3), knitr, Rcpp, RcppArmadillo, readr, rmarkdown

Remotes stsc1/sdsfun, GWmodel-Lab/GWmodel3

LinkingTo Rcpp, RcppArmadillo

VignetteBuilder knitr

Config/pak/sysreqs libgdal-dev gdal-bin libgeos-dev make libicu-dev libssl-dev libproj-dev libsqlite3-dev libudunits2-dev

Repository <https://stsc1.r-universe.dev>

RemoteUrl <https://github.com/stsc1/sep>

RemoteRef HEAD

RemoteSha 39498227a4f7c76f249270f8dc290f837dfcc4ae

Contents

fuzzyoverlay2	2
gwr_betas	3
sesp	4

Index	6
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fuzzyoverlay2	<i>Spatial fuzzy overlay between variables pairwise</i>
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Description

Spatial fuzzy overlay between variables pairwise

Usage

```
fuzzyoverlay2(formula, data, method = "and")
```

Arguments

formula	A formula.
data	A data.frame or tibble of discretized data.
method	(optional) Spatial overlay method. One of and, or, intersection. Default is and.

Value

A list

overlay overlay results between pairs of variables

variable pairwise interacting variable

Examples

```
sim = tibble::tibble(y = stats::runif(7,0,10),
                    x1 = c(1,rep(2,3),rep(3,3)),
                    x2 = c(rep(1,2),rep(2,2),rep(3,3)),
                    x3 = c(rep(1,3),rep(2,2),rep(3,2)))
fo1 = fuzzyoverlay2(y ~ .,data = sim, method = 'and')
fo1
fo2 = fuzzyoverlay2(y ~ .,data = sim, method = 'or')
fo2
fo3 = fuzzyoverlay2(y ~ .,data = sim, method = 'intersection')
fo3
```

gwr_betas	<i>Estimate GWR model coefficients</i>
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Description

Estimate GWR model coefficients

Usage

```
gwr_betas(  
  formula,  
  data,  
  bw = "AIC",  
  adaptive = TRUE,  
  kernel = "gaussian",  
  intercept = FALSE  
)
```

Arguments

formula	A formula.
data	An sf object of observation data
bw	(optional) The bandwidth used in selecting models. The optimal bandwidth can be selected using one of two methods: AIC, and CV. Default will use AIC.
adaptive	(optional) Whether the bandwidth value is adaptive or not. Default is TRUE.
kernel	(optional) Kernel function. Default is gaussian.
intercept	(optional) Whether to include the intercept term in the coefficient tibble. Default is FALSE'.

Value

A tibble

Examples

```
depression = system.file('extdata/Depression.csv', package = 'gdverse') |>  
  readr::read_csv() |>  
  sf::st_as_sf(coords = c('X', 'Y'), crs = 4326)  
gwr_betas(Depression_prevelence ~ ., data = depression)  
gwr_betas(Depression_prevelence ~ ., data = depression, intercept = TRUE)
```

sesp

*Spatially Explicit Stratified Power (SESP) Model***Description**

Spatially Explicit Stratified Power (SESP) Model

Usage

```
sesp(
  formula,
  data,
  listw = NULL,
  discvar = "all",
  discnum = 3:8,
  model = "ols",
  durbin = FALSE,
  overlay = "and",
  alpha = 0.5,
  intercept = FALSE,
  bw = "AIC",
  adaptive = TRUE,
  kernel = "gaussian",
  increase_rate = 0.05,
  cores = 1,
  ...
)
```

Arguments

formula	A formula for enhanced stratified power model.
data	An sf object of observation data. Please note that the column names of the independent variables should not be all or none.
listw	(optional) A listw object. See <code>spdep::mat2listw()</code> and <code>spdep::nb2listw()</code> for details.
discvar	(optional) Name of continuous variable columns that need to be discretized. Noted that when formula has discvar, data must have these columns. Default is all, which means all independent variables are used as discvar. When discvar is set to none, all independent variables do not need to be discretized.
discnum	(optional) Number of discretization. Default all will use 3:8.
model	(optional) The type of linear model used, default is ols. The model value must be any of ols, gwr, lag,error or sac.
durbin	(optional) Whether to consider spatial durbin terms, default is false.
overlay	(optional) Spatial overlay method. One of and, or, intersection. Default is and.

<code>alpha</code>	(optional) Controlling the strength of spatial soft constraints, the larger the alpha, the stronger the spatial soft constraint. Default is 0.5.
<code>intercept</code>	(optional) Whether to include the intercept term in the gwr coefficient tibble. Default is FALSE.
<code>bw</code>	(optional) The bandwidth used in selecting models. The optimal bandwidth can be selected using one of two methods: AIC, and CV. Default is AIC.
<code>adaptive</code>	(optional) Whether the bandwidth value is adaptive or not. Default is TRUE.
<code>kernel</code>	(optional) Kernel function. Default is gaussian.
<code>increase_rate</code>	(optional) The critical increase rate of the number of discretization. Default is 5%.
<code>cores</code>	(optional) Positive integer (default is 1). When cores are greater than 1, use multi-core parallel computing.
<code>...</code>	(optional) Other arguments passed to <code>sdsfun::hclustgeo_disc()</code> .

Value

A list.

`factor` global factor detection result

`interaction` global interactive detection results

`optdisc` independent variable optimal spatial discretization

`allfactor` factor detection results corresponding to different numbers of discreteization

`model` regression model used to estimate equivalent q values

Note

Note that when the number of continuous independent variables is small (three or fewer), the built-in spatial explicit discretization in `sesp` may overestimate the variable q value (when there are fewer input independent variables, GWR tends to overestimate the contribution of each variable). In such cases, it is recommended to discretize these variables beforehand and then input them into `sesp` for computation.

Examples

```
NTD = sf::st_as_sf(gdverse::NTDs, coords = c('X', 'Y'))
g = sesp(incidence ~ ., data = NTD, discvar = 'none',
        model = 'ols', overlay = 'intersection')
g
```

Index

fuzzyoverlay2, [2](#)

gwr_betas, [3](#)

seep, [4](#)