Package: sesp (via r-universe)

November 24, 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.

License GPL-3

Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.2

URL https://stscl.github.io/sesp/, https://github.com/stscl/sesp

BugReports https://github.com/stscl/sesp/issues

Depends R (>= 4.1.0)

Imports dplyr, forcats, ggplot2, GWmodel3, magrittr, parallel, patchwork, purrr, sdsfun (>= 0.5.0), sf, spatialreg, spdep, stats, tibble, tidyr, utils

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

Remotes stscl/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://stscl.r-universe.dev

RemoteUrl https://github.com/stscl/sesp

RemoteRef HEAD

RemoteSha 41a1e821075e8dbc51642f008699be3a4016cf2e

Contents

`fuzzyoverlay2` *Spatial fuzzy overlay between variables pairwise*

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 *Estimate GWR model coefficients*

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 spdep::mat2listw() and spdep::nb2listw() 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 or error.
durbin	(optional) Whether to consider spatial durbin terms, default is false.
overlay	(optional) Spatial overlay method. One of and, or, intersection. Default is and.

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

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

```
NTDs = sf::st_as_sf(gdverse::NTDs, coords = c('X','Y'))
g = sesp(incidence ~ ., data = NTDs, discvar = 'none',
         model = 'ols', overlay = 'intersection', cores = 1)
g
```

Index