Package 'geopsych'

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Type Package

Title Methods of Applied Psychology and Psychometrics in Geographical Analysis

Version 0.1.0

Description Integrating applied psychological and psychometric methods into geographical analysis. With the emergence of geo-referenced questionnaires, spatially explicit psychological and psychometric methods can offer a geographically contextualised approach that reflects latent traits and processes at a more local scale, leading to more tailored research and decision-making processes. The implemented methods include Geographically Weighted Cronbach's alpha and its bandwidth selection. See Zhang & Li (2025) <doi:10.1111/gean.70021>.

License GPL (>= 3)

Encoding UTF-8

LazyData true

RoxygenNote 7.3.3

URL https://github.com/ZhangSui921/geopsych

Depends R (>= 3.5)

Imports sp

NeedsCompilation no

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Contents

bes2011 2
bw_gwalpha 2
gwalpha 3
sum_gwalpha 4

Index **6**

bes2011 *Georeferenced responses of Neighborhood Social Capital Scale from BES2011*

Description

Responses of the Neighborhood Social Capital Scale (NSCS) from Baltimore Ecosystem Study (BES) Household Telephone Survey Wave 5 (2011), which excluded the samples from Queen Anne's County. The responses were geocoded and transformed to a SpatialPointsDataFrame.

Usage

```
data("bes2011")
```

Format

a SpatialPolygonsDataFrame with 1,410 responses on the following 5 items:

`willHelp` People in the neighborhood are willing to help one another

`closeKnit` This is a close knit neighborhood

`trust` People in this neighborhood can be trusted

`solComProb` There are many opportunities to meet neighbors and work on community problems

`relGroups` Churches, temples and other volunteer groups actively support the neighborhood

Source

Cary Institute Of Ecosystem Studies, M. Grove, and D. Locke. 2018. BES Household Telephone Survey ver 180. Environmental Data Initiative.

Examples

```
data("bes2011")
```

bw_gwalpha *Bandwidth Selection for Geographically Weighted Cronbach's Alpha*

Description

A function for automatic bandwidth selection to calibrate GWalpha.

Usage

```
bw_gwalpha(crit, minmax, adaptive = TRUE, tol = 3, max_iter = 100, ...)
```

Arguments

crit	predetermined criterion for reliability level
minmax	a numeric vector of length 2 with the lower and upper bounds of the bandwidth search interval
adaptive	logical; if TRUE (default), the bandwidth bw corresponds to the number of nearest neighbours; if FALSE, bw is a fixed distance
tol	convergence tolerance
max_iter	maximum number of iterations
...	additional arguments passed on to gwalpha().

Value

a adaptive or fixed distance bandwidth

See Also

gwalpha()

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gwalpha *Geographically Weighted Cronbach's Alpha*

Description

This function computes geographically weighted cronbach's alpha (GWalpha) for responses from georeferenced multi-item survey scales.

Usage

```
gwalpha(
  x,
  data,
  kernel = "bisquare",
  adaptive = TRUE,
  bw,
  ci = FALSE,
  p = 0.95,
  nsims = 1000
)
```

Arguments

x	a character vector or numeric vector with the column names or indices of items in data
data	a SpatialPointsDataFrame as defined in package sp, or a sf object defined in package sf

kernel	type of kernel function used to weight responses. Available options: "bisquare" (default), "gaussian", "exponential", or "boxcar"
adaptive	logical; if TRUE (default), the bandwidth bw corresponds to the number of nearest neighbours; if FALSE, bw is a fixed distance
bw	bandwidth for weighting function, can be specified or obtained using bw_gwalpha()
ci	logical; if TRUE, bootstrapped confidence intervals are computed
p	the percentile for the upper confidence interval if ci = TRUE
nsims	number of bootstrap iterations if ci = TRUE

Value

a data frame with:

gwalpha	local estimates of reliability
gwalpha_u	upper confidence interval if ci = TRUE
coords	coordinates matrix for each responses

References

Zhang, S., and Z. Li. 2025. " Geographically Weighted Cronbach's Alpha (GWalpha): An Exploratory Local Measure of Reliability for Scale Construction." Geographical Analysis 57, no. 4: 758–772.

See Also

bw_gwalpha()

Examples

```
data(bes2011)
alpha100 <- gwalpha(
  x = c("willHelp", "closeKnit", "trust", "solComProb", "relGroups"),
  data = bes2011,
  bw = 100
  )
```

---

sum_gwalpha *Counting the Number of GWalpha below Criterion*

Description

an internal function for counting how many responses have an upper confidence bound below a user-specified criterion for reliability level.

Usage

```
sum_gwalpha(bw, crit, ...)
```

Arguments

bw	bandwidth for weighting function
crit	predetermined criterion for reliability level
...	additional arguments passed on to gwalpha()

Value

the number of responses where the upper confidence bound of GWalpha is below crit.

Index

∗ **datasets**
bes2011, 2

bes2011, 2
bw_gwalpha, 2
bw_gwalpha(), *4*

gwalpha, 3
gwalpha(), *3*, *5*

sum_gwalpha, 4