

Package ‘scgwr’

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Type Package

Title Scalable Geographically Weighted Regression

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Description Estimates a fast and regularized version of GWR for large dataset, detailed in Murakami, Tsutsumida, Yoshida, Nakaya, and Lu (2019) <arXiv:1905.00266>.

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LazyData true

Imports FNN, spData, dplyr

NeedsCompilation no

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scgwr *Scalable Geographically Weighted Regression*

Description

This function estimates a scalable geographically weighted regression (GWR) model.

Usage

```
scgwr( coords, y, x, knn = 100, kernel = "gau", p = 4 )
```

Arguments

coords	Matrix of spatial point coordinates (N x 2)
y	Vector of explained variables (N x 1)
x	Matrix of explanatory variables (N x K). Default is NULL
knn	Number of nearest-neighbors being geographically weighted. Default is 100. Larger knn is better for larger samples (see Murakami et al., 2019)
kernel	Kernel to model spatial heterogeneity. Gaussian kernel ("gau") and exponential kernel ("exp") are available
p	Degree of the polynomial to approximate the kernel function. Default is 4

Value

b	Matrix of estimated coefficients (N x K)
bse	Matrix of the standard errors for the coefficients (N x k)
t	Matrix of the t-values for the coefficients (N x K)
p	Matrix of the p-values for the coefficients (N x K)
pa	Matrix of the p-values adjusted to address the multiple testing problem using the approach of de Silva and Fotheringham (2016) (N x K)
par	Estimated model parameters including a scale parameter and a shrinkage parameter if <code>penalty = TRUE</code> (see Murakami et al., 2018)
e	Error statistics. It includes sum of squared errors (SSE), residual standard error (<code>resid_SE</code>), R-squared (R2), adjusted R2 (<code>adjR2</code>), log-likelihood (<code>logLik</code>), corrected Akaike information criterion (AICc), and the cross-validation (CV) score measured by root mean squared error (RMSE) (<code>CV_score(RMSE)</code>)
pred	Vector of predicted values (N x 1)
resid	Vector of residuals (N x 1)

References

Murakami, D., Tsutsumida, N., Yoshida, T., Nakaya, T., and Lu, B. (2019) Scalable GWR: A linear-time algorithm for large-scale geographically weighted regression with polynomial kernels. <arXiv:1905.00266>.

da Silva, A.R., and Fotheringham, A.S. (2016) The multiple testing issue in geographically weighted regression. *Geographical Analysis*, 48(3), 233-247.

Examples

```
require(spData)
data(boston)
coords <- boston.c[, c("LON", "LAT")]
y <- log(boston.c[, "MEDV"])
x <- boston.c[, c("CRIM", "ZN", "INDUS", "CHAS", "AGE")]
res <- scgwr( coords = coords, y = y, x = x )
res$b
res$bse
```

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res\$p
res\$e

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