Package 'GWnnegPCA'

May 7, 2026

Type Package

Title Geographically Weighted Non-Negative Principal Components Analysis

Version 0.0.6

Description Implements a geographically weighted non-negative principal components analysis, which consists of the fusion of geographically weighted and sparse non-negative principal components analyses <doi:10.17608/k6.auckland.9850826.v1>.

License GPL (>= 3)

URL https://github.com/naru-T/GWnnegPCA

BugReports https://github.com/naru-T/GWnnegPCA/issues

Depends R (>= 3.5.0)

Imports geodist, methods, nsprcomp, sf

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

Encoding UTF-8

Language en-US

RoxygenNote 7.3.2

SystemRequirements GDAL (>= 2.0.1), GEOS (>= 3.4.0), PROJ (>= 4.8.0)

NeedsCompilation no

Author Narumasa Tsutsumida [aut, cre] (ORCID: <https://orcid.org/0000-0002-6333-0301>)

Maintainer Narumasa Tsutsumida <rsnaru.jp@gmail.com>

Repository CRAN

Date/Publication 2026-01-13 07:50:16 UTC

Contents

gw_nsprcomp *Geographically Weighted Non-negative Principal Component Analysis*

Description

Implementation of geographically weighted non-negative principal component analysis, which consists of the fusion of GWPCA and sparse non-negative PCA.

Usage

```
gw_nsprcomp(
  data,
  elocat,
  vars,
  bw,
  k = 2,
  kernel = "gaussian",
  adaptive = TRUE,
  p = 2,
  theta = 0,
  longlat = FALSE,
  geodisic_measure = "cheap",
  dMat = NULL,
  n.obs = NA,
  n.iter = 1,
  ncomp = k,
  nneg = TRUE,
  localcenter = TRUE,
  localscale = FALSE,
  ...
)
```

Arguments

data	An sf object containing the spatial data and attributes for analysis
elocat	Two-column numeric array or sf object for providing evaluation locations
vars	Character vector of variable names to be used in the analysis
bw	Bandwidth used in the weighting function
k	The number of retained components (default: 2)
kernel	Kernel function type: "gaussian", "exponential", "bisquare", "tricube", or "boxcar"
adaptive	If TRUE, calculate adaptive kernel (default: TRUE)
p	Power of the Minkowski distance (default: 2)
theta	Angle in radians to rotate coordinate system (default: 0)

longlat	If TRUE, great circle distances will be calculated (default: FALSE)
geodisic_measure	Method for geodesic distance calculation (default: "cheap")
dMat	Pre-specified distance matrix (default: NULL)
n.obs	Number of observations for correlation matrix (default: NA)
n.iter	Number of bootstrap iterations (default: 1)
ncomp	Number of principal components to compute (default: k)
nneg	If TRUE, constrain loadings to be non-negative (default: TRUE)
localcenter	If TRUE, center local weighted x (default: TRUE)
localscale	If TRUE, scale local weighted x (default: FALSE)
...	Additional arguments passed to methods

Value

A list containing:

loadings	The localized loadings matrix
score	The PC score matrix from the localized non-negative PCA
sdev	The localized standard deviation vector of the principal components

Examples

```
# Read North Carolina SIDS data from sf package
nc <- sf::st_read(system.file("shape/nc.shp", package="sf"), quiet = TRUE)

# Scale selected variables for analysis
vars_to_use <- c("SID74", "NWBIR74", "BIR74")
Data.scaled <- scale(as.matrix(sf::st_drop_geometry(nc[, vars_to_use])))

# Create sf object with scaled data
nc_scaled <- nc
nc_scaled[vars_to_use] <- Data.scaled

gwnnegpca_ans <- gw_nsprcomp(
  data = nc_scaled,
  vars = vars_to_use,
  bw = 0.25,
  k = 3,
  longlat = TRUE,
  kernel = "bisquare",
  adaptive = TRUE,
  nneg = TRUE,
  geodisic_measure = "geodesic"
)
```

Index