Package 'geoSAE'

October 13, 2022

Type Package

Title Geoadditive Small Area Model

Version 0.1.0

Maintainer Ketut Karang Pradnyadika <221709776@stis.ac.id>

Description This function is an extension of the Small Area Estimation (SAE) model. Geoadditive Small Area Model is a combination of the geoadditive model with the Small Area Estimation (SAE) model, by adding geospatial information to the SAE model. This package refers to J.N.K Rao and Isabel Molina (2015, ISBN: 978-1-118-73578-7), Bocci, C., & Petrucci, A. (2016)<doi:10.1002/9781118814963.ch13>, and Ardiansyah, M., Djuraidah, A., & Kurnia, A. (2018)<doi:10.21082/jpptp.v2n2.2018.p101-110>.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Imports MASS, nlme, stats

URL https://github.com/ketutdika/geoSAE

BugReports https://github.com/ketutdika/geoSAE/issues

Depends R (>= 2.10)

NeedsCompilation no

Author Ketut Karang Pradnyadika [aut, cre],
Ika Yuni Wulansari [aut, ths]

Repository CRAN

Date/Publication 2021-06-14 07:30:09 UTC

R topics documented:

---

dataArea *Data Unit Level Mean of Rice Field Productivity*

Description

This dataset is unit level data which is averaged by area.

Usage

    dataArea

Format

A data frame with 15 areas on the following 15 variables:

area domain codes

name name of the small area

x1 mean of proportion of paddy rice harvested area to total harvested area

x2 mean of latitude

x3 mean of longitude

population total rice harvested area

z1 mean of z1 in Unit Level

z2 mean of z2 in Unit Level

z3 mean of z3 in Unit Level

z4 mean of z4 in Unit Level

z5 mean of z5 in Unit Level

z6 mean of z6 in Unit Level

ni the number of samples per area is small (sample size in area)

ybar_direct mean of rice field productivity

v.ybar._direct varians of rice field productivity

---

dataUnit *Data Unit Level of Rice Field Productivity*

Description

This dataset is data on rice productivity in 15 sub-districts from 3 districts (Seruyan, East Kotawaringin, and West Kotawaringin) in Central Kalimantan obtained from the Ubinan Survey conducted routinely by BPS. This data will be implemented with the Geoadditive Small Area Model

Usage

```
dataUnit
```

Format

A data frame with 210 observations on the following 7 variables:

number order of observation

area domain codes

name name of the small area

y rice field productivity

x1 proportion of paddy rice harvested area to total harvested area

x2 latitude

x3 longitude

---

eblupgeo *EBLUP's for domain means using Geoadditive Small Area Model*

Description

This function calculates EBLUP's based on unit level using Geoadditive Small Area Model

Usage

```
eblupgeo(formula, zspline, dom, xmean, zmean, data)
```

Arguments

`formula`	the model that to be fitted
`zspline`	n*k matrix that used in model for random effect of spline-2 (n is the number of observations, and k is the number of knots used)
`dom`	a*1 vector with domain codes (a is the number of small areas)
`xmean`	a*p matrix of auxiliary variables means for each domains (a is the number of small areas, and p is the number of auxiliary variables)
`zmean`	a*k matrix of spline-2 means for each domains
`data`	data unit level that used as data frame that containing the variables named in formula and dom

Value

This function returns a list of the following objects:

`eblup`	A Vector with a list of EBLUP with Geoadditive Small Area Model
`fit`	A list of components of the formed Geoadditive Small Area Model that containing the following objects such as model structure of the model, coefficients of the model, method, and residuals
`sigma2`	Variance (sigma square) of random effect and error with Geoadditive Small Area Model

Examples

```
#Load the dataset for unit level
data(dataUnit)

#Load the dataset for spline-2
data(zspline)

#Load the dataset for area level
data(dataArea)

#Construct the data frame
y       <- dataUnit$y
x1      <- dataUnit$x1
x2      <- dataUnit$x2
x3      <- dataUnit$x3
formula <- y~x1+x2+x3
zspline <- as.matrix(zspline[,1:6])
dom     <- dataUnit$area
xmean   <- cbind(1,dataArea[,3:5])
zmean   <- dataArea[,7:12]
number  <- dataUnit$number
area    <- dataUnit$area
data    <- data.frame(number, area, y, x1, x2, x3)

#Estimate EBLUP
eblup_geosae <- eblupgeo(formula, zspline, dom, xmean, zmean, data)
```

---

pbmsegeo	*Parametric Bootstrap Mean Squared Error of EBLUP's for domain means using Geoadditive Small Area Model*

Description

This function calculates MSE of EBLUP's based on unit level using Geoadditive Small Area Model

Usage

```
pbmsegeo(formula, zspline, dom, xmean, zmean, data, B = 100)
```

Arguments

formula	the model that to be fitted
zspline	n*k matrix that used in model for random effect of spline-2 (n is the number of observations, and k is the number of knots used)
dom	a*1 vector with domain codes (a is the number of small areas)
xmean	a*p matrix of auxiliary variables means for each domains (a is the number of small areas, and p is the number of auxiliary variables)
zmean	a*k matrix of spline-2 means for each domains
data	data unit level that used as data frame that containing the variables named in formula and dom
B	the number of iteration bootstraping

Value

This function returns a list of the following objects:

est	A list containing the following objects:

- eblup: A Vector with a list of EBLUP with Geoadditive Small Area Model
- fit: A list of components of the formed Geoadditive Small Area Model that containing the following objects such as model structure of the model, coefficients of the model, method, and residuals
- sigma2: Variance (sigma square) of random effect and error with Geoadditive Small Area Model

mse	A vector with a list of estimated mean squared error of EBLUPs estimators

Examples

```
#Load the dataset for unit level
data(dataUnit)

#Load the dataset for spline-2
data(zspline)

#Load the dataset for area level
data(dataArea)

#Construct data frame
y       <- dataUnit$y
x1      <- dataUnit$x1
x2      <- dataUnit$x2
x3      <- dataUnit$x3
formula <- y~x1+x2+x3
zspline <- as.matrix(zspline[,1:6])
dom     <- dataUnit$area
xmean   <- cbind(1,dataArea[,3:5])
zmean   <- dataArea[,7:12]
number  <- dataUnit$number
area    <- dataUnit$area
data    <- data.frame(number, area, y, x1, x2, x3)

#Estimate MSE
mse_geosae <- pbmsegeo(formula,zspline,dom,xmean,zmean,data,B=100)
```

---

zspline   *Z-Spline*

Description

This dataset is obtained from the calculation of the optimum GCV (Generalized Cross Validation), where there are 6 knots that have the lowest GCV value.

Usage

```
zspline
```

Format

A data frame with 210 observations on the following 6 variables (number of knots used)

Index