

Package ‘SpatialRoMLE’

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Type Package

Title Robust Maximum Likelihood Estimation for Spatial Error Model

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Description Provides robust estimation for spatial error model to presence of outliers in the residuals. The classical estimation methods can be influenced by the presence of outliers in the data. We proposed a robust estimation approach based on the robustified likelihood equations for spatial error model (Vural Yildirim & Yeliz Mert Kantar (2020): Robust estimation approach for spatial error model, Journal of Statistical Computation and Simulation, <doi:10.1080/00949655.2020.1740223>).

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LazyData true

RoxygenNote 7.3.2

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NeedsCompilation no

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Contents

IPS_coefs	2
IPS_data	2
RoMLE.error	3
TRQWM	5
unemployment_coefs	5
unemployment_data	6

Index[7](#)

IPS_coefs	<i>Initial coefficients of individual pension system data</i>
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Description

Initial coefficients of individual pension system data were obtained by MLE.

Usage

IPS_coefs

Format

A list with 10 values, which are:

(Intercept) intercept

Labor_Rate labor rate

Unemployment_Rate unemployment rate

Sex_Ratio sex ratio

Urbanization_Rate urbanization rate

Deposit_Rate deposit rate

Illiteracy_Rate illiteracy rate

HDI human development index

lambda spatial autocorrelation parameter

s2 variance

IPS_data	<i>The individual pension system data of Turkey</i>
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Description

This is individual pension system data of Turkey for analysing spatial error model.

Usage

IPS_data

Format

A list with 10 variables, which are:

ID provinces ID
Province provinces names
RPIPS participant rate of individual pension system
Labor_Rate labor rate
Unemployment_Rate unemployment rate
Sex_Ratio sex ratio
Urbanization_Rate urbanization rate
Deposit_Rate deposit rate
Illiteracy_Rate illiteracy rate
HDI human development index

RoMLE.error

Robust Maximum Likelihood Estimation for Spatial Error Model

Description

This package provides robust maximum likelihood estimation for spatial error model.

Usage

```
RoMLE.error(
  initial.beta,
  initial.s2,
  initial.lambda,
  W,
  y,
  x,
  phi.function,
  converge.v,
  iter,
  print.values
)
```

Arguments

<code>initial.beta</code>	initial value of coefficients
<code>initial.s2</code>	initial value of varaince
<code>initial.lambda</code>	initial value of autocorrelation parameters
<code>W</code>	a symmetric weight matrix
<code>y</code>	dependent variable

x	independent variables
phi.function	a robust m-estimator function, should be set as 1 for Cauchy, 2 for Welsch, 3 for Insha and 4 for Logistic
converge.v	converge value for fisher scoring algorithm, can be set as 1e-04
iter	iteration number for fisher scoring algorithm, set by users (e.g. 100)
print.values	printing estimated values for each step until converge, should be set TRUE or FALSE

Value

coefficients, lambda, s2, Phi

References

- Yildirim, V. and Kantar, Y.M. (2020). Robust estimation of spatial error model. in Journal of Statistical Computation and Simulation [doi:10.1080/00949655.2020.1740223](https://doi.org/10.1080/00949655.2020.1740223)
- Yildirim, V., Mert Kantar, Y. (2019). Spatial Statistical Analysis of Participants in The Individual Pension System of Turkey. Eskisehir Teknik Universitesi Bilim Ve Teknoloji Dergisi B - Teorik Bilimler, 7(2), 184-194 [doi:10.20290/estubtdb.518706](https://doi.org/10.20290/estubtdb.518706)

Examples

```
#spdep library can be used to create a weight matrix from listw
#require(spdep)
#W <- as(listw, "CsparseMatrix")

#example 1
data(TRQWM)
data(unemployment_data)
data(unemployment_coefs)

y <- unemployment_data$unemployment
x <- unemployment_data$urbanization

#initial values was taken from MLE
initial.beta <- unemployment_coefs[1:2,2]
initial.lambda <- unemployment_coefs[3,2]
initial.s2 <- unemployment_coefs[4,2]

RoMLE.error(initial.beta, initial.s2, initial.lambda, W=TRQWM, y, x,
             phi.function=3, converge.v=0.0001, iter=100, print.values=TRUE)

#example 2
data(TRQWM)
data(IPS_data)
data(IPS_coefs)
y <- IPS_data[,3]
x <- IPS_data[,4:10]

#initial values was taken from MLE
```

```
initial.beta <- IPS_coefs[1:8,2]
initial.lambda <- IPS_coefs[9,2]
initial.s2 <- IPS_coefs[10,2]
RoMLE.error(initial.beta, initial.s2, initial.lambda, W=TRQWM, y, x,
            phi.function=3, converge.v=0.0001, iter=100, print.values=TRUE)
```

TRQWM	<i>Queen weight matrix of Turkey</i>
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Description

This is queen continugity weight matrix of Turkey.

Usage

TRQWM

Format

A symmetric matrix with 81x81 values,
V provinces ID

unemployment_coefs	<i>Initial coefficients of unemployment data</i>
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Description

Initial coefficients of unemployment data were obtained by MLE.

Usage

unemployment_coefs

Format

A list with 4 values, which are:
(Intercept) intercept
Unemployment_Rate unemployment rate
lambda spatial autocorrelation parameter
s2 variance

unemployment_data	<i>Unemployment data of Turkey</i>
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Description

This is unemployment data of Turkey for analysing spatial error model.

Usage

```
unemployment_data
```

Format

A list with 4 variables, which are:

ID provinces ID

province provinces names

unemployment unemployment rate

urbanization urbanization rate

Index

* datasets

IPS_coefs, [2](#)

IPS_data, [2](#)

TRQWM, [5](#)

unemployment_coefs, [5](#)

unemployment_data, [6](#)

IPS_coefs, [2](#)

IPS_data, [2](#)

RoMLE.error, [3](#)

TRQWM, [5](#)

unemployment_coefs, [5](#)

unemployment_data, [6](#)