

Package ‘sgstar’

October 14, 2022

Type Package

Title Seasonal Generalized Space Time Autoregressive (S-GSTAR) Model

Version 0.1.2

Description A set of function that implements for seasonal multivariate time series analysis based on Seasonal Generalized Space Time Autoregressive with Seemingly Unrelated Regression (S-GSTAR-SUR) Model by Setiawan(2016)<https://www.researchgate.net/publication/316517889_S-GSTAR-SUR_model_for_seasonal_spatio_temporal_data_forecasting>.

License GPL-3

Imports dplyr,ggplot2,stats,tidyr,utils

Encoding UTF-8

LazyData true

RoxygenNote 7.1.0

Suggests knitr,rmarkdown

Depends R (>= 3.5.0)

URL <https://github.com/yogasatria30/sgstar>

BugReports <https://github.com/yogasatria30/sgstar/issues>

NeedsCompilation no

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Repository CRAN

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coords	<i>Coordinate of region in South Sumatera</i>
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Description

A simple tibble dataset containing the coordinate region In South.

Usage

```
coords
```

Format

A tibble with 17 rows as Region/City and 2 column, which are:

"Longitude" longitude coordinate for each location

"Latitude" latitude coordinate for each location

Source

<https://www.bps.go.id/>

plot_sgstar	<i>Timeseries Plot for Model</i>
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Description

Plotting line chart dataset and fit.values of the Seasonal GSTAR model.

Usage

```
plot_sgstar(formula)
```

Arguments

formula an object from the output from sgstar() function.

Value

returns output a list that shown line chart for each location.

Examples

```
library(sgstar)
data("coords")
data("simulatedata")

#create weight matrix using distance inverse matrix

z<-dist(coords,method = "euclidean")
z <- as.matrix(z)

matriksd <- 1/z
matriksd[is.infinite(matriksd)] <- 0

matriksd_w <- matriksd / rowSums(as.data.frame(matriksd))

fit <- sgstar(data = simulatedata, w = matriksd_w, p = 2,ps = 1, s =4)
plot1 <- plot_sgstar(fit)
```

predict_sgstar

Predict for Seasonal GSTAR model.

Description

Predicting value based on Sgstar object

Usage

```
predict_sgstar(formula, n_time)
```

Arguments

formula an object from the output from sgstar() function.
n_time number of steps ahead for which prediction is required.

Value

returns output a dataframe that shown predict value based on model, with rows as time and column that shown for each location.

References

Setiawan, Suhartono, and Prastuti M.(2016).S GSTAR-SUR for Seasonal Spatio Temporal Data Forecasting. Malaysian Journal Of Mathematical Sciences.10.<Corpus ID :189955959>.

Examples

```

library(sgstar)
data("coords")
data("simulatedata")

#create weight matrix using distance inverse matrix
z<-dist(coords,method = "euclidean")
z <- as.matrix(z)

matriksd <- 1/z
matriksd[is.infinite(matriksd)] <- 0

matriksd_w <- matriksd / rowSums(as.data.frame(matriksd))

fit <- sgstar(data = simulatedata, w = matriksd_w, p = 2,ps = 1, s =4)

#predicting for 12 time ahead
predict.fit <-predict_sgstar(fit,12)

```

sgstar

Fit Seasonal Generalized Space Time Autoregressive Model

Description

sgstar function return the parameter estimation of Seasonal Generalized Space Time Autoregressive Model by using Generalized Least Square (GLS)

Usage

```
sgstar(data, w, p, ps, s)
```

Arguments

data	A dataframe that contain timeseries data with k column as space and n rows as time.
w	a spatial weight, matrix $n_{col}(data) * n_{col}(data)$ with diagonal = 0.
p	an autoregressive order, value must be greater than 0.
ps	an autoregressive order for seasonal, value must be greater than 0.
s	an order of the seasonal period

Value

sgstar returns output with detail are shown in the following list :

Coefficiens	coefficiens parameter model for each location
Fitted.Values	a dataframe with fit value for each location based on model

Residual	a dataframe that contain residual,that is response minus fitted values based on model
Performance	a dataframe containing the following objects: <ul style="list-style-type: none"> • MSE : Mean Squared Error (MSE) for all the data combined. • RMSE : Root Mean Squared Error (RMSE) for all the data combined. • AIC : a Version of Akaike's Information Criterion (AIC) • Rsquared : R^2, the 'fraction of variance explained by the model'.
p	an autoregressive order
ps	an autoregressive order for seasonal
s	an order of the seasonal period
weight	a spatial weight
data	a dataset that used in modeling

References

Setiawan, Suhartono, and Prastuti M.(2016).S GSTAR-SUR for Seasonal Spatio Temporal Data Forecasting. Malaysian Journal Of Mathematical Sciences.10.<Corpus ID :189955959>.

Examples

```
library(sgstar)
data("coords")
data("simulatedata")

#create weight matrix using distance inverse matrix

z<-dist(coords,method = "euclidean")
z <- as.matrix(z)

matriksd <- 1/z
matriksd[is.infinite(matriksd)] <- 0

matriksd_w <- matriksd / rowSums(as.data.frame(matriksd))

fit <- sgstar(data = simulatedata, w = matriksd_w, p = 2,ps = 1, s =4)
fit
```

simulatedata

Sample Data for simulate analysis data

Description

A simple tibble that is generate from random normal distribution for simulate seasonal generalized space-time autoregressive model.

Usage

```
simulatedata
```

Format

A tibble with 100 observation time and 17 column as location,which are:

"PALEMBANG" a value dataset for PALEMBANG

"LUBUKLINGGAU" a value dataset for LUBUKLINGGAU

"OGAN KOMERING ULU SELATAN" a value dataset for OGAN KOMERING ULU SELATAN

"OGAN KOMERING ULU" a value dataset for OGAN KOMERING ULU

"OGAN KOMERING ILIR" a value dataset for OGAN KOMERING ILIR

"MUSI RAWAS" a value dataset for MUSI RAWAS

"OGAN ILIR" a value dataset for OGAN ILIR

"PAGAR ALAM" a value dataset for PAGAR ALAM

"BANYU ASIN" a value dataset for BANYU ASIN

"OGAN KOMERING ULU TIMUR" a value dataset for OGAN KOMERING ULU TIMUR

"EMPAT LAWANG" a value dataset for EMPAT LAWANG

"PRABUMULIH" a value dataset for EMPAT LAWANG

"LAHAT" a value dataset for LAHAT

"MUSI RAWAS UTARA" a value dataset for MUSI RAWAS UTARA

"PENUKAL ABAB LEMATANG ILIR" a value dataset for PENUKAL ABAB LEMATANG ILIR

"MUARA ENIM" a value dataset for MUARA ENIM

"MUSI BANYUASIN" a value dataset for MUSI BANYUASIN

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