

# Package ‘sgstar’

January 28, 2021

**Type** Package

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

**Version** 0.1.1

**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](https://www.researchgate.net/publication/316517889_S-GSTAR-SUR_model_for_seasonal_spatio_temporal_data_forecasting)>.

**License** GPL-3

**Imports** dplyr,ggplot2,nlme,tidyr

**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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## R topics documented:

coords . . . . .	2
plot_sgstar . . . . .	2
predict_sgstar . . . . .	3
sgstar . . . . .	4
simulatedata . . . . .	6

**Index**

7

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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/>

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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)
```

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predict\_sgstar

*Predict for Seasonal GSTAR model.*

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**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)

```

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sgstar

*Fit Seasonal Generalized Space Time Autoregressive Model*


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**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"> <li>• MSE : Mean Squared Error (MSE) for all the data combined.</li> <li>• RMSE : Root Mean Squared Error (RMSE) for all the data combined.</li> <li>• AIC : a Version of Akaike's Information Criterion (AIC)</li> <li>• Rsquared : <math>R^2</math>, the 'fraction of variance explained by the model'.</li> </ul>
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
```

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`simulatedata`*Sample Data for simulate analysis data*

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**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

# Index

## \* datasets

coords, [2](#)

simulatedata, [6](#)

coords, [2](#)

plot\_sgstar, [2](#)

predict\_sgstar, [3](#)

sgstar, [4](#)

simulatedata, [6](#)