

Package ‘AriGaMyANNSVR’

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Type Package

Title Hybrid ARIMA-GARCH and Two Specially Designed ML-Based Models

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Description Describes a series first. After that does time series analysis using one hybrid model and two specially structured Machine Learning (ML) (Artificial Neural Network or ANN and Support Vector Regression or SVR) models. More information can be obtained from Paul and Garai (2022) <[doi:10.1007/s41096-022-00128-3](https://doi.org/10.1007/s41096-022-00128-3)>.

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`ariga`*ARIMA-GARCH Hybrid Modeling*

Description

First fits the time series data by using ARIMA model. If the residuals are having "arch" effect, then GARCH is fitted. Based on the previously mentioned condition final prediction is obtained.

Usage

```
ariga(Y, ratio = 0.9, n_lag = 4)
```

Arguments

<code>Y</code>	Univariate time series
<code>ratio</code>	Ratio of number of observations in training and testing sets
<code>n_lag</code>	Lag of the provided time series data

Value

- `Output_ariga`: List of three data frames containing three data frames namely `predict_compare`, `forecast_compare`, and `metrics`

References

- Paul, R. K., & Garai, S. (2021). Performance comparison of wavelets-based machine learning technique for forecasting agricultural commodity prices. *Soft Computing*, 25(20), 12857-12873.
- Paul, R. K., & Garai, S. (2022). Wavelets based artificial neural network technique for forecasting agricultural prices. *Journal of the Indian Society for Probability and Statistics*, 23(1), 47-61.
- Garai, S., Paul, R. K., Rakshit, D., Yeasin, M., Paul, A. K., Roy, H. S., Barman, S. & Manjunatha, B. (2023). An MRA Based MLR Model for Forecasting Indian Annual Rainfall Using Large Scale Climate Indices. *International Journal of Environment and Climate Change*, 13(5), 137-150.

Examples

```
Y <- rnorm(100, 100, 10)
result <- ariga(Y, ratio = 0.8, n_lag = 4)
```

Description

Fits a specially designed ANN model to the uni-variate time series data. The contribution is related to the PhD work of the maintainer.

Usage

```
my_ann(Y, ratio = 0.9, n_lag = 4)
```

Arguments

Y	Univariate time series
ratio	Ratio of number of observations in training and testing sets
n_lag	Lag of the provided time series data

Value

- Output_ann: List of three data frames containing three data frames namely predict_compare, forecast_compare, and metrics

References

- Paul, R. K., & Garai, S. (2021). Performance comparison of wavelets-based machine learning technique for forecasting agricultural commodity prices. *Soft Computing*, 25(20), 12857-12873.
- Paul, R. K., & Garai, S. (2022). Wavelets based artificial neural network technique for forecasting agricultural prices. *Journal of the Indian Society for Probability and Statistics*, 23(1), 47-61.
- Garai, S., Paul, R. K., Rakshit, D., Yeasin, M., Paul, A. K., Roy, H. S., Barman, S. & Manjunatha, B. (2023). An MRA Based MLR Model for Forecasting Indian Annual Rainfall Using Large Scale Climate Indices. *International Journal of Environment and Climate Change*, 13(5), 137-150.

Examples

```
Y <- rnorm(100, 100, 10)
result <- my_ann(Y, ratio = 0.8, n_lag = 4)
```

`my_svr`*Specially Designed SVR-Based Modeling*

Description

Fits a specially designed SVR model to the uni-variate time series data. The contribution is related to the PhD work of the maintainer.

Usage

```
my_svr(Y, ratio = 0.9, n_lag = 4)
```

Arguments

<code>Y</code>	Univariate time series
<code>ratio</code>	Ratio of number of observations in training and testing sets
<code>n_lag</code>	Lag of the provided time series data

Value

- `Output_svr`: List of three data frames containing three data frames namely `predict_compare`, `forecast_compare`, and `metrics`

References

- Paul, R. K., & Garai, S. (2021). Performance comparison of wavelets-based machine learning technique for forecasting agricultural commodity prices. *Soft Computing*, 25(20), 12857-12873.
- Paul, R. K., & Garai, S. (2022). Wavelets based artificial neural network technique for forecasting agricultural prices. *Journal of the Indian Society for Probability and Statistics*, 23(1), 47-61.
- Garai, S., Paul, R. K., Rakshit, D., Yeasin, M., Paul, A. K., Roy, H. S., Barman, S. & Manjunatha, B. (2023). An MRA Based MLR Model for Forecasting Indian svrual Rainfall Using Large Scale Climate Indices. *International Journal of Environment and Climate Change*, 13(5), 137-150.

Examples

```
Y <- rnorm(100, 100, 10)
result <- my_svr(Y, ratio = 0.8, n_lag = 4)
```

series_desstat	<i>Descriptive Statistics Of A Series</i>
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Description

Provides descriptive statistics of a particular series. First column in the output result mentions 10 different statistics and second column contains the Statistics values of the particular series.

Usage

```
series_descstat(Y)
```

Arguments

Y	Univariate time series
---	------------------------

Value

- desc_table: A table contains 10 descriptive statistics row-wise

References

- Garai, S., & Paul, R. K. (2023). Development of MCS based-ensemble models using CEEM-DAN decomposition and machine intelligence. *Intelligent Systems with Applications*, 18, 200202.
- Garai, S., Paul, R. K., Rakshit, D., Yeasin, M., Paul, A. K., Roy, H. S., Barman, S. & Manjunatha, B. (2023). An MRA Based MLR Model for Forecasting Indian svrual Rainfall Using Large Scale Climate Indices. *International Journal of Environment and Climate Change*, 13(5), 137-150.

Examples

```
Y <- rnorm(100, 100, 10)
result <- series_descstat(Y)
```

series_nonlinearity	<i>Non linearity test of a Data Frame</i>
---------------------	---

Description

Performs non linearity test result for a series. Provides output as a single element (data frame) list. First column mentions different statistics (eps). Other columns are the Statistics values of the particular dimension.

Usage

```
series_nonlinearity(Y)
```

Arguments

Y Univariate time series

Value

- nonlinearity_list: A list with a single element (data frame) . Element is named as the name of the series provided. The element is such that first column mentions different statistics and other columns are the Statistics values of the particular dimension.

References

- Garai, S., & Paul, R. K. (2023). Development of MCS based-ensemble models using CEEM-DAN decomposition and machine intelligence. *Intelligent Systems with Applications*, 18, 200202.
- Garai, S., Paul, R. K., Rakshit, D., Yeasin, M., Paul, A. K., Roy, H. S., Barman, S. & Manjunatha, B. (2023). An MRA Based MLR Model for Forecasting Indian svrual Rainfall Using Large Scale Climate Indices. *International Journal of Environment and Climate Change*, 13(5), 137-150.

Examples

```
my_series <- rnorm(100, 100, 10)
nonlinearity <- series_nonlinearity(my_series)
nonlinearity$my_series
```

series_stationarity *Stationarity Tests Of A Series*

Description

Provides a list of three data frames: 'ADF', 'PP', 'KPSS'. Also indicates whether the data is stationary or not according to the null hypothesis of the corresponding tests.

Usage

```
series_stationarity(Y)
```

Arguments

Y Univariate time series

Value

- stationarity_table - List of three data frames: 'ADF', 'PP', 'KPSS'

References

- Garai, S., & Paul, R. K. (2023). Development of MCS based-ensemble models using CEEM-DAN decomposition and machine intelligence. *Intelligent Systems with Applications*, 18, 200202.
- Garai, S., Paul, R. K., Rakshit, D., Yeasin, M., Paul, A. K., Roy, H. S., Barman, S. & Manjunatha, B. (2023). An MRA Based MLR Model for Forecasting Indian svrual Rainfall Using Large Scale Climate Indices. *International Journal of Environment and Climate Change*, 13(5), 137-150.

Examples

```
Y <- rnorm(100, 100, 10)
result <- series_stationarity(Y)
```

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