Package: IFARIMA (via r-universe)

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Type Package

Title Intuitionistic Fuzzy Autoregressive Integrated Moving Average Model

Version 0.1.0

Description The Intuitionistic Fuzzy Autoregressive Integrated Moving Average model offers advanced time series forecasting by integrating intuitionistic fuzzy sets with ARIMA. It enhances prediction accuracy by handling uncertainties and hesitations more effectively than traditional models, making it ideal for complex, real-world data applications. The package has been developed using the algorithm of Yolcu and Yolcu (2023) <doi:10.1016/j.eswa.2022.119336>.

License GPL-3

Encoding UTF-8

Imports stats, forecast

Suggests testthat (>= 3.0.0)

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`IFARIMA` *Intuitionistic Fuzzy Autoregressive Integrated Moving Average Model*

Description

Implements an intuitionistic fuzzy ARIMA forecasting model by integrating fuzzy clustering information with ARIMA modelling.

Usage

```
IFARIMA(Data, Class, Split)
```

Arguments

`Data`	Numeric time series data (a numeric vector without missing values).
`Class`	Number of fuzzy classes (at least 2).
`Split`	Proportion of the data used for training, strictly between 0 and 1.

Details

The membership matrix of the intuitionistic fuzzy clustering step is initialised at random, so results depend on the state of the random number generator. Call `set.seed()` before `IFARIMA()` to obtain reproducible results. The first `round(length(Data) * Split)` observations form the training set and the remainder the test set.

The membership degrees of an observation sum to one and the non-membership degrees are one minus the memberships, so some of these regressors are linearly dependent. Redundant columns are removed automatically before the ARIMA model with external regressors is fitted.

Value

A list with three components:

`Accuracy` Accuracy measures (as returned by `forecast::accuracy`) for the training and test sets.

`Train_Fitted` Numeric vector of fitted values on the training set.

`Test_Prediction` Numeric vector of forecasts for the test set.

References

Yolcu, O.C. and Yolcu, U. (2023). A novel intuitionistic fuzzy time series prediction model with cascaded structure for financial time series. *Expert Systems with Applications*, 215, 119336. doi:10.1016/j.eswa.2022.119336

Examples

```
# Small toy example (runs in about a second)
set.seed(123)
dat <- 50 + cumsum(rnorm(60))

Model <- IFARIMA(Data = dat, Class = 2, Split = 0.8)
Model$Accuracy
head(Model$Train_Fitted)
Model$Test_Prediction

# Larger example with three clusters
set.seed(123)
dat2 <- rnorm(100, 60, 10)
Model2 <- IFARIMA(Data = dat2, Class = 3, Split = 0.8)
Model2$Accuracy
```

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