

Package ‘TDSTNN’

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Type Package

Title Time Delay Spatio Temporal Neural Network

Version 0.1.0

Depends R (>= 4.2.3), nnet

Description

STARMA (Space-Time Autoregressive Moving Average) models are commonly utilized in modeling and forecasting spatiotemporal time series data. However, the intricate nonlinear dynamics observed in many space-time rainfall patterns often exceed the capabilities of conventional STARMA models. This R package enables the fitting of Time Delay Spatio-Temporal Neural Networks, which are adept at handling such complex nonlinear dynamics efficiently. For detailed methodology, please refer to Saha et al. (2020) <[doi:10.1007/s00704-020-03374-2](https://doi.org/10.1007/s00704-020-03374-2)>.

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NeedsCompilation no

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STNN

*Spatio-Temporal Neural Network***Description**

The STNN function fits a Time-Delay Spatio-Temporal Neural Network model for space-time time series data.

Usage

```
STNN(data, lag, weight0, weight1, hs, h)
```

Arguments

data	Spatio-temporal time series (ts) data.
lag	Number of time lag(s).
weight0	Zero-order weight matrix.
weight1	First-order weight matrix.
hs	Number of hidden layer(s).
h	The forecast horizon.

Details

This function enables you to apply the Time-delay Spatio-Temporal model for analyzing space-time series data.

Value

Model Summary	Summary of the fitted STNN
Fitted values	Fitted values of STNN
Forecasted values	h step ahead forecasted values employing STNN

Author(s)

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References

Saha, A., Singh, K.N., Ray, M. et al. A hybrid spatio-temporal modelling: an application to space-time rainfall forecasting. Theor Appl Climatol 142, 1271–1282 (2020).

See Also

ANN

Examples

```
ts.sim1 <- 50+arima.sim(list(order = c(1,1,0), ar = 0.7), n = 100)
ts.sim2<-70+arima.sim(list(order = c(1,1,0), ar = 0.8), n = 100)
weight0=diag(1, 2, 2)
weight1=matrix(c(0, 1, 1, 0), nrow= 2, ncol = 2, byrow = TRUE)
zz=as.matrix(cbind(ts.sim1,ts.sim2))
data=zz
lag=1
hs=2
h=5
STNN(data,lag,weight0,weight1,hs,h)
```

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