Package 'OptiSembleForecasting'

October 12, 2022

Type Package

Title Optimization Based Ensemble Forecasting Using MCS Algorithm

Version 0.1.0

Author Dr. Md Yeasin [aut, cre],
Dr. Ranjit Kumar Paul [aut]

Maintainer Dr. Md Yeasin <yeasin.iasri@gmail.com>

Description The real-life data is complex in nature. No single model can capture all aspect of complex time series data. In this package, 14 models, namely Recurrent Neural Network (RNN), Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM), Bidirectional LSTM, Deep LSTM, Artificial Neural Network (ANN), Support Vector Regression (SVR), Random Forest (RF), k-Nearest Neighbour (KNN), XGBoost (XGB), Autoregressive Integrated Moving Average (ARIMA), Error-Trend-Seasonality (ETS) and TBATS models, have been implemented and their accuracy have been checked. An PCA based error index has been proposed to select a group of best models using MCS algorithms. After selecting the models, the forecasts from these models have been ensembled using optimization techniques. This package allows to implement 20 optimization techniques, namely, Artificial Bee Colony (ABC), Ant Lion Optimizer (ALO), Bat Algorithm (BA), Black Hole Optimization Algorithm (BHO), Clonal Selection Algorithm (CLONALG), Cuckoo Search (CS), Cat Swarm Optimization (CSO), Dragonfly Algorithm (DA), Differential Evolution (DE), Firefly Algorithm (FFA), Genetic Algorithm (GA), Gravitational Based Search Algorithm (GBS), Grasshopper Optimisation Algorithm (GOA), Grey Wolf Optimizer (GWO), Harmony Search Algorithm (HS), Krill-Herd Algorithm (KH), Moth Flame Optimizer (MFO), Particle Swarm Optimization (PSO), Sine Cosine Algorithm (SCA), Shuffled Frog Leaping (SFL) and Whale Optimization Algorithm (WOA). This package has been developed using concept of Wang et al. (2022) <doi:10.1016/j.apm.2022.09.004>, Qu et al. (2022) <doi:10.1016/j.eswa.2022.118746> and Kriz 3-030-18195-6_21 >.

License GPL-3

Encoding UTF-8

Imports stats, keras, tsutils, readxl, tibble, tensorflow, Metrics, forecast, dplyr, neuralnet, MCS, caretForecast, kknn, metaheuristicOpt, FactoMineR, factoextra, utils

NeedsCompilation no

RoxygenNote 7.2.1

Repository CRAN

Date/Publication 2022-09-20 10:36:10 UTC

R topics documented:

`OptiSembleForcasting` *OptiSembleForecasting*

Description

Optimization Based Ensemble Forecasting Using MCS Algorithm

Usage

```
OptiSembleForcasting(TS, Lag, Optimization, Split_ratio)
```

Arguments

`TS`	Time series data with first column as date
`Lag`	Number of lag for modelling
`Optimization`	Optimization technique
`Split_ratio`	Train-Test Split Ration

Value

- SelectedModel: Selected models with weights
- Accuracy: Accuracy matrix
- TestResults: Final predicted value

References

- Wang, J., Wang, Y., Li, H., Yang, H. and Li, Z. (2022). Ensemble forecasting system based on decomposition-selection-optimization for point and interval carbon price prediction. Applied Mathematical Modelling, doi.org/10.1016/j.apm.2022.09.004.
- Qu, Z., Li, Y., Jiang, X. and Niu, C. (2022). An innovative ensemble model based on multiple neural networks and a novel heuristic optimization algorithm for COVID-19 forecasting. Expert System Application, doi:10.1016/j.eswa.2022.118746
- Kriz, K.A. (2019). Ensemble Forecasting. In: Williams, D., Calabrese, T. (eds) The Palgrave Handbook of Government Budget Forecasting. Palgrave Studies in Public Debt, Spending, and Revenue. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-18195-6_21

Examples

```
library(OptiSembleForecasting)
date<-seq.Date(from = as.Date('2019-09-17'), to = as.Date('2022-09-18'), by = 'days')
value<-rnorm(length(date),100, 50)
data<-cbind(date,value)
fit<-OptiSembleForcasting(TS=data,Lag = 20, Optimization = "ABC",Split_ratio = 0.9)
```

Index