Package 'EEML'

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Type Package

Title Ensemble Explainable Machine Learning Models

Version 0.1.1

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

Maintainer Dr. Ranjit Kumar Paul <ranjitstat@gmail.com>

Description We introduced a novel ensemble-based explainable machine learning model using Model Confidence Set (MCS) and two stage Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) algorithm. The model combined the predictive capabilities of different machine-learning models and integrates the interpretability of explainability methods. To develop the proposed algorithm, a two-stage Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) framework was employed. The package has been developed using the algorithm of Paul et al. (2023) <doi:10.1007/s40009-023-01218-x> and Yeasin and Paul (2024) <doi:10.1007/s11227-023-05542-3>.

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Encoding UTF-8

Imports stats, MCS, WeightedEnsemble, topsis

RoxygenNote 7.2.1

NeedsCompilation no

Repository CRAN

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Contents

EEML *Ensemble Explainable Machine Learning Models*

Description

Ensemble Explainable Machine Learning Models

Usage

```
EEML(df, Weight)
```

Arguments

df	List of dataframes containing various explainable scores for each model
Weight	Ensemble weights of the models (from weight function)

Value

- ImpScore: Final variable important score of EEML model

References

- Paul, R.K., Das, T. and Yeasin, M., 2023. Ensemble of time series and machine learning model for forecasting volatility in agricultural prices. National Academy Science Letters, 46(3), pp.185-188.
- Yeasin, M. and Paul, R.K., 2024. OptiSembleForecasting: optimization-based ensemble forecasting using MCS algorithm and PCA-based error index. The Journal of Supercomputing, 80(2), pp.1568-1597.

Examples

```
library("EEML")
df1<- as.data.frame(matrix(rnorm(50) , nrow = 10) )
df2<- as.data.frame(matrix(rnorm(50) , nrow = 10) )
df3<- as.data.frame(matrix(rnorm(50) , nrow = 10) )
rownames(df1)<- rownames(df2)<-rownames(df3)<-paste0("Var", seq(1,10,1))
colnames(df1)<- colnames(df2)<-colnames(df3)<-paste0("Exp", seq(1,5,1))
DF<- list(df1, df2, df3)
EEML<-EEML(df=DF,Weight=NULL)
```

ModelSel *Selection of Superior Models Using MSC Algorithm*

Description

Selection of Superior Models Using MSC Algorithm

Usage

```
ModelSel(df, Alpha, K)
```

Arguments

df	Dataframe of predicted values of models with first column as actual values
Alpha	Confidence level of MCS tests
K	Resampling length

Value

- SelModel: Name of the selected models

References

- Paul, R.K., Das, T. and Yeasin, M., 2023. Ensemble of time series and machine learning model for forecasting volatility in agricultural prices. National Academy Science Letters, 46(3), pp.185-188.
- Yeasin, M. and Paul, R.K., 2024. OptiSembleForecasting: optimization-based ensemble forecasting using MCS algorithm and PCA-based error index. The Journal of Supercomputing, 80(2), pp.1568-1597.
- Hansen PR, Lunde A, Nason JM, 2011. The model confidence set. Econometrica, 79(2), 453-497

Examples

```
library("EEML")
Actual<- as.ts(rnorm(200,100,50))
Model1<- as.ts(rnorm(200,100,50))
Model2<- as.ts(rnorm(200,100,50))
Model3<- as.ts(rnorm(200,100,50))
Model4<- as.ts(rnorm(200,100,50))
Model5<- as.ts(rnorm(200,100,50))
DF <- cbind(Actual, Model1,Model2,Model3,Model4,Model5)
SelModel<-ModelSel(df=DF, Alpha=0.2, K=1000)
```

Weight *Selection of Superior Models Using MSC Algorithm*

Description

Selection of Superior Models Using MSC Algorithm

Usage

```
Weight(ModelSel, Optim = "PSO")
```

Arguments

ModelSel	Dataframe of predicted values of selected models with first column as actual values
Optim	Optimisation technique

Value

- WeightEn: Ensemble weight of the candidate models

References

- Paul, R.K., Das, T. and Yeasin, M., 2023. Ensemble of time series and machine learning model for forecasting volatility in agricultural prices. National Academy Science Letters, 46(3), pp.185-188.
- Yeasin, M. and Paul, R.K., 2024. OptiSembleForecasting: optimization-based ensemble forecasting using MCS algorithm and PCA-based error index. The Journal of Supercomputing, 80(2), pp.1568-1597.

Examples

```
library("EEML")
Actual<- as.ts(rnorm(200,100,50))
Model1<- as.ts(rnorm(200,100,50))
Model2<- as.ts(rnorm(200,100,50))
Model3<- as.ts(rnorm(200,100,50))
DF <- cbind(Actual, Model1,Model2,Model3)
SelModel<-Weight(ModelSel=DF,Optim="PSO")
```

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