Package 'FMAdist'

January 11, 2019

Type Package

Title Frequentist Model Averaging Distribution

Version 0.1.0

Author Barry L. Nelson [aut],
Xi Jiang [aut, cre]

Maintainer Xi Jiang <xijiang2020@u.northwestern.edu>

Description Creation of an input model (fitted distribution) via the frequentist model averaging (FMA) approach and generate random-variates from the distribution specified by ``myfit'' which is the fitted input model via the FMA approach. See W. X. Jiang and B. L. Nelson (2018), ``Better Input Modeling via Model Averaging,'' Proceedings of the 2018 Winter Simulation Conference, IEEE Press, 1575-1586.

Depends R (>= 3.1.0), stats, utils

Imports fitdistrplus, STAR, EnvStats, extraDistr, MASS, quadprog

License GPL-2

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

NeedsCompilation no

Repository CRAN

Date/Publication 2019-01-11 16:30:07 UTC

R topics documented:

1

| fmafit | *Building frequentist model averaging input models* |

Description

Creation of an input model (fitted distribution) via the frequentist model averaging "FMA" approach.

Usage

```
fmafit(X,Fset,J,type)
```

Arguments

X	a numerical vector of nonzero length containing data values for fitting
Fset	a list of character strings that specifies the set of candidate distributions; supported distributions are `'normal'`, `'lognormal'`, `'exponential'`, `'gamma'`, `'weibull'`, `'inverse gaussian'`, `'student t'`, `'uniform'`, `'cauchy'`, `'loglogistic'`, `'ED'`
J	number of groups to divide the data into for cross-validation; if not specified, `J = 10`
type	a character string specifying the type of model averaging estimator: `'P'` for probability, `'Q'` for quantile; if not specified, `type = 'P'`

Details

`fmafit` first fits each candidate parametric distribution in `Fset` to the data `X` using maximum likelihood estimation, which yields a set of fitted distributions F = {F_1, F_2,..., F_q}. The MLEs for each distribution are returned as `MLE_list`. Next a weight vector w = {w_1, w_2,..., w_q} is obtained through cross-validation and also returned. The resulting model-average estimator of the true cumulative distribution of the data is

$$F(x, w) = \sum_{m=1}^{q} (w_m)(F_m(x)).$$

The model average fitting can be either in the cumulative probability space or quantile space. The difference between the two types of model averaging is only in the weight vector associated with the candidate distributions, which is obtained through cross-validation in either the probability or quantile space.

Value

`fmafit` returns an object which is a list with four components:

w	weight vector associated with distributions in `Fset`

MLE_list	list of MLE parameter estimates for each candidate distribution with `'NA'` for ED (the empirical distribution)
Fset	same as the input argument
data	sorted input argument X (needed for ED)

References

W. X. Jiang and B. L. Nelson (2018), "Better Input Modeling via Model Averaging," Proceedings of the 2018 Winter Simulation Conference, IEEE Press, 1575-1586.

See Also

See [rfma](#) for random-variate generation from the fitted distribution obtained via "FMA" approach.

Examples

```
data<-rlnorm(500,meanlog=0,sdlog=0.25)
Fset<-c('gamma','weibull','normal','ED')
type<-'P' #by default type<-'Q'
J<-5  #by default J<-10
myfit<-fmafit(data,Fset,J,type)
```

---

rfma	*FMA random-variate generation*

Description

Generate random variates from the distribution specified by `myfit` which is the fitted input model via the frequentist model averaging "FMA" approach.

Usage

```
rfma(n, myfit)
```

Arguments

n	number of random variates to generate
myfit	a list object returned by `fmafit` containing the four components needed for random-variate generation: w, MLE_list, Fset, and data

Details

`rfma` generates random variates that have the distribution of the model-average estimator. Each time a random variate is needed, a distribution is selected with probability equal to the corresponding weight and then a random variate from the fitted distribution is generated.

Value

`rfma` generates random variates from the distribution specified by `myfit`

References

W. X. Jiang and B. L. Nelson (2018), "Better Input Modeling via Model Averaging," Proceedings of the 2018 Winter Simulation Conference, IEEE Press, 1575-1586.

See Also

See fmafit for creation of an input model (fitted distribution) via the frequentist model averaging "FMA" approach.

Examples

```
data<-rlnorm(500,meanlog=0,sdlog=0.25)
Fset<-c('gamma','weibull','normal','ED')
type<-'P' #by default type<-'Q'
J<-5  #by default J<-10
myfit<-fmafit(data,Fset,J,type)
n<-100
sim_data<-rfma(n,myfit)
```

Index