R documentation

of ‘ldloglin.Rd’

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ldloglin *Locally D-optimal designs for Log-linear model*

Description

Finds Locally D-optimal designs for Log-linear regression model which is defined as $E(y) = a + b\log(x + c)$ with $Var(y) = \sigma^2$, where a, b, c and σ are unknown parameters.

Usage

```
ldloglin(a, b, c, lb, ub, user.points = NULL, user.weights = NULL, ...,
n.restarts = 1, n.sim = 1, tol = 1e-8, prec = 53)
```

Arguments

`a`	initial value for paremeter a, must be greater than 0.
`b`	initial value for parameter b, must be greater than 0.
`c`	initial value for parameter c, must be greater than 0.
`lb`	lower bound of design interval, must be greater than or equal to 0.
`ub`	upper bound of design interval.
`user.points`	(optional) vector of user design points which calculation of its D-efficiency is aimed. Each element of `user.points` must be within the design interval.
`user.weights`	(optional) vector of weights which its elements correspond to `user.points` elements. The sum of weights should be 1; otherwise they will be normalized.
`...`	(optional) additional parameters will be passed to function `curve`.
`prec`	(optional) a number, the maximal precision to be used for D-efficiency calculation, in bite. Must be at least 2 (default 53), see 'Details'.
`n.restarts`	(optional optimization parameter) number of solver restarts required in optimization process (default 1), see 'Details'.
`n.sim`	(optional optimization parameter) number of random parameters to generate for every restart of solver in optimization process (default 1), see 'Details'.
`tol`	(optional optimization parameter) relative tolerance on feasibility and optimality in optimization process (default $1e-8$).

Details

While D-efficiency is `NaN`, an increase in the value of `prec` can be beneficial to achieve a numeric value, however, can slow down the calculation speed.

Values of `n.restarts` and `n.sim` should be chosen according to the length of design interval.

Value

plot of derivative function, see 'Note'.

a list containing the following values:

`points`	obtained design points
`weights`	corresponding weights to the obtained design points
`det.value`	value of Fisher information matrix determinant at the obtained design
`user.eff`	D-efficeincy of user design, if `user.design` and `user.weights` are not `NULL`.

Note

To verify optimality of obtained design, derivate function (symmetry of Frechet derivative with respect to the x-axis) will be plotted on the design interval. Based on the equivalence theorem (Kiefer, 1974), a design is optimal if and only if its derivative function are equal or less than 0 on the design interval. The equality must be achieved just at the obtained points.

Author(s)

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References

Masoudi, E., Sarmad, M. and Talebi, H. 2012, An Almost General Code in R to Find Optimal Design, In Proceedings of the 1st ISM International Statistical Conference 2012, 292-297.

Dette, H., Kiss, C., Bevanda, M. and Bretz, F. (2010), Optimal designs for the emax, log-linear and exponential models. Biometrika, 97 513-518.

Kiefer, J. C. (1974), General equivalence theory for optimum designs (approximate theory). Ann. Statist., 2, 849-879.

See Also

`cfisher`, `cfderiv` and `eff`.

Examples

```
ldloglin(a= 1, b = 1, c = 3, lb = 0, ub =3)
## $points: 0.000000 1.158884 3.000000

## D-effecincy computation:
ldloglin(a = 1, b = 1, c = 3, lb = 0, ub =3, user.points = c(0.18, 0.82, 1.61, 3, 2),
user.weights = rep(1, 5)) ## $user.eff: 0.68677
```

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