Package ‘minxent’

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Title Entropy Optimization Distributions

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Depends R (>= 1.6.0)

Description This package implements entropy optimization distribution under specified constraints. It also offers an R interface to the MinxEnt and MaxEnt distributions.

License GPL (>= 2)

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R topics documented:

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`minxent.multiple` *Minimum Cross Entropy Distribution under Multiple Constraints*

Description

minxent.multiple estimates the MinxEnt distribution under given moment constraints.

Usage

```
## S3 method for class 'multiple'
minxent(q, G, eta, lambda)
```

Arguments

`q`	a priori distribution.
`G`	matrix of moment vector functions.
`eta`	vector of moment constraints.
`lambda`	initial points for langrangian multipliers.

Details

MinxEnt distribution is obtained by Kullback's minimum cross entropy principles. This principle is introduced by Kullback (1957) which minimizes Kullback-Leibler divergence subject to given constraints. If a priori distribution is taken to be uniform distribution then minimizing Kullback-Leibler divergence is equivalent to maximizing Shannon's entropy subject to same given constraints. In the other words, in this special case MaxEnt distribution introduced by Jaynes (1957) is equivalent to MinxEnt distribution. For various application see Kapur&Kesavan(1992).

Value

minxent.multiple returns an estimate of Lagrange multipliers and minimum cross entropy distribution under multiple constraints which is specified by user.

Warning

Since first Lagrange multiplies is a function of the others, there exists (m-1) constraints. (See. Kapur&Kesavan(1992) pp.44).

Author(s)

Senay Asma

References

Jaynes, E. T. (1957). Information Theory and Statistical Mechanics. Physical Reviews, 106: 620-630. Kapur, J.N. and Kesavan, H.K.(1992), Entropy Optimization Principle with Applications, Academic Press. Kullback, S. (1959). Information Theory and Statistics. John Wiley, New York.

See Also

`minxent.single`

Examples

```
xi <- 1:6
eta<-c(1,4,19)  #expected moment constraints
q<-c(rep(1/6),6)  #a priori distribution
G<-matrix(c(rep(1,6),xi,xi^2),byrow=TRUE,nrow=3) #matrix of moment vector function of observed data
minxent.multiple(q=q,G=G,eta=eta,c(0,0)) #estimates of lagrangian multipliers and MinxEnt distribution
```

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minxent.single — *Minimum Cross Entropy Distribution under One Constraint*

Description

minxent.single estimates the Minimum Cross Entropy Distribution (MinxEnt) under a single constraint for corresponding observed probabilities by using Kullback minimum cross entropy principle.

Usage

```
## S3 method for class 'single'
minxent(q, G, eta, lambda)
```

Arguments

`q`	a priori distribution.
`G`	matrix of moment vector function.
`eta`	vector of one moment constraint.
`lambda`	initial point for langrangian multiplier.

Details

If `"minxent"` is obtained under single constraint arising from the knowledge of the mean of the system and taking a priori distribution to be a uniform distribution then this distribution is equivalent to Maxwell-Boltzmann distribution which has importance in statistical mechanics (Kapur&Kesavan, 1992). One can also use different moment constraint and obtain different MinxEnt distributions.

Value

`"minxent.single"` returns an estimate of Lagrange multipliers and minimum cross entropy distribution under single constraint which is specified by user.

Author(s)

Senay Asma

References

Kapur, J.N. and Kesavan, H.K.(1992), Entropy Optimization Principle with Applications, Academic Pres.

See Also

minxent.multiple

Examples

```
q <- c(0.05,0.10,0.15,0.20,0.22,0.28) # a priori distribution
G <- matrix(c(rep(1,6),1:6),byrow=TRUE,nrow=2) # matrix of moment vector function of observed data
eta <- c(1,4.5) # vector of moment constraints
minxent.single(q=q,G=G,eta=eta,c(0)) # estimate of lagrangian multipliers and Kullback minimimum cross entropy di
```

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