Package ‘imprProbEst’

February 20, 2015

Type Package
Title Minimum distance estimation in an imprecise probability model
Version 1.0.1
Date 2008-10-23
Author Robert Hable
Maintainer Robert Hable <Robert.Hable@uni-bayreuth.de>
Description A minimum distance estimator is calculated for an imprecise probability model. The imprecise probability model consists of upper coherent previsions whose credal sets are given by a finite number of constraints on the expectations. The parameter set is finite. The estimator chooses that parameter such that the empirical measure lies next to the corresponding credal set with respect to the total variation norm.
Depends R(>= 2.7.0), inline, lpSolve
LazyLoad yes
License LGPL-3
Repository CRAN
Date/Publication 2010-05-07 16:10:30
NeedsCompilation no

R topics documented:

imprProbEst-package .................................................. 2
ArgMinDist ............................................................... 2

Index 5
Description

A minimum distance estimator is calculated for an imprecise probability model. The imprecise probability model consists of upper coherent previsions whose credal sets are given by a finite number of constraints on the expectations. The parameter set is finite. The estimator chooses that parameter such that the empirical measure lies next to the corresponding credal set with respect to the total variation norm.

Details

Package: imprProbEst
Type: Package
Version: 1.0
Date: 2008-10-23
License: LGPL-3
LazyLoad: yes

library(imprProbEst)

Note

R programming support was given by Matthias Kohl

Author(s)

Robert Hable
Maintainer: Robert Hable <Robert.Hable@uni-bayreuth.de>

References

**Description**

The function calculates a minimum distance estimator for an imprecise probability model. The imprecise probability model consists of upper coherent previsions whose credal sets are given by finite numbers of constraints on the expectations. The parameter set is finite. The estimator chooses that parameter such that the empirical measure lies next to the corresponding credal set with respect to the total variation norm.

**Usage**

`ArgMinDist(x, lbomega, ubomega, epsilon, ImpreciseModel)`

**Arguments**

- **x**: a matrix where each row corresponds to one observation
- **lbomega**: a vector containing the lower bounds of the sample space
- **ubomega**: a vector containing the upper bounds of the sample space
- **epsilon**: a positive real number; step size of the discretization
- **ImpreciseModel**: a list of upper coherent previsions; see 'Details'

**Details**

The matrix `x` contains independent identically distributed data. Each row corresponds to one observation. The sample space is assumed to be a hyperrectangle in $\mathbb{R}^k$. The lower bounds of this hyperrectangle are given by `lbomega`; the upper bounds of this hyperrectangle are given by `ubomega`. Accordingly, `length(lbomega)`, `length(ubomega)` and `length(x[,1])` are equal to `k`.

Smaller values of `epsilon` may lead to more accurate results but increase the calculation time. Too small values of `epsilon` may cause an error due to RAM limitations.

`ImpreciseModel` contains an imprecise model consisting of upper coherent previsions. `ImpreciseModel` is a list; each component of `ImpreciseModel` is again a list which corresponds to an upper coherent prevision. Each upper coherent prevision is given by a list containing a list of functions and a corresponding vector of upper previsions.

For example, the imprecise model `ImpreciseModel` may consist of three coherent upper previsions:

`ImpreciseModel <- list(CohUpPrev1, CohUpPrev2, CohUpPrev3).`  
`sapply(CohUpPrev1, function(p) p)`  

The estimation is that coherent upper prevision whose credal set has minimal total variation distance to the empirical measure generated by the observations `x`. Confer Hable (2008) for the definition of this minimum distance estimator; confer Walley (1991) and Hable (2008) for the theory of imprecise probabilities based on coherent upper previsions or coherent lower previsions.
Value

`ArgMinDist` returns a list, e.g. `results`, containing three components:

- `results[[1]]` - the estimation; that is, the number of the minimizing coherent upper prevision in `ImpreciseModel`
- `results[[2]]` - the total variation distance of the minimizing coherent upper prevision
- `results[[3]]` - the number of linear programs which had to be solved

Note

R programming support was given by Matthias Kohl

Author(s)

Robert Hable

References


Examples

```r
f1 <- function(v){ ifelse(abs(v-1)<1e-10,1,0) }
f2 <- function(v){ ifelse(abs(v-2)<1e-10,1,0) }
f3 <- function(v){ ifelse(abs(v-3)<1e-10,1,0) }
f4 <- function(v){ 1-ifelse(abs(v-3)<1e-10,1,0) }
x <- matrix(c(1,2,3,4),nrow=1)
UpperPrevisions1 <- c(1/4-0.03,1/4-0.03,1/4+0.03,1)
ListOfFunctions1 <- list(f1,f2,f3,f4)
CohUpPrev1 <- list(ListOfFunctions1,UpperPrevisions1)
UpperPrevisions2 <- c(1/4-0.04,1/4+0.04,1/4-0.01)
ListOfFunctions2 <- list(f1,f2,f3)
CohUpPrev2 <- list(ListOfFunctions2,UpperPrevisions2)
ImpreciseModel <- list(CohUpPrev1,CohUpPrev2)

lbomega <- 1
ubomega <- 4
epsilon <- 0.01

ArgMinDist(x,lbomega,ubomega,epsilon,ImpreciseModel)
```
Index

*Topic nonparametric
  ArgMinDist, 2
*Topic package
  imprProbEst-package, 2

ArgMinDist, 2

imprProbEst (imprProbEst-package), 2
imprProbEst-package, 2