

Package: stratbr (via r-universe)

September 17, 2024

Type Package

Title Optimal Stratification in Stratified Sampling

Version 1.2

Date 2017-05-19

Author Jose Brito, Pedro Silva and Tomas Veiga

Maintainer Jose Brito <jambrito@gmail.com>

Description An Optimization Algorithm Applied to Stratification Problem. This function aims at constructing optimal strata with an optimization algorithm based on a global optimisation technique called Biased Random Key Genetic Algorithms.

Depends Rglpk, snowfall, stratification

Encoding UTF-8

License GPL-2

LazyData true

RoxygenNote 5.0.1

NeedsCompilation no

Date/Publication 2017-05-26 21:44:59 UTC

Repository <https://jambrito.r-universe.dev>

RemoteUrl <https://github.com/cran/stratbr>

RemoteRef HEAD

RemoteSha f9d79e67354f40167b52226e3c8d3e96d91c4853

Contents

BSSM_FD	2
stratbr	3

Index	5
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BSSM_FD

*Optimal Allocation - Minimum Coefficient of Variation***Description**

Function that uses an integer programming formulation for allocation of the overall sample size n to the strata, for the following purpose: Coefficient of Variation of the estimate of total for the survey variable is minimized.

Usage

```
BSSM_FD(Nh, Sh2x, n, H, nmin = 2, X, takeall = FALSE)
```

Arguments

Nh	Vector with number of population elements, or population size, in stratum h
Sh2x	Vector with population variance of the variable X in stratum h.
n	Sample size.
H	Number of strata.
nmin	Minimum sample size (smallest possible sample size in any stratum). The default is 2.
X	Population Total
takeall	Take-all stratum (takeall=TRUE) => nH=NH.

Value

solution	Vector with sample of size by stratum and coefficient of variation for the estimator of total of the stratification variable considered.
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Author(s)

Jose Brito (jambrito@gmail.com), Pedro Silva, Gustavo Semaan and Nelson Maculan.

References

Brito, J.A.M, Silva, P.L.N.,Semaan, G.S. and Maculan, N. (2015). Integer Programming Formulations Applied to Optimal Allocation in Stratified Sampling. Survey Methodology, 41: 427-442.

Examples

```
X<-round(100*runif(50))
Nh<-c(10,20,20)
Sh2x<-c(var(X[1:10]),var(X[11:30]),var(X[31:50]))
a1oc1<-BSSM_FD(Nh,Sh2x,n=40,H=3,nmin=2,sum(X),takeall=TRUE)
Nh<-c(49,78,20,39,73,82,89)
X<-542350
Sh2x<-c(4436978,5581445,33454902,5763294,8689167,3716130,13938505)
a1oc2<-BSSM_FD(Nh,Sh2x,n=100,H=7,nmin=2,X)
```

stratbr

*Optimization Algorithm to solve stratification problem***Description**

This function aims at constructing optimal strata with an optimization algorithm based on a global optimisation technique called Biased Random Key Genetic Algorithms (BRKGA). The optimization algorithm is applied to solve the one dimensional case, which reduces the stratification problem to just determining strata boundaries. Assuming that the number H of strata and the total sample size n are fixed, it is possible to produce the strata boundaries by taking into consideration an objective function associated with the variance. This function determines strata boundaries so that the elements in each stratum are more homogeneous among themselves.

Usage

```
stratbr(X, H = 3, n = 30, nmin = 2, takeall = FALSE, tampop = 100,
        totgen = 1500, pelite = 0.2, pmutant = 0.3, rc = 0.6, cores = 2)
```

Arguments

X	Stratification variable.
H	Number of strata.
n	Sample size.
nmin	Minimum sample size (smallest possible sample size in any stratum).
takeall	Take-all stratum (takeall=TRUE) => $nH = NH$.
tampop	Number of chromosomes BRKGA. The default is 100.
totgen	Maximum number of generations BRKGA. The default is 1500.
pelite	Percentage elite solutions BRKGA. The default is 0.2.
pmutant	Percentage mutant solutions BRKGA. The default is 0.3.
rc	Crossover probability BRKGA. The default is 0.6.
cores	Numerical amount of CPUs requested for the cluster.

Value

cvtot	Coefficient of variation for the estimator of total of the stratification variable considered.
nh	Number of sample elements, or sample size, in stratum h .
Nh	Number of population elements, or population size, in stratum h .
Sh2	Population variance of the stratification variable x in stratum h .
bk	Strata boundaries
cputime	Time consumed by the algorithm in seconds.

Author(s)

Jose Brito (jambrito@gmail.com), Pedro Luis and Tomas Veiga.

References

Brito, J.A.M, Silva, P.L.N.,Semaan, G.S. and Maculan, N. (2015). Integer Programming Formulations Applied to Optimal Allocation in Stratified Sampling. *Survey Methodology*, 41: 427-442.

Brito, J.A.M, Semaan, G.S., Fadel, A.C. and Brito, L.R.(2017). An optimization approach applied to the optimal stratification problem, *Communications in Statistics - Simulation and Computation*.

Gonçalves, J.R. and Resende, M.G.C. (2011). Biased random-key genetic algorithms for combinatorial optimization, *Journal of Heuristics*, 17: 487-525.

Examples

```
data(Sweden)
REV84<-Sweden[, 9]
solution1<-stratbr(REV84,H=3,n=50,nmin=10,totgen=2,cores=4)
data(USbanks)
solution2<-stratbr(USbanks,H=3,n=50,totgen=2,cores=4,takeall=TRUE)
```

Index

BSSM_FD, 2

stratbr, 3