Package: stratvns (via r-universe)

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Type Package

Title Optimal Stratification in Stratified Sampling

Version 1.1

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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 vns.

Depends R (>= 3.5.0), parallel, purrr, partitions, MultAlloc

Encoding UTF-8

License GPL-2

LazyData true

RoxygenNote 7.1.0

NeedsCompilation no

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RemoteUrl https://github.com/cranhaven/cranhaven.r-universe.dev

RemoteRef package/stratvns

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RemoteSubdir stratvns

Contents

`STRATENUM` *Enumeration Algorithm*

Description

This function enumerates all feasible solutions to the stratification problem and produces the global optimum, applying an integer formulation proposed by Brito et al (2015).

Usage

```
STRATENUM(X, L, cvt = 0.1, nhmin = 2)
```

Arguments

`X`	Stratification Variable
`L`	Number of strata
`cvt`	Target cv
`nhmin`	Mininum sample size by stratum

Details

STRATENUM

Value

`n`	Sample size
`nh`	Sample size by strata
`cv`	coefficient of variation
`Nh`	Strata sizes
`Vh`	Strata variances
`totoptg`	Total global optimal solutions
`tfeasible`	Total feasible solutions
`cputime`	Runtime in seconds

Author(s)

Leonardo de Lima, Jose Brito, Pedro Gonzalez and Breno Oliveira

References

1. Brito, J.A.M., Silva, P.L.N., Semaan, G.S., Maculan, N., 2015. Integer programming formulations applied to optimal allocation in stratified sampling. Survey Methodology 41, 2, 427–442.

Examples

```
## Not run:
Example1:
s<-STRATENUM(U21,L=3,cvt=0.05)
Example2:
s<-STRATENUM(U15,L=4)
Example3:
s<-STRATENUM(U1,L=3,nhmin=4)

## End(Not run)
```

STRATVNS *Vns Algorithm*

Description

This function aims at constructing optimal strata with an optimization algorithm based on a global optimisation technique called Variable neighborhood search (VNS). 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 L of strata and the coefficient of variation are fixed, it is possible to produce the strata boundaries by taking into consideration an objective function associated with the sample size. This function determines strata boundaries so that the elements in each stratum are more homogeneous among themselves and produce minimum sample size applying an integer formulation proposed by Brito et al (2015).

Usage

```
STRATVNS(
  X,
  L = 3,
  cvt = 0.1,
  nhmin = 2,
  maxstart = 3,
  imax = 3,
  kmax = 3,
  s = 30,
  sl = 50,
  tmax = 15,
  nsols = 20,
  cputime = 3600,
  nIterWithNoImpMax = 5,
  parallelize = TRUE
)
```

Arguments

X	Stratification Variable

`L`	Number of strata
`cvt`	Target cv
`nhmin`	Mininum sample size by stratum
`maxstart`	Number of iterations in multstart
`imax`	Maximum Number Iterations - VNS
`kmax`	Maximum Neighborhoods = number of cut points selected to apply shaking and local search
`s`	Range of shaking procedure
`sl`	Range of RVNS procedure
`tmax`	Maximum number cut points in neighborhoods
`nsols`	Number of initial solutions generated
`cputime`	Maximum cpu time in seconds
`nIterWithNoImpMax`	Maximum number of iterations without improvement in VNS
`parallelize`	TRUE = Performs multiple vns calls in parallel

Details

STRATVNS

Value

`bk`	Cut points
`n`	Minimum sample size
`nh`	Sample size by strata
`cv`	coefficient of variation
`Nh`	Strata sizes
`Vh`	Strata variances
`cputime`	Runtime in seconds

Author(s)

Leonardo de Lima, Jose Brito, Pedro Gonzalez and Breno Oliveira

References

1. Hansen, P., Mladenovi ́c, N., 2001. Variable neighborhood search: Principles and applications. European Journal of Operational Research 130, 3, 449 – 467.

2. Brito, J.A.M., Silva, P.L.N., Semaan, G.S., Maculan, N., 2015. Integer programming formulations applied to optimal allocation in stratified sampling. Survey Methodology 41, 2, 427–442.

Examples

```
## Not run:
Example1:
s<-STRATVNS(U1,L=4,cvt=0.05,nhmin=3)
Example2:
s<-STRATVNS(U15,L=3)
#'Example3:
s<-STRATVNS(U21,L=5)
Example4:
s<-STRATVNS(U1,L=3,nhmin=4)

## End(Not run)
```

U1 *Population U1*

Description

Australian cattle farms stratified by industrial regions

Usage

```
U1
```

Format

A vector 430x1:

Details

U1

References

1. Chambers, R., Dunstan, R., 1986. Estimating distribution functions from survey data. Biometrika 73, 3, 597–604.

U15 *Population U15*

Description

Population in thousands of 284 municipalities in Sweden in 1975

Usage

```
U15
```

Format

A vector 284x1:

Details

U15

References

Särndal, C.E., Swensson,B., Wretman, J. (2003). Model Assisted Survey Sampling, 1st edition, Springer.

U21 *Population U21*

Description

Million dollar funds from major US commercial banks

Usage

```
U21
```

Format

A vector 357x1:

Details

U21

References

Särndal, C.E., Swensson,B., Wretman, J. (2003). Model Assisted Survey Sampling, 1st edition, Springer.

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