Package 'bootstrapFP'

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Type Package

Title Bootstrap Algorithms for Finite Population Inference

Version 0.4.6

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Description Finite Population bootstrap algorithms to estimate the variance of the Horvitz-Thompson estimator for single-stage sampling. For a survey of bootstrap methods for finite populations, see Mashreghi et Al. (2016) <doi:10.1214/16-SS113>.

License GPL-3

Encoding UTF-8

BugReports https://github.com/rhobis/bootstrapFP/issues

RoxygenNote 7.3.1

Imports sampling

NeedsCompilation no

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R topics documented:

bootstrapFP-package *bootstrapFP: Bootstrap Algorithms for Finite Population Inference*

Description

Perform bootstrap variance estimation of the Horvitz-Thompson total estimator in finite population sampling with equal or unequal probabilities.

Author(s)

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References

Mashreghi Z.; Haziza D.; Léger C., 2016. A survey of bootstrap methods in finite population sampling. Statistics Surveys 10 1-52.

See Also

Useful links:

- Report bugs at https://github.com/rhobis/bootstrapFP/issues

bootstrapFP *Bootstrap algorithms for Finite Population sampling*

Description

Bootstrap variance estimation for finite population sampling.

Usage

```
bootstrapFP(
  y,
  pik,
  B,
  D = 1,
  method,
  design,
  x = NULL,
  s = NULL,
  distribution = "uniform"
)
```

Arguments

y	vector of sample values
pik	vector of sample first-order inclusion probabilities
B	scalar, number of bootstrap replications
D	scalar, number of replications for the double bootstrap (when applicable)
method	a string indicating the bootstrap method to be used, see Details for more
design	sampling procedure to be used for sample selection. Either a string indicating the name of the sampling design or a function; see section "Details" for more information.
x	vector of length N with values of the auxiliary variable for all population units, only required if method "ppHotDeck" is chosen
s	logical vector of length N, TRUE for units in the sample, FALSE otherwise. Alternatively, a vector of length n with the indices of the sample units. Only required for "ppHotDeck" method.
distribution	required only for `method='generalised'`, a string indicating the distribution to use for the Generalised bootstrap. Available options are "uniform", "normal", "exponential" and "lognormal"

Details

Argument `design` accepts either a string indicating the sampling design to use to draw samples or a function. Accepted designs are "brewer", "tille", "maxEntropy", "poisson", "sampford", "systematic", "randomSystematic". The user may also pass a function as argument; such function should take as input the parameters passed to argument `design_pars` and return either a logical vector or a vector of 0 and 1, where `TRUE` or `1` indicate sampled units and `FALSE` or `0` indicate non-sample units. The length of such vector must be equal to the length of `x` if `units` is not specified, otherwise it must have the same length of `units`.

`method` must be a string indicating the bootstrap method to use. A list of the currently available methods follows, the sampling design they they should be used with is indicated in square brackets. The prefix "pp" indicates a pseudo-population method, the prefix "d" represents a direct method, and the prefix "w" inicates a weights method. For more details on these methods see Mashreghi et al. (2016).

- "ppGross" [SRSWOR]
- "ppBooth" [SRSWOR]
- "ppChaoLo85" [SRSWOR]
- "ppChaoLo94" [SRSWOR]
- "ppBickelFreedman" [SRSWOR]
- "ppSitter" [SRSWOR]
- "ppHolmberg" [UPSWOR]
- "ppChauvet" [UPSWOR]
- "ppHotDeck" [UPSWOR]
- "dEfron" [SRSWOR]

- "dMcCarthySnowden" [SRSWOR]
- "dRaoWu" [SRSWOR]
- "dSitter" [SRSWOR]
- "dAntalTille_UPS" [UPSWOR]
- "wRaoWuYue" [SRSWOR]
- "wChipperfieldPreston" [SRSWOR]
- "wGeneralised" [any]

Value

The bootstrap variance of the Horvitz-Thompson estimator.

References

Mashreghi Z.; Haziza D.; Léger C., 2016. A survey of bootstrap methods in finite population sampling. Statistics Surveys 10 1-52.

Examples

```
library(bootstrapFP)

### Generate population data ---
N   <- 20; n <- 5
x   <- rgamma(N, scale=10, shape=5)
y   <- abs( 2*x + 3.7*sqrt(x) * rnorm(N) )
pik <- n * x/sum(x)

### Draw a dummy sample ---
s  <- sample(N, n)

### Estimate bootstrap variance ---
bootstrapFP(y = y[s], pik = n/N, B=100, method = "ppSitter")
bootstrapFP(y = y[s], pik = pik[s], B=10, method = "ppHolmberg", design = 'brewer')
bootstrapFP(y = y[s], pik = pik[s], B=10, D=10, method = "ppChauvet")
bootstrapFP(y = y[s], pik = n/N, B=10, method = "dRaoWu")
bootstrapFP(y = y[s], pik = n/N, B=10, method = "dSitter")
bootstrapFP(y = y[s], pik = pik[s], B=10, method = "dAntalTille_UPS", design='brewer')
bootstrapFP(y = y[s], pik = n/N, B=10, method = "wRaoWuYue")
bootstrapFP(y = y[s], pik = n/N, B=10, method = "wChipperfieldPreston")
bootstrapFP(y = y[s], pik = pik[s], B=10, method = "wGeneralised", distribution = 'normal')
```

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