

Package ‘sregsurvey’

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Type Package

Title Semiparametric Model-Assisted Estimation in Finite Population

Version 0.1.0

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Description It is a framework to fit semiparametric regression estimators for the total parameter of a finite population when the interest variable is asymmetric distributed. The main references for this package are: Sarndal C.E., Swensson B., and Wretman J. (2003, ISBN: 978-0-387-40620-6, "Model Assisted Survey Sampling." Springer-Verlag) and Cardozo C.A and Alonso C.E. (2021). "Semi-parametric model assisted estimation in finite populations." In preparation.

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Encoding UTF-8

RoxygenNote 7.1.1

Suggests survey

Imports gamlss, gamlss.dist, TeachingSampling, methods, dplyr, caret

NeedsCompilation no

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sreg_ber	<i>Semiparametric Model-Assisted Estimation under a Bernoulli Sampling Design</i>
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Description

sreg_ber is used to estimate the total parameter of a finite population generated from a semi-parametric generalized gamma population under a Bernoulli sampling design.

Usage

```
sreg_ber(location_formula, scale_formula, data, pi)
```

Arguments

location_formula	a symbolic description of the systematic component of the location model to be fitted.
scale_formula	a symbolic description of the systematic component of the scale model to be fitted.
data	a data frame, list containing the variables in the model.
pi	numeric, represents the first order probability. Default value is 0.5.

Value

sampling_design is the name of the sampling design used in the estimation process.

N is the population size.

n is the random sample size used in the estimation process.

first_order_probabilities vector of the first order probabilities used in the estimation process.

sample is the random sample used in the estimation process.

total_y_sreg is the SREG estimate of the total parameter of the finite population.

Author(s)

Carlos Alberto Cardozo Delgado <cardozorpackages@gmail.com>

References

Sarndal C.E., Swensson B., and Wretman J. (2003). Model Assisted Survey Sampling. Springer.

Cardozo C.A., Paula G., and Vanegas L. (2021). Generalized log-gamma semiparametric models with P-spline smoothing. Submitted.

Examples

```
#This example use the data set 'apipop' of the survey package.
library(survey)
library(dplyr)
data(api)
attach(apipop)
Apipop <- filter(apipop,full!= 'NA')
Apipop <- filter(Apipop, stype == 'H')
Apipop <- select(Apipop,c(api00,grad.sch,full))
sreg_ber(api00 ~ pb(grad.sch), scale_formula = ~ full - 1, data= Apipop, pi=0.25)
sum(Apipop$api00)
```

sreg_pips	<i>Semiparametric Model-Assisted Estimation under a Proportional to Size Sampling Design</i>
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Description

sreg_pips is used to estimate the total parameter of a finite population generated from a semi-parametric generalized gamma population under a proportional to size without-replacement sampling design.

Usage

```
sreg_pips(location_formula, scale_formula, data, x, n)
```

Arguments

location_formula	a symbolic description of the systematic component of the location model to be fitted.
scale_formula	a symbolic description of the systematic component of the scale model to be fitted.
data	a data frame, list containing the variables in the model.
x	vector, an auxiliary variable to calculate the inclusion probabilities of each unit.
n	numeric, sample size.

Value

sampling_design is the name of the sampling design used in the estimation process.

N is the population size.

n is the sample size used in the estimation process.

first_order_probabilities vector of the first order probabilities used in the estimation process.

sample is the random sample used in the estimation process.

total_y_sreg is the SREG estimate of the total parameter of the finite population.

Author(s)

Carlos Alberto Cardozo Delgado <cardozorpackages@gmail.com>

References

Sarndal C.E., Swensson B., and Wretman J. (2003). Model Assisted Survey Sampling. Springer.

Examples

```
library(survey)
library(dplyr)
data(api)
attach(apipop)
Apipop <- filter(apipop, full != 'NA')
Apipop <- filter(Apipop, stype == 'H')
Apipop <- select(Apipop, c(api00, grad.sch, full, api99))
n = ceiling(0.2 * dim(Apipop)[1])
aux_var <- select(Apipop, 'api99')
sreg_pips(api00 ~ pb(grad.sch), scale_formula = ~ full - 1, data = Apipop, x = aux_var, n = n)
sum(Apipop$api00)
```

sreg_poisson	<i>Semiparametric Model-Assisted Estimation under a Poisson Sampling Design</i>
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Description

sreg_poisson is used to estimate the total parameter of a finite population generated from a semi-parametric generalized gamma population under a Poisson sampling design.

Usage

```
sreg_poisson(location_formula, scale_formula, data, pis)
```

Arguments

location_formula	a symbolic description of the systematic component of the location model to be fitted.
scale_formula	a symbolic description of the systematic component of the scale model to be fitted.
data	a data frame, list containing the variables in the model.
pis	numeric vector, first order inclusion probabilities. Default value 0.1 for each element.

Value

sampling_design is the name of the sampling design used in the estimation process.

N is the population size.

n is the random sample size used in the estimation process.

first_order_probabilities vector of the first order probabilities used in the estimation process.

sample is the random sample used in the estimation process.

total_y_sreg is the SREG estimate of the total parameter of the finite population.

Author(s)

Carlos Alberto Cardozo Delgado <cardozorpackages@gmail.com>

References

Cardozo C.A, Alonso C. (2021) Semi-parametric model assisted estimation in finite populations. In preparation.

Sarndal C.E., Swensson B., and Wretman J. (2003). Model Assisted Survey Sampling. Springer.

Examples

```
library(survey)
library(dplyr)
data(api)
attach(apipop)
Apipop <- filter(apipop,full!= 'NA')
Apipop <- filter(Apipop, stype == 'H')
Apipop <- select(Apipop,c(api00,grad.sch,full))
sreg_poisson(api00 ~ pb(grad.sch), scale_formula = ~ full - 1, data= Apipop)
sum(Apipop$api00)
```

sreg_srswr

Semiparametric Model-Assisted Estimation under a Simple Random Sampling Without Replace Sampling Design

Description

sreg_srswr is used to estimate the total parameter of a finite population generated from a semi-parametric generalized gamma population under a simple random sampling without-replacement sampling design.

Usage

```
sreg_srswr(location_formula, scale_formula, data, fraction)
```

Arguments

location_formula	a symbolic description of the systematic component of the location model to be fitted.
scale_formula	a symbolic description of the systematic component of the scale model to be fitted.
data	a data frame, list containing the variables in the model.
fraction	numeric, represents a fraction of the size of the population. Default value is 0.2.

Value

sampling_design is the name of the sampling design used in the estimation process.

N is the population size.

n is the fixed sample size used in the estimation process.

first_order_probabilities vector of the first order probabilities used in the estimation process.

sample is the random sample used in the estimation process.

total_y_sreg is the SREG estimate of the total parameter of the finite population.

Author(s)

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References

Sarndal C.E., Swensson B., and Wretman J. (2003). Model Assisted Survey Sampling. Springer.

Cardozo C.A., Paula G., and Vanegas L. (2021). Generalized log-gamma semiparametric models with P-spline smoothing. Submitted.

Examples

```
library(survey)
library(dplyr)
data(api)
attach(api)
Apipop <- filter(api, full != 'NA')
Apipop <- filter(Apipop, stype == 'H')
Apipop <- select(Apipop, c(api00, grad.sch, full))
sreg_srswr(api00 ~ pb(grad.sch), scale_formula = ~ full - 1, data= Apipop, fraction=0.25)
sum(Apipop$api00)
```

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