

Package: allocation (via r-universe)

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Type Package

Title Exact Optimal Allocation Algorithms for Stratified Sampling

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Description Implements several exact methods for allocating optimal sample sizes when designing stratified samples. These methods are discussed in Wright (2012) <[doi:10.1080/00031305.2012.733679](https://doi.org/10.1080/00031305.2012.733679)> and Wright (2017) <[doi:10.1016/j.spl.2017.04.026](https://doi.org/10.1016/j.spl.2017.04.026)>.

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allocation-package *allocation*

Description

Package documentation

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allocation *Accessor for to Extract Allocation*

Description

Extract the allocation from the result of one of the [Allocation-Methods](#).

Usage

allocation(object)

Arguments

object Result from an allocation method

Value

A numeric vector whose elements contain an allocation for the corresponding stratum.

Allocation-Methods *Algorithms for Exact Optimization Allocation*

Description

Algorithms III and IV from Wright (2017), and classical unconstrained Neyman allocation (Neyman, 1934).

Usage

allocate_fixn(n0, N, S, lo = NULL, hi = NULL, control = allocation_control())

allocate_neyman(n0, N, S, control = allocation_control())

allocate_prec(v0, N, S, lo = NULL, hi = NULL, control = allocation_control())

Arguments

<code>n0</code>	Target sample size for Algorithm III; integer.
<code>N</code>	Population size for each stratum; integer vector of length H .
<code>S</code>	Standard deviation for each stratum; numeric vector of length H .
<code>lo</code>	Sample size lower bounds for each stratum; numeric vector of length H . Default argument NULL is transformed to a vector of ones.
<code>hi</code>	Sample size upper bounds for each stratum; numeric vector of length H . Default argument NULL is transformed to a vector of Inf.
<code>control</code>	Control object from allocation_control .
<code>v0</code>	Target variance for Algorithm IV; numeric.

Details

The function `allocate_fixn` implements Algorithm III of Wright (2017) and finds the optimal allocation for a given total sample size n_0 . The function `allocate_prec` implements Algorithm IV of Wright (2017) and optimally allocates units until the overall variance is smaller than a given v_0 . Classical Neyman allocation is implemented by the function `allocate_neyman`.

Value

A list whose structure depends on the allocation method.

`allocate_neyman`

- `n`: Integer vector with allocation n_1, \dots, n_H .
- `v`: Value of variance achieved at selected allocation.
- `N`: The argument `N` passed to the function.
- `S`: The argument `S` passed to the function.

`allocate_fixn`

- `n`: Integer vector with allocation n_1, \dots, n_H .
- `iter`: Number of steps taken in the algorithm.
- `v`: Value of variance achieved at selected allocation.
- `N`: The argument `N` passed to the function.
- `S`: The argument `S` passed to the function.
- `lo`: The argument `lo` passed to the function.
- `hi`: The argument `hi` passed to the function.

`allocate_prec`

- `n`: Integer vector with allocation n_1, \dots, n_H .
- `iter`: Number of steps taken in the algorithm.
- `v`: Value of variance achieved at selected allocation.
- `v0`: The argument `v0` passed to the function.

- N: The argument N passed to the function.
- S: The argument S passed to the function.
- lo: The argument lo passed to the function.
- hi: The argument hi passed to the function.

References

Neyman, Jerzy (1934). On the Two Different Aspects of the Representative Method: The Method of Stratified Sampling and the Method of Purposive Selection. *Journal of the Royal Statistical Society*, 97 (4): 558-625.

Tommy Wright (2012). The Equivalence of Neyman Optimum Allocation for Sampling and Equal Proportions for Apportioning the U.S. House of Representatives. *The American Statistician*, 66, pp.217-224.

Tommy Wright (2017), Exact optimal sample allocation: More efficient than Neyman, *Statistics & Probability Letters*, 129, pp.50-57.

allocation_control *Control Object for Allocation Methods*

Description

Additional arguments (controls) for [Allocation-Methods](#).

Usage

```
allocation_control(verbose = FALSE, bits = 256, tol = 1e-10, digits = 4)
```

Arguments

verbose	Logical; if TRUE, detailed information will be printed to the console by allocate_fixn and allocate_prec .
bits	Number of bits of precision to use with mpfr objects in internal calculations.
tol	A small positive number for use in allocate_prec ; if all strata have $V \leq \text{tol}$, regard the situation as one where no more allocation is possible, even if target value v_0 has not yet been attained.
digits	Number of decimals to display in output.

Value

An list of class allocation_control.

Examples

```
out1 = allocation_control()
out2 = allocation_control(verbose = TRUE, bits = 128, tol = 1e-8, digits = 2)
```

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