

Package: gsample (via r-universe)

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Type Package

Title Efficient Weighted Sampling Without Replacement

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Description Sample without replacement using the Gumbel-Max trick
(c.f. [url{https://arxiv.org/pdf/1903.06059.pdf}](https://arxiv.org/pdf/1903.06059.pdf)).

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

LinkingTo Rcpp

Imports Rcpp

SystemRequirements C++11

URL <https://github.com/vgherard/gsample>

BugReports <https://github.com/vgherard/gsample/issues>

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

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

RemoteUrl <https://github.com/vgherard/gsample>

RemoteRef HEAD

RemoteSha 5b1bbc8e768417389b6ca1451e80f93457cbcfba

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 gsample

Efficient weighted sampling without replacement

Description

These functions offer a drop-in replacement for [sample](#), with considerably better performance for the case of weighted sampling without replacement (both from the speed and memory point of view). The interface of `gsample` and `gsample.int` is essentially the same of the corresponding base functions, so that they can be replaced in base R code with little (if any) modification.

Usage

```
gsample.int(n, size = n, replace = FALSE, prob = NULL, algorithm = NULL)
```

```
gsample(x, size, replace = FALSE, prob)
```

Arguments

<code>n</code>	length one integer. The total number of categories to choose from. See ‘Details’.
<code>size</code>	length one integer. Size of sample.
<code>replace</code>	TRUE or FALSE. Sample with replacement? Defaults to FALSE.
<code>prob</code>	either NULL, or a numeric vector of length <code>n</code> , containing probability weights for sampling the various classes. If NULL (default), sampling is performed assuming uniform probabilities.
<code>algorithm</code>	either NULL, "introsselect" or "partial_heap". The default (NULL), uses a rough estimate of the relative time complexities to select between the two algorithms. See ‘Details’.
<code>x</code>	a vector of one or more elements from which to choose.

Details

These functions are meant to replace `base::sample()` and `base::sample.int()` for weighted sampling without replacement, for which the base implementation is inefficient. For uniform sampling, or sampling with replacement, `gsample` simply calls the base functions.

The APIs of `gsample()` and `gsample.int()` are almost identical to the ones of `base::sample()` and `base::sample.int()`, respectively, with the following differences:

- The argument `useHash` for `base::sample.int(replace = FALSE, prob = NULL)` is not provided.
- An additional `algorithm` argument.

The basic arguments `x`, `n`, `size`, `replace` and `prob` are documented in [sample](#), to which we refer. Here we describe the additional argument `algorithm`.

`gsample` supports two algorithms, "introsselect" and "partial_heap" with different space and time complexities for weighted sampling without replacement. If the argument `algorithm` is left as

default (NULL), `gsample()` tentatively selects the fastest algorithm based on a rough estimate of the two running times. `algorithm = "introselect"` has time complexity $T = O(n)$, and space complexity $S = O(n)$, whereas `algorithm = "partial_heap"` has time complexity $T = O(n * \log(\text{size}))$, and space complexity $S = O(\text{size})$. The running time of "introselect" is largely independent of the actual value of `prob`, whereas "partial_heap" can be get some speed-up (speed-down) if `prob` is sorted in decreasing (increasing) order.

Despite its worst asymptotic performance, "partial_heap" is typically faster for small sample sizes (of less than 100, say), in which case it is also much cheaper from the memory point of view.

Value

an integer vector of class indexes for `gsample.int`, a vector of the same type of `x` for `gsample`.

Author(s)

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Examples

```
set.seed(840)
gsample(letters, 5, prob = runif(length(letters)))
gsample.int(10, 3, prob = 10:1)
```

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