

Package ‘arrApply’

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Type Package

Title Apply a Function to a Margin of an Array

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Description High performance variant of apply() for a fixed set of functions.

Considerable speedup is a trade-off for universality, user defined functions cannot be used with this package. However, 21 most currently employed functions are available for usage. They can be divided in three types: reducing functions (like mean(), sum() etc., giving a scalar when applied to a vector), mapping function (like normalise(), cumsum() etc., giving a vector of the same length as the input vector) and finally, vector reducing function (like diff() which produces result vector of a length different from the length of input vector). Optional or mandatory additional arguments required by some functions (e.g. norm type for norm() or normalise() functions) can be passed as named arguments in '...'.

License GPL (>= 2)

Imports Rcpp (>= 0.12.0)

LinkingTo Rcpp, RcppArmadillo

Suggests testthat

RoxygenNote 6.1.1

SystemRequirements C++11

NeedsCompilation yes

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arrApply

*High Performance Variant of apply()***Description**

High performance variant of `apply()` for a fixed set of functions. Considerable speedup is a trade-off for universality, user defined functions cannot be used with `arrApply`. However, 20 most currently employed functions are available for usage. They can be divided in three types: reducing functions (like `mean()`, `sum()` etc., giving a scalar when applied to a vector), mapping function (like `normalise()`, `cumsum()` etc., giving a vector of the same length as the input vector) and finally, vector reducing function (like `diff()` which produces result vector of a length different from the length of input vector). Optional or mandatory additional arguments required by some functions (e.g. `norm` type for `norm()` or `normalise()` functions) can be passed as named arguments in `'...'`.

Usage

```
arrApply(arr, idim = 1L, fun = "sum", ...)
```

Arguments

<code>arr</code>	numeric array of arbitrary dimension
<code>idim</code>	integer, dimension number along which a function must be applied
<code>fun</code>	character string, function name to be applied
<code>...</code>	additional named parameters. Optional parameters can be helpful for the following functions: <code>sd()</code> , <code>var()</code> [<code>norm_type</code> : 0 normalisation using N-1 entries (default); 1 normalisation using N entries]; <code>norm()</code> [<code>p</code> : integer ≥ 1 (default=2) or one of <code>"-inf"</code> , <code>"inf"</code> , <code>"fro"</code> .] <code>normalise()</code> [<code>p</code> : integer ≥ 1 , default=2] <code>diff()</code> [<code>k</code> : integer ≥ 1 (default=1) number of recursive application of <code>diff()</code>]. The size of <code>idim</code> -th dimension will be reduced by <code>k</code> .] <code>trapez()</code> [<code>x</code> : numerical vector of the same length as <code>idim</code> -th size of <code>arr</code>] Mandatory parameter: <code>multv()</code> , <code>divv()</code> , <code>addv()</code> , <code>subv()</code> [<code>v</code> : numerical vector of the same length as <code>idim</code> -th size of <code>arr</code>]

Details

The following functions can be used as argument `'fun'` (brackets `[]` indicate additional parameters that can be passed in `'...'`): - reducing functions: `sum()`, `prod()`, `all()`, `any()`, `min()`, `max()`, `mean()`, `median()`, `sd()` [`norm_type`], `var()` [`norm_type`], `norm()` [`p`], `trapez()` [`x`] (trapezoidal integration with respect to spacing in `x`, if `x` is provided, otherwise unit spacing is used), `range()`; - mapping functions: `normalise()` [`p`], `cumsum()`, `cumprod()`, `multv()` [`v`] (multiply a given dimension by a vector `v`, term by term), `divv()` [`v`] (divide by a vector `v`), `addv()` [`v`] (add a vector `v`), `subv()` [`v`] (subtract a vector `v`); - vector reducing function: `diff()` [`k`].

`RcppArmadillo` is used to do the job in very fast way but it comes at price of not allowing NA in the input numeric array. Vectors are allowed at input. They are considered as arrays of dimension 1. So in this case, `idim` can only be 1. NB. Here, `range()` is different from R version of the homonym function. In `Armadillo`, when applied to a vector, it returns a scalar max-min, while in R, it return a 2-component vector (`min`, `max`).

Value

output array of dimension cut by 1 (the idim-th dimension will disappear for reducing functions) or of the same dimension as the input arr for mapping and vector reducing functions. For vector reducing functions, the idim-th dimension will be different from idim-th dimension of arr. The type of result (numeric or logical) depends on the function applied, logical for all() and any(), numerical – for all other functions.

Author(s)

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Examples

```
arr=matrix(1:12, 3, 4)
v1=arrApply(arr, 2, "mean")
v2=rowMeans(arr)
stopifnot(all(v1==v2))
```

```
arr=array(1:24, dim=2:4) # dim(arr)=c(2, 3, 4)
mat=arrApply(arr, 2, "prod") # dim(mat)=c(2, 4), the second dimension is cut out
stopifnot(all(mat==apply(arr, c(1, 3), prod)))
```

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