

Package ‘slam’

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Title Sparse Lightweight Arrays and Matrices

Description Data structures and algorithms for sparse arrays and matrices, based on index arrays and simple triplet representations, respectively.

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`crossprod`*Matrix Crossproduct*

Description

Compute the matrix cross-product of a sparse and dense matrix.

Usage

```
tcrossprod.simple_triplet_matrix(x, y = NULL)
```

Arguments

`x` a matrix in `simple_triplet_matrix`-form.
`y` a numeric matrix.

Details

Provides fast computation of `x %**% t(y)` (`tcrossprod`).

Value

A double matrix, with appropriate `dimnames` taken from `x` and `y`.

Note

If `y = NULL` or contains any of the special values `NA`, `NaN`, or `Inf` then `x` is coerced to `matrix` and the computation is delegated to `tcrossprod`.

Author(s)

Christian Buchta

See Also

[crossprod](#) for dense-on-dense computations.

Examples

```
##  
x <- matrix(c(1, 0, 0, 2, 1, 0), nrow = 3)  
x  
s <- as.simple_triplet_matrix(x)  
tcrossprod.simple_triplet_matrix(s, x)  
## see note  
tcrossprod.simple_triplet_matrix(s)
```

`simple_sparse_array`*Simple Sparse Arrays*

Description

Data structures and operators for sparse arrays based on a representation by index matrix and value vector.

Usage

```
simple_sparse_array(i, v, dim = NULL, dimnames = NULL)
```

```
as.simple_sparse_array(x)
```

```
is.simple_sparse_array(x)
```

Arguments

<code>i</code>	Integer matrix of array indices.
<code>v</code>	Vector of values.
<code>dim</code>	Integer vector specifying the size of the dimensions.
<code>dimnames</code>	either <code>NULL</code> or the names for the dimensions. This is a list with one component for each dimension, either <code>NULL</code> or a character vector of the length given by <code>dim</code> for that dimension. The list can be named, and the list names will be used as names for the dimensions. If the list is shorter than the number of dimensions, it is extended by <code>NULL</code> 's to the length required.
<code>x</code>	An R object.

Details

`simple_sparse_array` is a generator for a class of “lightweight” sparse arrays, represented by index matrices and value vectors. Currently, only methods for indexing and coercion are implemented.

See Also

[simple_sparse_array](#) for sparse arrays.

Examples

```
x <- array(c(1, 0, 0, 2, 0, 0, 0, 3), dim = c(2, 2, 2))
s <- as.simple_sparse_array(x)
identical(x, as.array(s))
```

```
simple_sparse_array(matrix(c(1, 1, 1, 3, 3, 3), nrow = 2), c(1, 2))
```

```
simple_triplet_matrix
      Simple Triplet Matrix
```

Description

Data structures and operators for sparse matrices based on simple triplet representation.

Usage

```
simple_triplet_matrix(i, j, v, nrow = max(i), ncol = max(j), dimnames = NULL)
simple_triplet_zero_matrix(nrow, ncol = nrow, mode = "double")
simple_triplet_diag_matrix(v, nrow = length(v))

as.simple_triplet_matrix(x)
is.simple_triplet_matrix(x)
```

Arguments

<code>i, j</code>	Integer vectors of row and column indices, respectively.
<code>v</code>	Vector of values.
<code>nrow, ncol</code>	Integer values specifying the number of rows and columns, respectively. Defaults are the maximum row and column indices, respectively.
<code>dimnames</code>	A <code>dimnames</code> attribute for the matrix: <code>NULL</code> or a list of length 2 giving the row and column names respectively. An empty list is treated as <code>NULL</code> , and a list of length one as row names. The list can be named, and the list names will be used as names for the dimensions.
<code>mode</code>	Character string specifying the mode of the values.
<code>x</code>	An R object.

Details

`simple_triplet_matrix` is a generator for a class of “lightweight” sparse matrices, “simply” represented by triplets (`i`, `j`, `v`) of row indices `i`, column indices `j`, and values `v`, respectively. `simple_triplet_zero_matrix` and `simple_triplet_diag_matrix` are convenience functions for the creation of empty and diagonal matrices.

Currently implemented operations include the addition, subtraction, multiplication and division of compatible simple triplet matrices, as well as the multiplication and division of a simple triplet matrix and a vector. Comparisons of the elements of a simple triplet matrices with a number are also provided. In addition, methods for indexing, combining by rows (`rbind`) and columns (`cbind`), transposing (`t`), concatenating (`c`), and detecting/extracting duplicated and unique rows are implemented.

See Also

[simple_sparse_array](#) for sparse arrays.

Examples

```
x <- matrix(c(1, 0, 0, 2), nrow = 2)
s <- as.simple_triplet_matrix(x)
identical(x, as.matrix(s))

simple_triplet_matrix(c(1, 4), c(1, 2), c(1, 2))
simple_triplet_zero_matrix(3)
simple_triplet_diag_matrix(1:3)

cbind(rbind(x, t(x)), rbind(x, x))
```

sums

*Form Row and Column Sums and Means***Description**

Form row and column sums and means for sparse arrays (currently `simple_triplet_matrix` only).

Usage

```
rowSums(x, na.rm = FALSE, dims = 1, ...)
colSums(x, na.rm = FALSE, dims = 1, ...)
rowMeans(x, na.rm = FALSE, dims = 1, ...)
colMeans(x, na.rm = FALSE, dims = 1, ...)

## S3 method for class 'simple_triplet_matrix':
rowSums(x, na.rm = FALSE, dims = 1, ...)
## S3 method for class 'simple_triplet_matrix':
colSums(x, na.rm = FALSE, dims = 1, ...)
## S3 method for class 'simple_triplet_matrix':
rowMeans(x, na.rm = FALSE, dims = 1, ...)
## S3 method for class 'simple_triplet_matrix':
colMeans(x, na.rm = FALSE, dims = 1, ...)
```

Arguments

<code>x</code>	a sparse array containing numeric, integer, or logical values.
<code>na.rm</code>	logical. Should missing values (including <code>NaN</code>) be omitted from the calculations?
<code>dims</code>	currently not used for sparse arrays.
<code>...</code>	currently not used for sparse arrays.

Details

Provides fast summation over the rows or columns of sparse matrices in `simple_triplet`-form.

Value

A numeric (double) array of suitable size, or a vector if the result is one-dimensional. The `dimnames` (or names for a vector result) are taken from the original array.

Note

Results are always of storage type `double` to avoid (integer) overflows.

Author(s)

Christian Buchta

See Also

`simple_triplet_matrix`, `colSums` for dense numeric arrays.

Examples

```
##
x <- matrix(c(1, 0, 0, 2, 1, NA), nrow = 3)
x
s <- as.simple_triplet_matrix(x)
rowSums(s)
rowSums(s, na.rm = TRUE)
colSums(s)
colSums(s, na.rm = TRUE)
```

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