Package 'DelayedMatrixStats'

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Type Package

Title Functions that Apply to Rows and Columns of 'DelayedMatrix' Objects

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Description A port of the 'matrixStats' API for use with DelayedMatrix objects from the 'DelayedArray' package. High-performing functions operating on rows and columns of DelayedMatrix objects, e.g. col / rowMedians(), col / rowRanks(), and col / rowSds(). Functions optimized per data type and for subsetted calculations such that both memory usage and processing time is minimized.

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Suggests testthat, knitr, rmarkdown, BiocStyle, microbenchmark, profmem, HDF5Array, matrixStats (>= 1.0.0)

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colAlls,DelayedMatrix-method

> *Check if all elements in a row (column) of a matrix-like object are
> equal to a value*

Description

Check if all elements in a row (column) of a matrix-like object are equal to a value.

Usage

```
## S4 method for signature 'DelayedMatrix'
colAlls(
  x,
  rows = NULL,
  cols = NULL,
  value = TRUE,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colAnys(
  x,
  rows = NULL,
  cols = NULL,
  value = TRUE,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowAlls(
  x,
  rows = NULL,
  cols = NULL,
  value = TRUE,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowAnys(
  x,
  rows = NULL,
  cols = NULL,
  value = TRUE,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x   A NxK [DelayedMatrix.](#)

rows, cols	A [vector](#) indicating the subset of rows (and/or columns) to operate over. If [NULL](#), no subsetting is done.
value	The value to search for.
na.rm	If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).
...	Additional arguments passed to specific methods.
useNames	If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowAlls](#) / matrixStats::[colAlls](#).

Value

Returns a [logical](#) [vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowAlls](#)() and matrixStats::[colAlls](#)() which are used when the input is a matrix or numeric vector.
- For checks if *any* element is equal to a value, see [rowAnys](#)().
- base::[all](#)().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'SolidRleArraySeed' seed
dm_Rle <- RleArray(Rle(c(rep(1L, 5),
                         as.integer((0:4) ^ 2),
                         seq(-5L, -1L, 1L))),
                   dim = c(5, 3))

colAlls(dm_matrix, value = 1)
colAnys(dm_matrix, value = 2)
rowAlls(dm_Rle, value = 1)
rowAnys(dm_Rle, value = 2)
```

colAnyNAs,DelayedMatrix-method

Check if any elements in a row (column) of a matrix-like object is missing

Description

Check if any elements in a row (column) of a matrix-like object is missing.

Usage

```
## S4 method for signature 'DelayedMatrix'
colAnyNAs(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowAnyNAs(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowAnyNAs]() / matrixStats::[colAnyNAs]().

Value

Returns a [logical](#) [vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- `matrixStats::`[rowAnyNAs](#)`()` and `matrixStats::`[colAnyNAs](#)`()` which are used when the input is a `matrix` or numeric vector.
- For checks if any element is equal to a value, see [rowAnys](#)`()`.
- `base::`[is.na](#)`()` and `base::`[any](#)`()`.

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'HDF5ArraySeed' seed
# NOTE: Requires that the HDF5Array package is installed
library(HDF5Array)
dm_HDF5 <- writeHDF5Array(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))

dm_matrix[dm_matrix > 3] <- NA
colAnyNAs(dm_matrix)
dm_HDF5[dm_HDF5 > 3] <- NA
rowAnyNAs(dm_HDF5)
```

---

colAvgsPerRowSet,DelayedMatrix-method

> *Calculates for each row (column) a summary statistic for equally sized subsets of columns (rows)*

Description

Calculates for each row (column) a summary statistic for equally sized subsets of columns (rows).

Usage

```
## S4 method for signature 'DelayedMatrix'
colAvgsPerRowSet(
  X,
  W = NULL,
  cols = NULL,
  S,
  FUN = colMeans,
```

```
  ...,
  force_block_processing = FALSE,
  na.rm = NA,
  tFUN = FALSE
)

## S4 method for signature 'DelayedMatrix'
rowAvgsPerColSet(
  X,
  W = NULL,
  rows = NULL,
  S,
  FUN = rowMeans,
  ...,
  force_block_processing = FALSE,
  na.rm = NA,
  tFUN = FALSE
)
```

Arguments

X	A NxM [DelayedMatrix]().
W	An optional numeric NxM matrix of weights.
S	An [integer]() KxJ matrix that specifying the J subsets. Each column hold K column (row) indices for the corresponding subset. The range of values is [1, M] ([1,N]).
FUN	A row-by-row (column-by-column) summary statistic function. It is applied to to each column (row) subset of X that is specified by S.
...	Additional arguments passed to specific methods.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
na.rm	(logical) Argument passed to FUN() as na.rm = na.rm. If NA (default), then na.rm = TRUE is used if X or S holds missing values, otherwise na.rm = FALSE.
tFUN	If TRUE, X is transposed before it is passed to FUN.
rows, cols	A [vector]() indicating the subset (and/or columns) to operate over. If [NULL](), no subsetting is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowAvgsPerColSet]() / matrixStats::[colAvgsPerRowSet]().

Value

Returns a numeric JxN (MxJ) matrix.

Author(s)

Peter Hickey

See Also

- matrixStats::rowAvgsPerColSet() and matrixStats::colAvgsPerRowSet() which are used when the input is a `matrix` or numeric vector.

Examples

```
# A DelayedMatrix with a 'DataFrame' seed
dm_DF <- DelayedArray(S4Vectors::DataFrame(C1 = rep(1L, 5),
                                           C2 = as.integer((0:4) ^ 2),
                                           C3 = seq(-5L, -1L, 1L)))
colAvgsPerRowSet(dm_DF, S = matrix(1:2, ncol = 2))

rowAvgsPerColSet(dm_DF, S = matrix(1:2, ncol = 1))
```

---

colCollapse,DelayedMatrix-method

Extract one cell from each row (column) of a matrix-like object

---

Description

Extract one cell from each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colCollapse(
  x,
  idxs,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowCollapse(
  x,
  idxs,
  rows = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK DelayedMatrix.
idxs	An index vector with the position to extract. It is recycled to match the number of rows (column)

force_block_processing

      FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary base::array.

...   Additional arguments passed to specific methods.

useNames   If TRUE (default), names attributes of result are set. Else if FALSE, no naming support is done.

rows, cols   A vector indicating the subset of rows (and/or columns) to operate over. If NULL, no subsetting is done.

Details

The S4 methods for x of type matrix, array, table, or numeric call matrixStats::rowCollapse / matrixStats::colCollapse.

Value

Returns a numeric vector of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowCollapse() and matrixStats::colCollapse() which are used when the input is a matrix or numeric vector.

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'HDF5ArraySeed' seed
# NOTE: Requires that the HDF5Array package is installed
library(HDF5Array)
dm_HDF5 <- writeHDF5Array(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))

# Extract the 4th row as a vector
# NOTE: An ordinary vector is returned regardless of the backend of
#       the DelayedMatrix object
colCollapse(dm_matrix, 4)
colCollapse(dm_HDF5, 4)

# Extract the 2nd column as a vector
# NOTE: An ordinary vector is returned regardless of the backend of
#       the DelayedMatrix object
rowCollapse(dm_matrix, 2)
```

```
rowCollapse(dm_HDF5, 2)
```

---

colCounts,DelayedMatrix-method

*Count how often an element in a row (column) of a matrix-like object
is equal to a value*

Description

Count how often an element in a row (column) of a matrix-like object is equal to a value.

Usage

```
## S4 method for signature 'DelayedMatrix'
colCounts(
  x,
  rows = NULL,
  cols = NULL,
  value = TRUE,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowCounts(
  x,
  rows = NULL,
  cols = NULL,
  value = TRUE,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK DelayedMatrix.
rows, cols	A vector indicating the subset of rows (and/or columns) to operate over. If NULL, no subsetting is done.
value	The value to search for.
na.rm	If TRUE, missing values (NA or NaN) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary base::array.

...	Additional arguments passed to specific methods.
useNames	If TRUE (default), names attributes of result are set. Else if FALSE, no naming support is done.

Details

The S4 methods for x of type matrix, array, table, or numeric call matrixStats::rowCounts / matrixStats::colCounts.

Value

Returns a integer vector of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowCounts() and matrixStats::colCounts() which are used when the input is a matrix or numeric vector.
- For checks if any element is equal to a value, see rowAnys(). To check if all elements are equal, see rowAlls().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'DataFrame' seed
dm_DF <- DelayedArray(S4Vectors::DataFrame(C1 = rep(1L, 5),
                                           C2 = as.integer((0:4) ^ 2),
                                           C3 = seq(-5L, -1L, 1L)))

colCounts(dm_matrix, value = 1)
# Only count those in the first 4 rows
colCounts(dm_matrix, rows = 1:4, value = 1)

rowCounts(dm_DF, value = 5)
# Only count those in the odd-numbered rows of the 2nd column
rowCounts(dm_DF, rows = seq(1, nrow(dm_DF), 2), cols = 2, value = 5)
```

---

colCummaxs,DelayedMatrix-method

Calculates the cumulative maxima for each row (column) of a matrix-like object

---

Description

Calculates the cumulative maxima for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colCummaxs(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colCummins(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colCumprods(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colCumsums(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowCummaxs(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
```

```
rowCummins(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowCumprods(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowCumsums(
  x,
  rows = NULL,
  cols = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x   A NxK [DelayedMatrix](#).

rows, cols   A [vector](#) indicating the subset of rows (and/or columns) to operate over. If
                      [NULL](#), no subsetting is done.

force_block_processing
                      FALSE (the default) means that a seed-aware, optimised method is used (if avail-
                      able). This can be overridden to use the general block-processing strategy by
                      setting this to TRUE (typically not advised). The block-processing strategy loads
                      one or more (depending on \link[DelayedArray]{getAutoBlockSize}())
                      columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).

...   Additional arguments passed to specific methods.

useNames   If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming
                      support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowCummaxs](#)
/ matrixStats::[colCummaxs](#).

Value

Returns a [numeric](#) [matrix](#)with the same dimensions as x.

Author(s)

Peter Hickey

See Also

- matrixStats::rowCummaxs() and matrixStats::colCummaxs() which are used when the input is a matrix or numeric vector.
- For single maximum estimates, see rowMaxs().
- base::cummax().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                           as.integer((0:4) ^ 2),
                                           seq(-5L, -1L, 1L)),
                                         ncol = 3))

colCummaxs(dm_matrix)

colCummins(dm_matrix)

colCumprods(dm_matrix)

colCumsums(dm_matrix)

# Only use rows 2-4
rowCummaxs(dm_Matrix, rows = 2:4)

# Only use rows 2-4
rowCummins(dm_Matrix, rows = 2:4)

# Only use rows 2-4
rowCumprods(dm_Matrix, rows = 2:4)

# Only use rows 2-4
rowCumsums(dm_Matrix, rows = 2:4)
```

colDiffs,DelayedMatrix-method
                        Calculates the difference between each element of a row (column) of a
                        matrix-like object

Description

Calculates the difference between each element of a row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colDiffs(
  x,
  rows = NULL,
  cols = NULL,
  lag = 1L,
  differences = 1L,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowDiffs(
  x,
  rows = NULL,
  cols = NULL,
  lag = 1L,
  differences = 1L,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
lag	An integer specifying the lag.
differences	An integer specifying the order of difference.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowDiffs]() / matrixStats::[colDiffs]().

Value

Returns a [numeric]() [matrix]() with one column (row) less than x: $Nx(K - 1)$ or $(N - 1)xK$.

Author(s)

Peter Hickey

See Also

- `matrixStats::`rowDiffs`()` and `matrixStats::`colDiffs`()` which are used when the input is a `matrix` or `numeric` vector.
- `base::`diff`()`.

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'HDF5ArraySeed' seed
# NOTE: Requires that the HDF5Array package is installed
library(HDF5Array)
dm_HDF5 <- writeHDF5Array(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))

colDiffs(dm_matrix)

rowDiffs(dm_HDF5)
# In reverse column order
rowDiffs(dm_HDF5, cols = seq(ncol(dm_HDF5), 1, -1))
```

---

colIQRDiffs,DelayedMatrix-method

Calculates the interquartile range of the difference between each element of a row (column) of a matrix-like object

---

Description

Calculates the interquartile range of the difference between each element of a row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colIQRDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
```

```
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colMadDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colSdDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colVarDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowIQRDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
```

```
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowMadDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowSdDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowVarDiffs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  diff = 1L,
  trim = 0,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix](#).
rows, cols	A [vector](#) indicating the subset of rows (and/or columns) to operate over. If [NULL](#), no subsetting is done.
na.rm	If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.
diff	An integer specifying the order of difference.
trim	A double in [0,1/2] specifying the fraction of observations to be trimmed from each end of (sorted) x before estimation.

force_block_processing

> FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary base::array.

...   Additional arguments passed to specific methods.

useNames   If TRUE (default), names attributes of result are set. Else if FALSE, no naming support is done.

Details

The S4 methods for x of type matrix, array, table, or numeric call matrixStats::rowIQRDiffs / matrixStats::colIQRDiffs.

Value

Returns a numeric vector of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowIQRDiffs() and matrixStats::colIQRDiffs() which are used when the input is a matrix or numeric vector.
- For the direct interquartile range see also rowIQRs.

Examples

```
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                           as.integer((0:4) ^ 2),
                                           seq(-5L, -1L, 1L)),
                                         ncol = 3))
# A DelayedMatrix with a 'SolidRleArraySeed' seed
dm_Rle <- RleArray(Rle(c(rep(1L, 5),
                         as.integer((0:4) ^ 2),
                         seq(-5L, -1L, 1L))),
                   dim = c(5, 3))

colIQRDiffs(dm_Matrix)

colMadDiffs(dm_Matrix)

colSdDiffs(dm_Matrix)

colVarDiffs(dm_Matrix)

# Only using rows 2-4
rowIQRDiffs(dm_Rle, rows = 2:4)

# Only using rows 2-4
rowMadDiffs(dm_Rle, rows = 2:4)
```

```
# Only using rows 2-4
rowSdDiffs(dm_Rle, rows = 2:4)

# Only using rows 2-4
rowVarDiffs(dm_Rle, rows = 2:4)
```

colIQRs,DelayedMatrix-method

Calculates the interquartile range for each row (column) of a matrix-like object

Description

Calculates the interquartile range for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colIQRs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowIQRs(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix](#).
rows, cols	A [vector](#) indicating the subset of rows (and/or columns) to operate over. If [NULL](#), no subsetting is done.
na.rm	If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).

...	Additional arguments passed to specific methods.
useNames	If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowIQRs](#) / matrixStats::[colIQRs](#).

Value

Returns a [numeric vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowIQRs](#)() and matrixStats::[colIQRs](#)() which are used when the input is a matrix or numeric vector.
- For a non-robust analog, see [rowSds](#)(). For a more robust version see [rowMads()](#)
- stats::[IQR](#)().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                           as.integer((0:4) ^ 2),
                                           seq(-5L, -1L, 1L)),
                                         ncol = 3))

colIQRs(dm_matrix)

# Only using rows 2-4
rowIQRs(dm_matrix, rows = 2:4)
```

---

colLogSumExps,DelayedMatrix-method
Accurately calculates the logarithm of the sum of exponentials for each row (column) of a matrix-like object

---

Description

Accurately calculates the logarithm of the sum of exponentials for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colLogSumExps(
  lx,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowLogSumExps(
  lx,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

lx	A NxK [DelayedMatrix](#). Typically, lx are $log(x)$ values.
rows, cols	A [vector](#) indicating the subset (and/or columns) to operate over. If [NULL](#), no subsetting is done.
na.rm	If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).
...	Additional arguments passed to specific methods.
useNames	If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowLogSumExps](#) / matrixStats::[colLogSumExps](#).

Value

Returns a [numeric](#) [vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowLogSumExps() and matrixStats::colLogSumExps() which are used when the input is a matrix or numeric vector.
- rowSums2()

Examples

```
x <- DelayedArray(matrix(runif(10), ncol = 2))
colLogSumExps(log(x))
rowLogSumExps(log(x))
```

---

colMads,DelayedMatrix-method

Calculates the median absolute deviation for each row (column) of a matrix-like object

---

Description

Calculates the median absolute deviation for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colMads(
  x,
  rows = NULL,
  cols = NULL,
  center = NULL,
  constant = 1.4826,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colSds(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  center = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowMads(
  x,
```

```
  rows = NULL,
  cols = NULL,
  center = NULL,
  constant = 1.4826,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowSds(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  center = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix](#).
rows, cols	A [vector](#) indicating the subset of rows (and/or columns) to operate over. If [NULL](#), no subsetting is done.
center	(optional) the center, defaults to the row means
constant	A scale factor. See stats::[mad](#)() for details.
na.rm	If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).
...	Additional arguments passed to specific methods.
useNames	If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowMads](#) / matrixStats::[colMads](#).

Value

Returns a [numeric](#) [vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowMads() and matrixStats::colMads() which are used when the input is a matrix or numeric vector.
- For mean estimates, see rowMeans2() and rowMeans().
- For non-robust standard deviation estimates, see rowSds().

Examples

```
# A DelayedMatrix with a 'data.frame' seed
dm_df <- DelayedArray(data.frame(C1 = rep(1L, 5),
                                 C2 = as.integer((0:4) ^ 2),
                                 C3 = seq(-5L, -1L, 1L)))
# A DelayedMatrix with a 'DataFrame' seed
dm_DF <- DelayedArray(S4Vectors::DataFrame(C1 = rep(1L, 5),
                                           C2 = as.integer((0:4) ^ 2),
                                           C3 = seq(-5L, -1L, 1L)))

colMads(dm_df)

colSds(dm_df)

rowMads(dm_DF)

rowSds(dm_DF)
```

---

colMeans2,DelayedMatrix-method
Calculates the mean for each row (column) of a matrix-like object

---

Description

Calculates the mean for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colMeans2(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'Matrix'
colMeans2(x, rows = NULL, cols = NULL, na.rm = FALSE, ..., useNames = TRUE)

## S4 method for signature 'SolidRleArraySeed'
colMeans2(x, rows = NULL, cols = NULL, na.rm = FALSE, ..., useNames = TRUE)
```

```
## S4 method for signature 'DelayedMatrix'
rowMeans2(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'Matrix'
rowMeans2(x, rows = NULL, cols = NULL, na.rm = FALSE, ..., useNames = TRUE)
```

Arguments

x	A NxK [DelayedMatrix](#).
rows, cols	A [vector](#) indicating the subset of rows (and/or columns) to operate over. If [NULL](#), no subsetting is done.
na.rm	If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).
...	Additional arguments passed to specific methods.
useNames	If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowMeans2](#) / matrixStats::[colMeans2](#).

Value

Returns a [numeric](#) [vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowMeans2](#)() and matrixStats::[colMeans2](#)() which are used when the input is a matrix or numeric vector.
- See also [rowMeans](#)() for the corresponding function in base R.
- For variance estimates, see [rowVars](#)().
- See also the base R version base::[rowMeans](#)().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'SolidRleArraySeed' seed
dm_Rle <- RleArray(Rle(c(rep(1L, 5),
                         as.integer((0:4) ^ 2),
                         seq(-5L, -1L, 1L))),
                   dim = c(5, 3))

colMeans2(dm_matrix)

# NOTE: Temporarily use verbose output to demonstrate which method is
#       which method is being used
options(DelayedMatrixStats.verbose = TRUE)
# By default, this uses a seed-aware method for a DelayedMatrix with a
# 'SolidRleArraySeed' seed
rowMeans2(dm_Rle)
# Alternatively, can use the block-processing strategy
rowMeans2(dm_Rle, force_block_processing = TRUE)
options(DelayedMatrixStats.verbose = FALSE)
```

---

colMedians,DelayedMatrix-method

Calculates the median for each row (column) of a matrix-like object

---

Description

Calculates the median for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colMedians(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowMedians(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
```

```
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
na.rm	If [TRUE](), missing values ([NA]() or [NaN]()) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowMedians]() / matrixStats::[colMedians]().

Value

Returns a [numeric]() [vector]() of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowMedians]() and matrixStats::[colMedians]() which are used when the input is a matrix or numeric vector.
- For mean estimates, see [rowMeans2]() and [rowMeans]().

Examples

```
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                           as.integer((0:4) ^ 2),
                                           seq(-5L, -1L, 1L)),
                                         ncol = 3))

colMedians(dm_Matrix)

rowMedians(dm_Matrix)
```

colOrderStats,DelayedMatrix-method

Calculates an order statistic for each row (column) of a matrix-like object

Description

Calculates an order statistic for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colOrderStats(
  x,
  rows = NULL,
  cols = NULL,
  which,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowOrderStats(
  x,
  rows = NULL,
  cols = NULL,
  which,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
which	An integer index in [1,K] ([1,N]) indicating which order statistic to be returned
force_block_processing	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowOrderStats](#)
/ matrixStats::[colOrderStats](#).

Value

Returns a [numeric vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowOrderStats](#)() and matrixStats::[colOrderStats](#)() which are used when
  the input is a matrix or numeric vector.

Examples

```
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                         as.integer((0:4) ^ 2),
                                         seq(-5L, -1L, 1L)),
                                       ncol = 3))
# Only using columns 2-3
colOrderStats(dm_Matrix, cols = 2:3, which = 1)

# Different algorithms, specified by `which`, may give different results
rowOrderStats(dm_Matrix, which = 1)
rowOrderStats(dm_Matrix, which = 2)
```

---

colProds,DelayedMatrix-method
                         Calculates the product for each row (column) of a matrix-like object

---

Description

Calculates the product for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colProds(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  method = c("direct", "expSumLog"),
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

```
## S4 method for signature 'SolidRleArraySeed'
colProds(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  method = c("direct", "expSumLog"),
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowProds(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  method = c("direct", "expSumLog"),
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
na.rm	If [TRUE](), missing values ([NA]() or [NaN]()) are omitted from the calculations.
method	A character vector of length one that specifies the how the product is calculated. Note, that this is not a generic argument and not all implementation have to provide it.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowProds]() / matrixStats::[colProds]().

Value

Returns a [numeric]() [vector]() of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowProds() and matrixStats::colProds() which are used when the input is a matrix or numeric vector.
- For sums across rows (columns), see rowSums2() (colSums2())
- base::prod().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'HDF5ArraySeed' seed
# NOTE: Requires that the HDF5Array package is installed
library(HDF5Array)
dm_HDF5 <- writeHDF5Array(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))

colProds(dm_matrix)

rowProds(dm_matrix)
```

---

colQuantiles,DelayedMatrix-method
                          Calculates quantiles for each row (column) of a matrix-like object

---

Description

Calculates quantiles for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colQuantiles(
  x,
  rows = NULL,
  cols = NULL,
  probs = seq(from = 0, to = 1, by = 0.25),
  na.rm = FALSE,
  type = 7L,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE,
  drop = TRUE
```

```
)

## S4 method for signature 'DelayedMatrix'
rowQuantiles(
  x,
  rows = NULL,
  cols = NULL,
  probs = seq(from = 0, to = 1, by = 0.25),
  na.rm = FALSE,
  type = 7L,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE,
  drop = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
probs	A numeric vector of J probabilities in [0, 1].
na.rm	If [TRUE](), missing values ([NA]() or [NaN]()) are omitted from the calculations.
type	An integer specifying the type of estimator. See stats::[quantile]() for more details.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.
drop	If TRUE a vector is returned if J == 1.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowQuantiles]() / matrixStats::[colQuantiles]().

Value

a [numeric]() NxJ (KxJ) [matrix](), where N (K) is the number of rows (columns) for which the J values are calculated.

Author(s)

Peter Hickey

See Also

- matrixStats::rowQuantiles() and matrixStats::colQuantiles() which are used when
  the input is a matrix or numeric vector.
- stats::quantile

Examples

```
# A DelayedMatrix with a 'data.frame' seed
dm_df <- DelayedArray(data.frame(C1 = rep(1L, 5),
                                 C2 = as.integer((0:4) ^ 2),
                                 C3 = seq(-5L, -1L, 1L)))

# colnames, if present, are preserved as rownames on output
colQuantiles(dm_df)

# Input has no rownames so output has no rownames
rowQuantiles(dm_df)
```

---

colRanks,DelayedMatrix-method

*Calculates the rank of the elements for each row (column) of a matrix-
like object*

Description

Calculates the rank of the elements for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colRanks(
  x,
  rows = NULL,
  cols = NULL,
 ties.method = c("max", "average", "first", "last", "random", "max", "min", "dense"),
  preserveShape = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowRanks(
  x,
  rows = NULL,
  cols = NULL,
 ties.method = c("max", "average", "first", "last", "random", "max", "min", "dense"),
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
ties.method	A character string specifying how ties are treated. Note that the default specifies fewer options than the original matrixStats package.
preserveShape	If TRUE the output matrix has the same shape as the input x. Note, that this is not a generic argument and not all implementation of this function have to provide it.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowRanks]() / matrixStats::[colRanks]().

The matrixStats::rowRanks() function can handle a lot of different values for the ties.method argument. Users of the generic function should however only rely on max and average because the other ones are not guaranteed to be implemented:

max for values with identical values the maximum rank is returned

average for values with identical values the average of the ranks they cover is returned. Note, that in this case the return value is of type numeric.

Value

A [matrix]() of type [integer]() is returned, unless ties.method = "average" when it is of type [numeric]().

The rowRanks() function always returns an NxK [matrix](), where N (K) is the number of rows (columns) whose ranks are calculated.

The colRanks() function returns an NxK [matrix](), if preserveShape = TRUE, otherwise a KxN [matrix]().

Any [names]() of x are ignored and absent in the result.

Author(s)

Peter Hickey

See Also

- matrixStats::[rowRanks]() and matrixStats::[colRanks]() which are used when the input is a matrix or numeric vector.
- [base::rank]()

Examples

```
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                           as.integer((0:4) ^ 2),
                                           seq(-5L, -1L, 1L)),
                                         ncol = 3))

colRanks(dm_Matrix)

rowRanks(dm_Matrix)
```

---

colSums2,DelayedMatrix-method
                              Calculates the sum for each row (column) of a matrix-like object

---

Description

Calculates the sum for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colSums2(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'Matrix'
colSums2(x, rows = NULL, cols = NULL, na.rm = FALSE, ..., useNames = TRUE)

## S4 method for signature 'SolidRleArraySeed'
colSums2(x, rows = NULL, cols = NULL, na.rm = FALSE, ..., useNames = TRUE)

## S4 method for signature 'DelayedMatrix'
rowSums2(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'Matrix'
rowSums2(x, rows = NULL, cols = NULL, na.rm = FALSE, ..., useNames = TRUE)
```

Arguments

x	A NxK [DelayedMatrix]().
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
na.rm	If [TRUE](), missing values ([NA]() or [NaN]()) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowSums2]() / matrixStats::[colSums2]().

Value

Returns a [numeric vector]() of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowSums2]() and matrixStats::[colSums2]() which are used when the input is a matrix or numeric vector.
- For mean estimates, see [rowMeans2]() and [rowMeans]().
- base::[sum]().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                           as.integer((0:4) ^ 2),
                                           seq(-5L, -1L, 1L)),
                                         ncol = 3))

colSums2(dm_matrix)

# NOTE: Temporarily use verbose output to demonstrate which method is
#       which method is being used
```

```
options(DelayedMatrixStats.verbose = TRUE)
# By default, this uses a seed-aware method for a DelayedMatrix with a
# 'SolidRleArraySeed' seed
rowSums2(dm_Matrix)
# Alternatively, can use the block-processing strategy
rowSums2(dm_Matrix, force_block_processing = TRUE)
options(DelayedMatrixStats.verbose = FALSE)
```

---

colTabulates,DelayedMatrix-method

Tabulates the values in a matrix-like object by row (column)

Description

Tabulates the values in a matrix-like object by row (column).

Usage

```
## S4 method for signature 'DelayedMatrix'
colTabulates(
  x,
  rows = NULL,
  cols = NULL,
  values = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowTabulates(
  x,
  rows = NULL,
  cols = NULL,
  values = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x   A NxK DelayedMatrix.

rows, cols   A vector indicating the subset of rows (and/or columns) to operate over. If
                    NULL, no subsetting is done.

values   the values to search for.

force_block_processing

                    FALSE (the default) means that a seed-aware, optimised method is used (if avail-
                    able). This can be overridden to use the general block-processing strategy by
                    setting this to TRUE (typically not advised). The block-processing strategy loads
                    one or more (depending on \link[DelayedArray]{getAutoBlockSize}())
                    columns (colFoo()) or rows (rowFoo()) into memory as an ordinary base::array.

...	Additional arguments passed to specific methods.
useNames	If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowTabulates](#) / matrixStats::[colTabulates](#).

Value

a [numeric](#) NxJ (KxJ) [matrix](#), where N (K) is the number of rows (columns) for which the J values are calculated.

Author(s)

Peter Hickey

See Also

- matrixStats::[rowTabulates](#)() and matrixStats::[colTabulates](#)() which are used when the input is a matrix or numeric vector.
- base::[table](#)()

Examples

```
# A DelayedMatrix with a 'DataFrame' seed
dm_DF <- DelayedArray(S4Vectors::DataFrame(C1 = rep(1L, 5),
                                           C2 = as.integer((0:4) ^ 2),
                                           C3 = seq(-5L, -1L, 1L)))

colTabulates(dm_DF)

rowTabulates(dm_DF)
```

---

colVars,DelayedMatrix-method

Calculates the variance for each row (column) of a matrix-like object

---

Description

Calculates the variance for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colVars(
  x,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  center = NULL,
```

```
    force_block_processing = FALSE,
    ...,
    useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowVars(
    x,
    rows = NULL,
    cols = NULL,
    na.rm = FALSE,
    center = NULL,
    force_block_processing = FALSE,
    ...,
    useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix](#).
rows, cols	A [vector](#) indicating the subset of rows (and/or columns) to operate over. If [NULL](#), no subsetting is done.
na.rm	If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.
center	(optional) the center, defaults to the row means.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).
...	Additional arguments passed to specific methods.
useNames	If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowVars](#) / matrixStats::[colVars](#).

Value

Returns a [numeric](#) [vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowVars](#)() and matrixStats::[colVars](#)() which are used when the input is a matrix or numeric vector.
- For mean estimates, see [rowMeans2](#)() and [rowMeans](#)().

- For standard deviation estimates, see [rowSds](#)().
- stats::[var](#)().

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))
# A DelayedMatrix with a 'HDF5ArraySeed' seed
# NOTE: Requires that the HDF5Array package is installed
library(HDF5Array)
dm_HDF5 <- writeHDF5Array(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))

colVars(dm_matrix)

rowVars(dm_matrix)
```

---

colWeightedMads,DelayedMatrix-method

Calculates the weighted median absolute deviation for each row (column) of a matrix-like object

---

Description

Calculates the weighted median absolute deviation for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colWeightedMads(
  x,
  w = NULL,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  constant = 1.4826,
  center = NULL,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowWeightedMads(
  x,
  w = NULL,
  rows = NULL,
```

```
    cols = NULL,
    na.rm = FALSE,
    constant = 1.4826,
    center = NULL,
    force_block_processing = FALSE,
    ...,
    useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
w	A [numeric]() vector of length K (N) that specifies by how much each element is weighted.
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
na.rm	If [TRUE](), missing values ([NA]() or [NaN]()) are omitted from the calculations.
constant	A scale factor. See stats::[mad]() for details.
center	(optional) the center, defaults to the row means
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().
...	Additional arguments passed to specific methods.
useNames	If [TRUE]() (default), names attributes of result are set. Else if [FALSE](), no naming support is done.

Details

The S4 methods for x of type [matrix](), [array](), [table](), or [numeric]() call matrixStats::[rowWeightedMads]() / matrixStats::[colWeightedMads]().

Value

Returns a [numeric vector]() of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowWeightedMads]() and matrixStats::[colWeightedMads]() which are used when the input is a matrix or numeric vector.

- See also [rowMads]() for the corresponding unweighted function.

Examples

```
# A DelayedMatrix with a 'matrix' seed
dm_matrix <- DelayedArray(matrix(c(rep(1L, 5),
                                   as.integer((0:4) ^ 2),
                                   seq(-5L, -1L, 1L)),
                                 ncol = 3))

colWeightedMads(dm_matrix, w = 1:5)

rowWeightedMads(dm_matrix, w = 3:1)
```

---

colWeightedMeans,DelayedMatrix-method
Calculates the weighted mean for each row (column) of a matrix-like object

---

Description

Calculates the weighted mean for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colWeightedMeans(
  x,
  w = NULL,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowWeightedMeans(
  x,
  w = NULL,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x   A NxK DelayedMatrix.

w   A numeric vector of length K (N) that specifies by how much each element is
               weighted.

rows, cols   A [vector](#) indicating the subset of rows (and/or columns) to operate over. If [NULL](#), no subsetting is done.

na.rm   If [TRUE](#), missing values ([NA](#) or [NaN](#)) are omitted from the calculations.

force_block_processing

        FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array](#).

...   Additional arguments passed to specific methods.

useNames   If [TRUE](#) (default), names attributes of result are set. Else if [FALSE](#), no naming support is done.

Details

The S4 methods for x of type [matrix](#), [array](#), [table](#), or [numeric](#) call matrixStats::[rowWeightedMeans](#) / matrixStats::[colWeightedMeans](#).

Value

Returns a [numeric](#) [vector](#) of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::[rowWeightedMeans](#)() and matrixStats::[colWeightedMeans](#)() which are used when the input is a matrix or numeric vector.

- See also [rowMeans2](#) for the corresponding unweighted function.

Examples

```
# A DelayedMatrix with a 'Matrix' seed
dm_Matrix <- DelayedArray(Matrix::Matrix(c(rep(1L, 5),
                                           as.integer((0:4) ^ 2),
                                           seq(-5L, -1L, 1L)),
                                         ncol = 3))

colWeightedMeans(dm_Matrix)
# Specifying weights inversely proportional to rowwise variances
colWeightedMeans(dm_Matrix, w = 1 / rowVars(dm_Matrix))
rowWeightedMeans(dm_Matrix, w = 1:3)
```

colWeightedMedians,DelayedMatrix-method

Calculates the weighted median for each row (column) of a matrix-like object

Description

Calculates the weighted median for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colWeightedMedians(
  x,
  w = NULL,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowWeightedMedians(
  x,
  w = NULL,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
  force_block_processing = FALSE,
  ...,
  useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
w	A [numeric]() vector of length K (N) that specifies by how much each element is weighted.
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
na.rm	If [TRUE](), missing values ([NA]() or [NaN]()) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary [base::array]().

...	Additional arguments passed to specific methods.
useNames	If TRUE (default), names attributes of result are set. Else if FALSE, no naming support is done.

Details

The S4 methods for x of type matrix, array, table, or numeric call matrixStats::rowWeightedMedians / matrixStats::colWeightedMedians.

Value

Returns a numeric vector of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowWeightedMedians() and matrixStats::colWeightedMedians() which are used when the input is a matrix or numeric vector.
- See also rowMedians for the corresponding unweighted function.

Examples

```
# A DelayedMatrix with a 'SolidRleArraySeed' seed
dm_Rle <- RleArray(Rle(c(rep(1L, 5),
                         as.integer((0:4) ^ 2),
                         seq(-5L, -1L, 1L))),
                   dim = c(5, 3))

# Specifying weights inversely proportional to rowwise MADs
colWeightedMedians(dm_Rle, w = 1 / rowMads(dm_Rle))
```

---

colWeightedSds,DelayedMatrix-method
                    Calculates the weighted standard deviation for each row (column) of
                    a matrix-like object

Description

Calculates the weighted standard deviation for each row (column) of a matrix-like object.

Usage

```
## S4 method for signature 'DelayedMatrix'
colWeightedSds(
  x,
  w = NULL,
  rows = NULL,
  cols = NULL,
  na.rm = FALSE,
```

```
    force_block_processing = FALSE,
    ...,
    useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
colWeightedVars(
    x,
    w = NULL,
    rows = NULL,
    cols = NULL,
    na.rm = FALSE,
    force_block_processing = FALSE,
    ...,
    useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowWeightedSds(
    x,
    w = NULL,
    rows = NULL,
    cols = NULL,
    na.rm = FALSE,
    force_block_processing = FALSE,
    ...,
    useNames = TRUE
)

## S4 method for signature 'DelayedMatrix'
rowWeightedVars(
    x,
    w = NULL,
    rows = NULL,
    cols = NULL,
    na.rm = FALSE,
    force_block_processing = FALSE,
    ...,
    useNames = TRUE
)
```

Arguments

x	A NxK [DelayedMatrix]().
w	A [numeric]() vector of length K (N) that specifies by how much each element is weighted.
rows, cols	A [vector]() indicating the subset of rows (and/or columns) to operate over. If [NULL](), no subsetting is done.
na.rm	If [TRUE](), missing values ([NA]() or [NaN]()) are omitted from the calculations.
force_block_processing	
	FALSE (the default) means that a seed-aware, optimised method is used (if available). This can be overridden to use the general block-processing strategy by

setting this to TRUE (typically not advised). The block-processing strategy loads one or more (depending on \link[DelayedArray]{getAutoBlockSize}()) columns (colFoo()) or rows (rowFoo()) into memory as an ordinary base::array.

...   Additional arguments passed to specific methods.

useNames   If TRUE (default), names attributes of result are set. Else if FALSE, no naming support is done.

Details

The S4 methods for x of type matrix, array, table, or numeric call matrixStats::rowWeightedSds / matrixStats::colWeightedSds.

Value

Returns a numeric vector of length N (K).

Author(s)

Peter Hickey

See Also

- matrixStats::rowWeightedSds() and matrixStats::colWeightedSds() which are used when the input is a matrix or numeric vector.

- See also rowSds for the corresponding unweighted function.

Examples

```
# A DelayedMatrix with a 'SolidRleArraySeed' seed
dm_Rle <- RleArray(Rle(c(rep(1L, 5),
                         as.integer((0:4) ^ 2),
                         seq(-5L, -1L, 1L))),
                   dim = c(5, 3))

colWeightedSds(dm_Rle, w = 1 / rowMeans2(dm_Rle))

# Specifying weights inversely proportional to rowwise means
colWeightedVars(dm_Rle, w = 1 / rowMeans2(dm_Rle))

# Specifying weights inversely proportional to columnwise means
rowWeightedSds(dm_Rle, w = 1 / colMeans2(dm_Rle))

# Specifying weights inversely proportional to columnwise means
rowWeightedVars(dm_Rle, w = 1 / colMeans2(dm_Rle))
```

| DelayedMatrixStats | *DelayedMatrixStats: Functions that apply to rows and columns of* De-layedMatrix *objects.* |

Description

DelayedMatrixStats is a port of the **matrixStats** API to work with *DelayedMatrix* objects from the **DelayedArray** package. High-performing functions operating on rows and columns of *Delayed-Matrix* objects, e.g. colMedians() / rowMedians(), colRanks() / rowRanks(), and colSds() / rowSds(). Functions optimized per data type and for subsetted calculations such that both memory usage and processing time is minimized.

Author(s)

Maintainer: Peter Hickey <peter.hickey@gmail.com> (ORCID)

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- Hervé Pagès <hpages.on.github@gmail.com> [contributor]
- Aaron Lun <infinite.monkeys.with.keyboards@gmail.com> [contributor]

See Also

Useful links:

- https://github.com/PeteHaitch/DelayedMatrixStats
- Report bugs at https://github.com/PeteHaitch/DelayedMatrixStats/issues

| from_DelayedArray_to_simple_seed_class | |
| *Coerce DelayedArray to its 'simple seed' form* | |

Description

Coerce DelayedArray to its 'simple seed' form

Usage

```
from_DelayedArray_to_simple_seed_class(x, drop = FALSE, do_transpose = TRUE)
```

Arguments

x	A DelayedArray
drop	If TRUE the result is coerced to the lowest possible dimension
do_transpose	Should transposed input be physically transposed?

Details

Like DelayedArray:::.from_DelayedArray_to_array but returning an object of the same class as seedClass(x) instead of an *array*. In doing so, all delayed operations are realised (including subsetting).

Value

An object of the same class as seedClass(x).

Note

Can be more efficient to leave the transpose implicit (do_transpose = FALSE) and switch from a row*() method to a col*() method (or vice versa).

Only works on [DelayedArray](#) objects with 'simple seeds'

---

reexports   *Objects exported from other packages*

Description

These objects are imported from other packages. Follow the links below to see their documentation.

DelayedArray [colMaxs](#), [colMins](#), [colRanges](#), [rowMaxs](#), [rowMins](#), [rowRanges](#)

---

subset_by_Nindex   subset_by_Nindex

Description

subset_by_Nindex() is an internal generic function not aimed to be used directly by the user. It is basically an S4 generic for DelayedArray:::subset_by_Nindex.

Usage

```
subset_by_Nindex(x, Nindex)
```

Arguments

x   An array-like object.

Nindex   An unnamed list of subscripts as positive integer vectors, one vector per dimen-
                sion in x. Empty and missing subscripts (represented by integer(0) and NULL
                list elements, respectively) are allowed. The subscripts can contain duplicated
                indices. They cannot contain NAs or non-positive values.

Details

subset_by_Nindex(x, Nindex) conceptually performs the operation x[Nindex[1], ..., Nindex[length(Nindex)]].
subset_by_Nindex() methods need to support empty and missing subscripts, e.g., subset_by_Nindex(x,
list(NULL, integer(0))) must return an M x 0 object of class class(x) and subset_by_Nindex(x,
list(integer(0), integer(0))) a 0 x 0 object of class class(x).

Also, subscripts are allowed to contain duplicate indices so things like subset_by_Nindex(x,
list(c(1:3, 3:1), 2L)) need to be supported.

Value

A object of class class(x) of the appropriate type (e.g., integer, double, etc.). For example, if x is
a [data.frame](#) representing an M x N matrix of integers, subset_by_Nindex(x, list(NULL, 2L)
must return its 2nd column as a [data.frame](#) with M rows and 1 column of type integer.

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