

# Package ‘sparseLRMatrix’

March 2, 2021

**Title** Represent and Use Sparse + Low Rank Matrices

**Version** 0.1.0

**Description** Provides an S4 class for representing and interacting with sparse plus rank matrices. At the moment the implementation is quite spare, but the plan is eventually subclass Matrix objects.

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**URL** <https://rohelab.github.io/sparseLRMatrix/>,  
<https://github.com/RoheLab/sparseLRMatrix>

**BugReports** <https://github.com/RoheLab/sparseLRMatrix/issues>

**Depends** Matrix, methods

**Imports** RSpectra

**Suggests** covr, testthat (>= 3.0.0)

**Config/testthat/edition** 3

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.1.9000

**NeedsCompilation** no

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dim,sparseLRMatrix-method

*Check the dimension of a sparseLRMatrix*

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## Description

Check the dimension of a sparseLRMatrix

## Usage

```
## S4 method for signature 'sparseLRMatrix'  
dim(x)
```

## Arguments

x                    A [sparseLRMatrix](#) object.

## Value

Dimension of x.

## Examples

```
set.seed(528491)  
  
n <- 50  
m <- 40  
k <- 3  
  
A <- rsparsematrix(n, m, 0.1)  
  
U <- Matrix(rnorm(n * k), nrow = n, ncol = k)  
V <- Matrix(rnorm(m * k), nrow = m, ncol = k)  
  
# construct the matrix, which represents A + U %*% t(V)  
X <- sparseLRMatrix(sparse = A, U = U, V = V)  
  
dim(X)  
  
s <- svds(X, 5) # efficient
```

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sparseLRMatrix      *Create a sparse plus low rank matrix*

---

## Description

Create a sparse plus low rank matrix

## Usage

```
sparseLRMatrix(sparse, U, V)
```

## Arguments

sparse	sparseMatrix.
U	Matrix.
V	Matrix.

## Value

A [sparseLRMatrix](#) S4 object.

## Examples

```
set.seed(528491)

n <- 50
m <- 40
k <- 3

A <- rsparsematrix(n, m, 0.1)

U <- Matrix(rnorm(n * k), nrow = n, ncol = k)
V <- Matrix(rnorm(m * k), nrow = m, ncol = k)

# construct the matrix, which represents A + U %*% t(V)
X <- sparseLRMatrix(sparse = A, U = U, V = V)

dim(X)

s <- svds(X, 5) # efficient
```

---

sparseLRMatrix-class *Sparse plus low rank matrix*

---

## Description

Eventually this class will subclass `Matrix` objects, but for now this is a basic implementation that essentially only supports singular value decomposition.

## Details

To learn more about S4 classes, please see <https://adv-r.hadley.nz/s4.html>.

## Slots

sparse `sparseMatrix`.

U `Matrix`.

V `Matrix`.

## Examples

```
set.seed(528491)

n <- 50
m <- 40
k <- 3

A <- rsparsematrix(n, m, 0.1)

U <- Matrix(rnorm(n * k), nrow = n, ncol = k)
V <- Matrix(rnorm(m * k), nrow = m, ncol = k)

# construct the matrix, which represents A + U %*% t(V)
X <- sparseLRMatrix(sparse = A, U = U, V = V)

dim(X)

s <- svds(X, 5) # efficient
```

---

svds.sparseLRMatrix     *Truncated singular value decomposition of a matrix*

---

### Description

A thin wrapper around `RSpectra::svds()`, please see more detailed documentation there. In particular, this function leverages the function interface.

### Usage

```
## S3 method for class 'sparseLRMatrix'  
svds(A, k, nu = k, nv = k, opts = list(), ...)
```

### Arguments

A	Matrix to decompose.
k	Number of singular values to estimate.
nu	Number of left singular vectors to estimate.
nv	Number of right singular vectors to estimate.
opts	Passed to <code>RSpectra::svds()</code> .
...	Passed to <code>RSpectra::svds()</code> .

### Value

A list with the following components:

d	A vector of the computed singular values.
u	An $m$ by $nu$ matrix whose columns contain the left singular vectors. If $nu == 0$ , NULL will be returned.
v	An $n$ by $nv$ matrix whose columns contain the right singular vectors. If $nv == 0$ , NULL will be returned.
nconv	Number of converged singular values.
niter	Number of iterations used.
nops	Number of matrix-vector multiplications used.

### Examples

```
set.seed(528491)  
  
n <- 50  
m <- 40  
k <- 3  
  
A <- rsparsematrix(n, m, 0.1)
```

```
U <- Matrix(rnorm(n * k), nrow = n, ncol = k)
V <- Matrix(rnorm(m * k), nrow = m, ncol = k)

X <- sparseLRMatrix(sparse = A, U = U, V = V)

svds(X, 5)
```

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