Package: sparselu (via r-universe)

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Type Package

Title Sparse LU Decomposition via SuiteSparse

Version 0.3.0

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Description Provides an interface to the SuiteSparse UMFPACK LU factorisation routines for sparse matrices stored in compressed column format. Implements the algorithm described in Davis (2004) <doi:10.1145/992200.992206>.

License GPL-3

Depends R (>= 3.6.0)

LinkingTo Rcpp

SystemRequirements SuiteSparse (UMFPACK, AMD, SuiteSparse_config)

Imports Rcpp (>= 0.11.0)

Suggests Matrix, testthat (>= 3.0.0)

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OS_type unix

RoxygenNote 7.3.2

NeedsCompilation yes

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Config/pak/sysreqs libsuitesparse-dev

Repository https://cran.r-universe.dev

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`sparseLU` *Sparse LU Decomposition*

Description

Compute an LU factorisation of a sparse matrix stored in compressed column storage using the SuiteSparse UMFPACK routines.

Usage

```
sparseLU(Ap, Ai, Ax)
```

Arguments

`Ap`	Integer vector of column pointers indexing into `Ai` and `Ax`.
`Ai`	Integer vector of row indices for each non-zero element.
`Ax`	Numeric vector of the non-zero values.

Details

The column pointers `Ap` and row indices `Ai` must use zero-based indexing as required by the SuiteSparse UMFPACK interface.

Value

A named list with components `L`, `U`, `P`, and `Q` describing the LU factorisation returned by UMFPACK.

Examples

```
Ap <- c(0L, 2L, 3L, 5L)
Ai <- c(0L, 2L, 1L, 0L, 2L)
Ax <- c(1, 4, 3, 2, 5)

sparseLU(Ap, Ai, Ax)
```

`sparseLU_solve` *Solve a Sparse Linear System*

Description

Solve the sparse linear system $Ax = b$ using the SuiteSparse UMFPACK LU factorisation.

Usage

```
sparseLU_solve(Ap, Ai, Ax, b)
```

Arguments

`Ap`	Integer vector of column pointers indexing into `Ai` and `Ax`.
`Ai`	Integer vector of row indices for each non-zero element.
`Ax`	Numeric vector of the non-zero values.
`b`	Numeric vector containing the right-hand side of the linear system.

Details

The sparse matrix is provided in compressed column storage using zero-based indexing in `Ap` and `Ai`, matching the expectations of the SuiteSparse UMFPACK interface.

Value

Numeric vector with the solution to the system.

Examples

```
Ap <- c(0L, 2L, 3L, 5L)
Ai <- c(0L, 2L, 1L, 0L, 2L)
Ax <- c(1, 4, 3, 2, 5)
b <- c(1, 2, 3)

sparseLU_solve(Ap, Ai, Ax, b)
```

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