Package 'sssp'

September 5, 2026

Title Semi-Symmetric Sparse Projection

Version 0.1.0

Description Computes the exact joint sparsity and group sparsity projection using the Semi-symmetric Sparse Projection algorithm of J. Shen and S. Damadi, ``Sparse projection onto semi-symmetric sets with applications to sparse optimization", Journal of Global Optimization (2026), <doi:10.1007/s10898-026-01592-y>.

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Encoding UTF-8

VignetteBuilder knitr

Suggests knitr, rmarkdown

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Repository CRAN

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sssp_citation *Citation for the SSSP algorithm*

Description

Returns the citation line for the SSSP algorithm and the Journal of Global Optimization paper.

Usage

```
sssp_citation()
```

Value

A character scalar.

Examples

```
sssp_citation()
```

sssp_project *Exact joint sparsity and group sparsity projection*

Description

Computes an exact element of $P_{G_r \cap C_s}(v)$. The argument `groups` must form a disjoint union of all indices of `v`; R index vectors are 1-based. A numeric vector `groups` is interpreted as $(|\mathcal{L}_1|, \ldots, |\mathcal{L}_p|)$ for contiguous groups.

Usage

```
sssp_project(v, groups, r, s, verbose = FALSE)
```

Arguments

`v`	Numeric vector $v \in \mathbb{R}^n$.
`groups`	Group sizes or a list of 1-based index vectors encoding $\mathcal{L}_1, \ldots, \mathcal{L}_p$.
`r`	Group sparsity level r.
`s`	Sparsity level s.
`verbose`	If `TRUE`, print a citation-bearing result.

Value

A list with `x`, the projection, and `info`, including `objective`, `tuple`, `selected_groups`, `n_tuples`, and `wall_time`.

Examples

```
v <- c(10, -1, 2, 3, 9, 0, -4, -8, 7, 6)
res <- sssp_project(v, c(3, 4, 3), r = 3, s = 6)
res$x
res$info$tuple

## non-uniform groups given as index lists
v2 <- c(4, -3, 5, 2, -6, 1, 7, -8, 0.5, 9, -2, 3)
groups2 <- list(c(1, 4), c(2, 3, 5, 8, 9, 10), c(6, 7, 11, 12))
sssp_project(v2, groups2, r = 2, s = 5)$info$tuple
```

`sssp_solve` *Projected gradient descent with the SSSP projection*

Description

Applies $x^{k+1} \in P_{G_r \cap C_s}(x^k - \gamma \nabla f(x^k))$ to $f(x) = \frac{1}{2}\|Ax - b\|_2^2$.

Usage

```
sssp_solve(A, b, groups, r, s, gamma = NULL, max_iter = 200L,
  tol = 1e-06, x0 = NULL, verbose = FALSE)
```

Arguments

`A`	Numeric matrix.
`b`	Numeric response vector.
`groups`	Group sizes or a list of 1-based index vectors encoding $\mathcal{L}_1, \ldots, \mathcal{L}_p$.
`r`	Group sparsity level r.
`s`	Sparsity level s.
`gamma`	Step length γ; if `NULL`, use $1/\|A\|_2^2$.
`max_iter`	Maximum iterations.
`tol`	Relative step stopping tolerance.
`x0`	Optional initial vector.
`verbose`	If `TRUE`, print a citation-bearing result.

Value

A list with `x` and `info`.

Examples

```
set.seed(1)
A <- matrix(rnorm(40 * 12), 40, 12)
x_true <- c(1, 2, 0, 0, 0, 0, 3, 4, 0, 0, 0, 0)
b <- as.vector(A %*% x_true)
res <- sssp_solve(A, b, groups = c(4, 4, 4), r = 2, s = 4)
res$x
```

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