

Package ‘ROI.plugin.clarabel’

July 21, 2025

Version 0.3

Title 'clarabel' Plug-in for the 'R' Optimization Infrastructure

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Description Enhances the 'R' Optimization Infrastructure ('ROI') package with the 'clarabel' solver for solving convex cone problems. More information about 'clarabel' can be found at <<https://oxfordcontrol.github.io/ClarabelDocs/stable/>>.

Imports stats, methods, slam, ROI (>= 1.0-0), clarabel (>= 0.5.1)

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URL <https://gitlab.com/roigrp/solver/roi.plugin.clarabel>

RoxygenNote 7.1.2

NeedsCompilation no

Repository CRAN

Date/Publication 2023-08-24 09:40:06 UTC

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Example-1

*SOCP 1***Description**

$$\begin{aligned}
 & \text{maximize } x + y \\
 & \text{subject to } x^2 + y^2 \leq 1 \\
 & \quad x \geq 0, y \geq 0
 \end{aligned}$$

Examples

```

Sys.setenv("ROI_LOAD_PLUGINS" = FALSE)
library(ROI)
library(ROI.plugin.clarabel)

obj <- L_objective(c(1, 1))
## NOTE: chol(diag(2)) == diag(2)
con <- C_constraint(L = rbind(0, -diag(2)), cones = K_soc(3), rhs = c(1, 0, 0))
op <- OP(obj, con, maximum = TRUE)
x <- ROI_solve(op, solver = "clarabel")
x
## Optimal solution found.
## The objective value is: 1.414214e+00
solution(x)
## [1] 0.7071068 0.7071068

```

Example-2

*SOCP 2***Description**

The following example is also known as Problem 10 from the Hock-Schittkowski-Collection Hock and Schittkowski (1981).

$$\begin{aligned}
 & \text{minimize } x - y \\
 & \text{subject to } -3x^2 + 2xy + 1 \geq 0
 \end{aligned}$$

References

W. Hock, K. Schittkowski (1981): Test Examples for Nonlinear Programming Codes, Lecture Notes in Economics and Mathematical Systems, Vol. 187, Springer

Examples

```

Sys.setenv("ROI_LOAD_PLUGINS" = FALSE)
library(ROI)
library(ROI.plugin.clarabel)

obj <- L_objective(c(1, -1))
L <- chol(rbind(c(3, -1), c(-1, 1)))
con <- C_constraint(L = rbind(0, -L), cones = K_soc(3), rhs = c(1, 0, 0))
op <- OP(objective = obj, constraints = con,
        bounds = V_bound(li = 1:2, lb = rep(-Inf, 2)))
x <- ROI_solve(op, solver="clarabel")
x
## Optimal solution found.
## The objective value is: -1.000000e+00
solution(x)
## [1] -4.622464e-16  1.000000e+00

```

Example-3

SOCP 3

Description

The following example is originally from the CVXOPT (<https://cvxopt.org/userguide/coneprog.html>) homepage.

$$\begin{aligned}
 & \text{minimize} \quad -2x_1 + x_2 + 5x_3 \\
 & \text{subject to} \quad \left\| \begin{array}{l} -13x_1 + 3x_2 + 5x_3 - 3 \\ -12x_1 + 12x_2 - 6x_3 - 2 \end{array} \right\|_2 \leq -12x_1 - 6x_2 + 5x_3 - 12 \\
 & \quad \left\| \begin{array}{l} -3x_1 + 6x_2 + 2x_3 \\ x_1 + 9x_2 + 2x_3 + 3 \\ -x_1 - 19x_2 + 3x_3 - 42 \end{array} \right\|_2 \leq -3x_1 + 6x_2 - 10x_3 + 27
 \end{aligned}$$

References

Andersen, Martin S and Dahl, Joachim and Vandenberghe, Lieven (2016) CVXOPT: A Python package for convex optimization, version 1.1.8, <https://cvxopt.org/>

Examples

```

Sys.setenv("ROI_LOAD_PLUGINS" = FALSE)
library(ROI)
library(ROI.plugin.clarabel)

lo <- L_objective(c(-2, 1, 5))
lc1 <- rbind(c(12, 6, -5), c(13, -3, -5), c(12, -12, 6))
lc2 <- rbind(c(3, -6, 10), c(3, -6, -2), c(-1, -9, -2), c(1, 19, -3))

```

```

lc <- C_constraint(L = rbind(lc1, lc2),
                  cones = K_soc(c(3, 4)),
                  rhs = c(c(-12, -3, -2), c(27, 0, 3, -42)))
vb <- V_bound(li = 1:3, lb = rep(-Inf, 3))
op <- OP(objective = lo, constraints = lc, bounds = vb)
x <- ROI_solve(op, solver="clarabel")
x
## Optimal solution found.
## The objective value is: -3.834637e+01
solution(x)
## [1] -5.014767 -5.766924 -8.521796

```

vech

Half-Vectorization

Description

Extension of the utility function [vech](#) performing a half-vectorization on the given matrices.

Usage

```
vech(..., lower = TRUE, scale = FALSE)
```

Arguments

...	one or more matrices to be half-vectorized.
lower	use lower or upper half-vectorization
scale	whether the lower/upper triangular elements are scaled

Value

a matrix

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