# Package ‘ROI.plugin.alabama’

July 7, 2023

**Version** 1.0-2

**Title** 'alabama' Plug-in for the 'R' Optimization Infrastructure

**Description** Enhances the R Optimization Infrastructure ('ROI') package
with the 'alabama' solver for solving nonlinear optimization problems.

**Imports** methods, stats, utils, ROI (>= 1.0-0), alabama (>= 1.0.1)

**License** GPL-3

**URL** https://roigrp.gitlab.io,
https://gitlab.com/roigrp/solver/ROI.plugin.alabama

**NeedsCompilation** no

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**Repository** CRAN

**Date/Publication** 2023-07-07 12:40:07 UTC

## R topics documented:



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`Example-1` *Banana*

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### Description

The following example is also known as Rosenbrock’s banana function (https://en.wikipedia.org/wiki/Rosenbrock_function).

$$minimize\ f(x) = 100(x_2 - x_1^2)^2 + (1 - x_1)^2$$

Solution: `c(1, 1)`

## Examples

```
library(ROI)

f <- function(x) {
    return( 100 * (x[2] - x[1]^2)^2 + (1 - x[1])^2 )
}

f.gradient <- function(x) {
    return( c( -400 * x[1] * (x[2] - x[1] * x[1]) - 2 * (1 - x[1]),
               200 * (x[2] - x[1] * x[1])) )
}

x <- OP(objective = F_objective(f, n = 2L, G = f.gradient),
        bounds = V_bound(li = 1:2, ui = 1:2, lb = c(-3, -3), ub = c(3,  3)))

nlp <- ROI_solve(x, solver = "alabama", start = c(-2, 2.4), method = "BFGS")
nlp
## Optimal solution found.
## The objective value is: 3.049556e-23
solution(nlp)
## [1] 1 1
```

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`Example-2` *Hock-Schittkowski-Collection Problem 16*

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## Description

The following example solves problem 16 from the `Hock-Schittkowski-Collection`.

$$minimize\ f(x) = 100(x_2 - x_1^2)^2 + (1 - x_1)^2$$

$$subject\ to: \quad x_1 + x_2^2 \geq 0 \quad x_1^2 + x_2 \geq 0$$

$$-2 \geq x_1 \geq 0.5 \quad x_2 \geq 1$$

Solution: `c(0.5, 0.25)`

## Examples

```
library(ROI)

f <- function(x) {
    return( 100 * (x[2] - x[1]^2)^2 + (1 - x[1])^2 )
}

f.gradient <- function(x) {
    return( c( -400 * x[1] * (x[2] - x[1] * x[1]) - 2 * (1 - x[1]),
               200 * (x[2] - x[1] * x[1])) )
}

x <- OP( objective = F_objective(f, n=2L, G=f.gradient),
```

```
        constraints = c(F_constraint(F=function(x) x[1] + x[2]^2, ">=", 0,
                                     J=function(x) c(1, 2*x[2])),
                        F_constraint(F=function(x) x[1]^2 + x[2], ">=", 0,
                                     J=function(x) c(2*x[1], x[2]))),
        bounds = V_bound(li=1:2, ui=1:2, lb=c(-2, -Inf), ub=c(0.5,  1)) )

nlp <- ROI_solve(x, solver="alabama", start=c(-2, 1))
nlp
## Optimal solution found.
## The objective value is: 2.499999e-01
solution(nlp)
## [1] 0.5000001 0.2499994
```

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Example-3 *Hock-Schittkowski-Collection Problem 36*

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## Description

The following example solves exmaple 36 from the Hock-Schittkowski-Collection.

$$minimize \ -x_1 x_2 x_3$$
$$subject\ to:\ x_1 + 2x_2 + x_3 \leq 72$$
$$0 \leq x_1 \leq 20,\ 0 \leq x_2 \leq 11,\ 0 \leq x_3 \leq 42$$

## Examples

```
library(ROI)

hs036_obj <- function(x) {
    -x[1] * x[2] * x[3]
}

hs036_con <- function(x) {
    x[1] + 2 * x[2] + 2 * x[3]
}


x <- OP( objective = F_objective(hs036_obj, n = 3L),
         constraints = F_constraint(hs036_con, "<=", 72),
         bounds = V_bound(ub = c(20, 11, 42)) )

nlp <- ROI_solve(x, solver = "alabama", start = c(10, 10, 10))
nlp
## Optimal solution found.
## The objective value is: -3.300000e+03
solution(nlp, "objval")
## [1] -3300
solution(nlp)
## [1] 20 11 15
```

# Index