Package ‘modopt.matlab’

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Title 'MatLab'-Style Modeling of Optimization Problems
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Description 'MatLab'-Style Modeling of Optimization Problems with 'R'. This package provides a set of convenience functions to transform a 'MatLab'-style optimization modeling structure to its 'ROI' equivalent.
Depends R (>= 3.4), ROI, ROI.plugin.glpk, ROI.plugin.quadprog
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modopt.matlab-package  *MatLab(R)-style Optimization Modeling in R using ROI*

**Description**

'MatLab'-Style Modeling of Optimization Problems with 'R'. This package provides a set of convenience functions to transform a 'MatLab'-style optimization modeling structure to its 'ROI' equivalent.

**Author(s)**

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**References**

http://www.finance-r.com/

**See Also**

Useful links:
- http://www.finance-r.com/

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intlinprog  *MatLab(R)-style Mixed Integer Linear Programming in R using ROI*

**Description**

`intlinprog` provides a simple interface to ROI using the optimization model specification of Mat-Lab(R)

\[
\text{minimize in } x: \; f^T x \; \text{subject to } \begin{array}{ll}
A^T x & \leq b \\
A_{eq}^T x & = \text{beq} \\
x & \geq \text{lb} \\
x & \leq \text{ub}
\end{array}
\]

**Usage**

```r
intlinprog(f, intcon = NULL, A = NULL, b = NULL, Aeq = NULL, beq = NULL, lb = NULL, ub = NULL, x0 = NULL, options = NULL)
```

**Arguments**

- **f**  
  Linear term (vector) of the objective function

- **intcon**  
  Vector of which variables are integer

- **A**  
  Inequality constraints (left-hand side)

- **b**  
  Inequality constraints (right-hand side)

- **Aeq**  
  Equality constraints (left-hand side)
linprog

Value

The solution vector in x as well as the objective value in fval.

Author(s)

Ronald Hochreiter, <ron@hochreiter.net>

Examples

```r
# minimize 8x1 + x2
# subject to
#  x1 + 2x2 >= -14
#  -4x1 + 2x2 <= -33
#  2x1 + x2 <= 20
#  x1, x2 integer

f <- c(8, 1)
A <- matrix(c(-1, -2, -4, -1, 2, 1), nrow=3, byrow=TRUE)
b <- c(14, -33, 20)

sol <- intlinprog(f, c(1, 2), A, b)
sol <- intlinprog(f, NULL, A, b)

sol$x
```

Description

linprog provides a simple interface to ROI using the optimization model specification of Mat-
Lab(R)

minimize in x: f'*x subject to: A*x <= b subject to: Aeq*x == beq x >= lb x <= ub

Usage

linprog(f, A = NULL, b = NULL, Aeq = NULL, beq = NULL, lb = NULL, ub = NULL, x0 = NULL, options = NULL)
Arguments

- **f**: Linear term (vector) of the objective function
- **A**: Inequality constraints (left-hand side)
- **b**: Inequality constraints (right-hand side)
- **Aeq**: Equality constraints (left-hand side)
- **beq**: Equality constraints (right-hand side)
- **lb**: Lower bound
- **ub**: Upper bound
- **x0**: Initial solution
- **options**: Additional optimization parameters

Value

The solution vector in x as well as the objective value in `fval`.

Author(s)

Ronald Hochreiter, <ron@hochreiter.net>

Examples

```r
# maximize: 2x1 + x2
# subject to:
#  x1 + x2 <= 5
#  x1 <= 3
#  x1 >= 0, x2 >= 0

f <- c(2, 1)
A <- matrix(c(1, 1, 1, 0), nrow=2, byrow=TRUE)
b <- c(5, 3)

sol <- linprog(-f, A, b)
sol$x
```

Description

`quadprog` provides a simple interface to ROI using the optimization model specification of MatLab(R)

minimize in x: \( f^T x + 0.5 x^T H x \) subject to: \( A^T x \leq b \ Aeq^T x = beq \ x \geq lb \ x \leq ub \)

MatLab(R)-style Quadratic Programming in R using ROI
Usage

quadprog(H, f, A = NULL, b = NULL, Aeq = NULL, beq = NULL,
        lb = NULL, ub = NULL, x0 = NULL, options = NULL)

Arguments

H      Quadratic term (matrix) of the objective function
f      Linear term (vector) of the objective function
A      Inequality constraints (left-hand side)
b      Inequality constraints (right-hand side)
Aeq    Equality constraints (left-hand side)
beq    Equality constraints (right-hand side)
lb     Lower bound
ub     Upper bound
x0     Initial solution
options Additional optimization parameters

Value

The solution vector in x as well as the objective value in fval.

Author(s)

Ronald Hochreiter, <ron@hochreiter.net>

Examples

# Covariance matrix of four stocks (weekly returns from 2011):
#
#      AAPL    IBM   MSFT   ORCL
# AAPL  0.0014708114  0.0006940036  0.0006720841  0.0008276391
# IBM  0.0006940036  0.0009643581  0.0006239411  0.0011266429
# MSFT 0.0006720841  0.0006239411  0.0009387787  0.0008728736
# ORCL 0.0008276391  0.0011266429  0.0008728736  0.0021489512

covariance = matrix(c(0.0014708114, 0.0006940036, 0.0006720841, 0.0008276391,
    0.0006940036, 0.0009643581, 0.0006239411, 0.0011266429,
    0.0006720841, 0.0006239411, 0.0009387787, 0.0008728736,
    0.0008276391, 0.0011266429, 0.0008728736, 0.0021489512),
    nrow=4, byrow=TRUE)

assets <- dim(covariance)[1]

H <- covariance
f <- rep(0, assets)
Aeq <- rep(1, assets)
beq <- 1
lb <- rep(0, assets)
ub <- rep(1, assets)
solution <- quadprog(H, f, NULL, NULL, Aeq, beq, lb, ub)
portfolio <- solution$x
print(portfolio)
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