Package 'Rglpk'

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Title R/GNU Linear Programming Kit Interface

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Description R interface to the GNU Linear Programing Kit (GLPK version 4.37). GLPK is open source software for solving large-scale linear programming (LP), mixed integer linear programming (MILP) and other related problems.

Depends R (>= 2.7.0), slam

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URL http://R-Forge.R-project.org/projects/rglp/, http://www.gnu.org/software/glpk/

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R topics documented:

`Rglpk_read_file` *Interface to GLPK's file reader*

Description

High level R interface to the MPS and CPLEX_LP reader of the GNU Linear Programming Kit (GLPK).

Usage

```
## MPS file reader
Rglpk_read_file(file, type = c("MPS_fixed", "MPS_free", "CPLEX_LP"),
ignore_first_row = FALSE, verbose = FALSE)

## print method
## S3 method for class 'MP_data_from_file':
print(x, ...)
```

Arguments

`file`	a character specifying the relative or absolute path to the model file.
`type`	a character specifying the file format. This can be either `"MPS_fixed"`, `"MPS_free"` and `"CPLEX_LP"`.
`ignore_first_row`	a logical indicating whether the first row of the model file should be ignored or not. Default: `FALSE`.
`verbose`	a logical for turning on/off additional solver output. Default: `FALSE`.
`x`	an object of class `"MP_data_from_file"`.
`...`	further arguments passed on to the print method.

Details

`Rglpk_read_file()` takes the path to a file as an argument and calls GLPK's file reader. The description of the linear or mixed integer linear program is returned as an object of class `"MP_data_from_file"`.

Value

`Rglpk_read_file()` returns the specification of a mixed integer linear program defined in `file` as an object of class `"MP_data_from_file"`.

Author(s)

Stefan Theussl

Examples

```
## not run:
## x <- Rglpk_read_file(some_file.MPS)
## x
## Rglpk_solve_LP(x$objective, x$constraints[[1]], x$constraints[[2]],
##                x$constraints[[3]], x$types, x$maximum, x$bounds)
```

`Rglpk_solve_LP` *Linear and Mixed Integer Programming Solver Using GLPK*

Description

High level R interface to the GNU Linear Programming Kit for solving linear as well as mixed integer linear programming problems (MILPs).

Usage

```
Rglpk_solve_LP(obj, mat, dir, rhs, types = NULL, max = FALSE,
               bounds = NULL, verbose = FALSE)
```

Arguments

`obj`	a vector with the objective coefficients
`mat`	a vector or a matrix of the constraint coefficients
`dir`	a character vector with the directions of the constraints. Each element must be one of `"<"`, `"<="`, `">"`, `">="`, or `"=="`.
`rhs`	the right hand side of the constraints
`types`	a vector indicating the types of the objective variables. `types` can be either `"B"` for binary, `"C"` for continuous or `"I"` for integer. By default all variables are of type `"C"`.
`max`	a logical giving the direction of the optimization. `TRUE` means that the objective is to maximize the objective function, `FALSE` (default) means to minimize it.
`bounds`	`NULL` (default) or a list with elements `upper` and `lower` containing the indices and corresponding bounds of the objective variables. The default for each variable is a bound between 0 and `Inf`.
`verbose`	a logical for turning on/off additional solver output: Default: `FALSE`.

Details

The GNU Linear Programming Kit is open source. The current version can be found at http://www.gnu.org/software/glpk/glpk.html. Package **Rglpk** provides a high level solver function using the low level C interface of the GLPK solver. There also exists an R interface done by Lopaka Lee which ports all low level C Interface routines of the GLPK API to R (R package **glpk**).

Value

A list containing the optimal solution, with the following components.

`solution`	the vector of optimal coefficients
`objval`	the value of the objective function at the optimum
`status`	an integer with status information about the solution returned: 0 if the optimal solution was found, a non-zero value otherwise.

Author(s)

Stefan Theussl and Kurt Hornik

References

GNU Linear Programming Kit (http://www.gnu.org/software/glpk/glpk.html).

GLPK Interface to R (http://cran.R-project.org/package=Rglpk).

See Also

`lp` in package **lpSolve**; `Rsymphony_solve_LP` in package **Rsymphony**.

Examples

```
## Simple linear program.
## maximize:   2 x_1 + 4 x_2 + 3 x_3
## subject to: 3 x_1 + 4 x_2 + 2 x_3 <= 60
##             2 x_1 +   x_2 +   x_3 <= 40
##               x_1 + 3 x_2 + 2 x_3 <= 80
##               x_1, x_2, x_3 are non-negative real numbers

obj <- c(2, 4, 3)
mat <- matrix(c(3, 2, 1, 4, 1, 3, 2, 2, 2), nrow = 3)
dir <- c("<=", "<=", "<=")
rhs <- c(60, 40, 80)
max <- TRUE

Rglpk_solve_LP(obj, mat, dir, rhs, max = max)

## Simple mixed integer linear program.
## maximize:    3 x_1 + 1 x_2 + 3 x_3
## subject to: -1 x_1 + 2 x_2 +   x_3 <= 4
##                      4 x_2 - 3 x_3 <= 2
##               x_1 - 3 x_2 + 2 x_3 <= 3
##               x_1, x_3 are non-negative integers
##               x_2 is a non-negative real number

obj <- c(3, 1, 3)
mat <- matrix(c(-1, 0, 1, 2, 4, -3, 1, -3, 2), nrow = 3)
dir <- c("<=", "<=", "<=")
rhs <- c(4, 2, 3)
types <- c("I", "C", "I")
```

```
max <- TRUE

Rglpk_solve_LP(obj, mat, dir, rhs, types, max)

## Same as before but with bounds replaced by
## -Inf <  x_1 <= 4
##    0 <= x_2 <= 100
##    2 <= x_3 <  Inf

bounds <- list(lower = list(ind = c(1L, 3L), val = c(-Inf, 2)),
               upper = list(ind = c(1L, 2L), val = c(4, 100)))
Rglpk_solve_LP(obj, mat, dir, rhs, types, max, bounds)
```

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