Package: mknapsack (via r-universe)

August 25, 2024

Type Package

Title Multiple Knapsack Problem Solver

Version 0.1.0

Description Package solves multiple knapsack optimisation problem. Given a set of items, each with volume and value, it will allocate them to knapsacks of a given size in a way that value of top N knapsacks is as large as possible.

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URL https://github.com/madedotcom/mknapsack

BugReports https://github.com/madedotcom/mknapsack/issues

Encoding UTF-8

LazyData true

Suggests testthat, mockery, Rglpk, ROI, ROI.plugin.glpk

Imports assertthat, data.table, lpSolve

RoxygenNote 6.0.1

NeedsCompilation no

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Contents

`group_moq` *Collapse function for the MOQ items*

Description

Combines items with MOQ greater than one to a single line that represents min amount that can be ordered

Usage

```
group_moq(units)
```

Arguments

`units`	data.table with following fields: sku, utility, volume, moq

Value

data.table with sku, utility, volume and units fields. first lines for each sku are grouped according to moq

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`knapsack` *Solves knapsack problem with the library defined in knapsack.solver option: - cbc (default) - uses rcbc package - lpsolve - uses lpSolve package*

Description

Solves knapsack problem with the library defined in knapsack.solver option: - cbc (default) - uses rcbc package - lpsolve - uses lpSolve package

Usage

```
knapsack(profit, volume, moq = rep(0, length(profit)), cap = 65)
```

Arguments

`profit`	vector with profit for item
`volume`	vector of item sizes in cubic meters
`moq`	vector of flags where 1 means that row contans mininum order quantity (MOQ). Defaults to zero vector matching profit in length.
`cap`	size of the container in cubic meters

Value

vector with container numbers keeping the permutation of the original data

mknapsack *Optimal packing into multiple containers*

Description

Gets containers based on the utility of individual items, their volume and container size

Usage

```
mknapsack(profit, volume, moq = rep(0, length(profit)), cap = 65,
  sold = rep(0, length(profit)))
```

Arguments

profit	vector with profit for item
volume	vector of item sizes in cubic meters
moq	vector of flags where 1 means that row contans mininum order quantity (MOQ). Defaults to zero vector matching profit in length.
cap	size of the container in cubic meters
sold	vector with a number of items that were sold on demand

Value

vector with container numbers keeping the permutation of the original data

Examples

```
# Calculate the optimal containers summary for a sample dataset
data(unitsbro)
library(data.table)
units.combined <- data.table(unitsbro)
moq <- units.combined$moq
profit <- units.combined$utility
volume <- units.combined$volume
res <- mknapsack(profit, volume, moq, 65)
units.combined$container <- as.factor(res)
#Aggregate solution to container
containers <- units.combined[order(container), .(volume = sum(volume),
profit = sum(profit)), by = container]
```

moq_constraint *Mininum Order Quantity (MOQ) contstraint generator*

Description

Creates matrix of moq constraints for the LP optimisation. It is assumed that there is only one moq position per SKU and data is sorted by sku, therefore SKU index can be calculated

Usage

```
moq_constraint(moq)
```

Arguments

moq	flag that indicates that this position contains MOQ

Value

matrix that expesses the MOQ constraint: non-MOQ item cannot be put into container that does not contain MOQ item

unitsbro *Real sample of item utility for BRO created in May 2017*

Description

Dataset contains line items with utility and volume and can be used for exploration of the package functionality.

Usage

```
unitsbro
```

Format

A data frame with rows and variables

sku identifier for the product

utility proxy of the profit that this item delivers to the company if purchased

volume volume of the item, usually in cubic meters

units number of untis that this line contains

moq If equals one, this line contains the minimum order quantity and shoudl be ordered prior to other lines of the same sku

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