Package 'classGraph'

May 8, 2026

Type Package

Title Construct Graphs of S4 Class Hierarchies

Version 0.7-7

Depends methods

Imports graphics, stats, utils, graph, Rgraphviz

Suggests Matrix

Description Construct directed graphs of S4 class hierarchies and visualize them. In general, these graphs typically are DAGs (directed acyclic graphs), often simple trees in practice.

License GPL

NeedsCompilation no

Author Martin Maechler [cre, aut] (Partly based on code from Robert Gentleman, ORCID: <https://orcid.org/0000-0002-8685-9910>)

Maintainer Martin Maechler <maechler@stat.math.ethz.ch>

Repository CRAN

Date/Publication 2025-04-29 11:40:06 UTC

Contents

`classGraph-package` *The R Package 'classGraph'*

Description

The package **classGraph** is package using graph and graph visualization methods to visualize inheritance graphs of S4 classes.

Details

Package:	classGraph
Type:	Package
Title:	Construct Graphs of S4 Class Hierarchies
Version:	0.7-7
Authors@R:	person("Martin", "Maechler", role = c("cre", "aut"), email = "maechler@stat.math.ethz.ch", comment = c("Par
Depends:	methods
Imports:	graphics, stats, utils, graph, Rgraphviz
Suggests:	Matrix
Description:	Construct directed graphs of S4 class hierarchies and visualize them. In general, these graphs typically are DA
License:	GPL
Author:	Martin Maechler [cre, aut] (Partly based on code from Robert Gentleman, ORCID: <https://orcid.org/0000-000
Maintainer:	Martin Maechler <maechler@stat.math.ethz.ch>

Index of help topics:

Author(s)

Martin Maechler

See Also

`classTree()` is the main function of this package.

bGraph *Create a "Branch Graph" (Simple Tree with Root and Leaves)*

Description

Create a "Branch Graph", i.e., a simple tree with root and n (simple) branches or leaves.

Usage

```
bGraph(n, root = "Mom",
       leaves = paste(l.prefix, seq(length = n), sep = ""),
       l.prefix = "D", weights = NULL,
       mode = c("undirected", "directed"))
```

Arguments

n	integer specifying the number of leave branches.
root	the node on which to root the tree.
leaves	the nodes to be used as leaves.
l.prefix	a string specifying .....
weights	.....
mode	string indicating which mode is to be used.

Value

a graph object of class graphNEL.

Author(s)

Martin Maechler, Aug.2005

See Also

class graphNEL; ftM2graphNEL.

Examples

```
require("graph") ## Using package 'graph' => plot() method (via package 'Rgraphviz'):

(bg7 <- bGraph(7)) # 8 nodes {Mom, D1..D7}; 7 edges
plot(bg7) # draws the graph

(bgD3 <- bGraph(3, mode="directed"))
plot(bgD3) # directed: using arrows

(bgw2 <- bGraph(2, weights = c(10,1)))
plot(bgw2) # {maybe use lwd for weights in the future?}
```

```
if(require("Matrix"))
  show(as(bgw2, "sparseMatrix")) # shows the weights
```

`class2Graph` *Build the Graph of Super Classes from an S4 Class Definition*

Description

From an S4 class definition `class`, computes the graph of all super classes, i.e., of all classes that `class` extends.

Usage

```
class2Graph(class, fullNames = TRUE, simpleOnly = FALSE,
            bottomUp = FALSE, package = class@package)
```

Arguments

`class`	class name
`fullNames`	logical indicating if full name should be applied....
`simpleOnly`	logical, simply passed to `getAllSuperClasses(..)`.
`bottomUp`	logical indicating the *direction* of the graph.
`package`	package where the super classes should be gotten from.

Value

an R object inheriting from class `graph`.

Author(s)

Robert Gentleman (original code) and Martin Maechler

See Also

`classTree` which builds the graph of all *sub*classes.

Examples

```
require("graph")
cg <- class2Graph("graphNEL") # simple :  graphNEL |-> graph
plot(cg)

if(require("Matrix")) {
   cg2 <- class2Graph("dgCMatrix")
   as(cg2, "sparseMatrix")
   plot(cg2)
   ## alternative: don't show the initial "Matrix:"
   cg2. <- class2Graph("dgCMatrix", fullNames=FALSE)
```

```
   plot(cg2.)
   ## 'simpleOnly' does not change anything here :
   stopifnot(identical(cg2.,
          class2Graph("dgCMatrix", fullNames=FALSE, simpleOnly = TRUE)))


   ## very simple, since "sparseMatrix" only extends "Matrix" :
   cg3 <- class2Graph("sparseMatrix")
   plot(cg3)
}
```

`classTree` *builds a directed graph, typically a tree from a class Object*

Description

From an S4 class, by investigating all subclasses, a inheritance graph is built, a directed graph, often a tree.

Usage

```
classTree(Cl, all = FALSE, ...)
```

Arguments

`Cl`	class name ...
`all`	logical indicating if all instead of just direct sub-classes should be used.
`...`	....

Value

an R object inheriting from class `graph`.

Author(s)

Martin Maechler

See Also

`class2Graph`, ...

Examples

```
## Using classes and methods from package 'graph' :
trGclass <- classTree("graph")
as(trGclass, "matrix")
plot(trGclass) # using package 'Rgraphviz'
```

mRagraph *Construct a Laid-Out Graph for Plotting*

Description

My constructor of an Ragraph object, a kind of "laid-out" graph, from package **Rgraphviz**. This allows more customization in plotting than just calling `plot(gr, ...)` for a graph object from package **graph**.

Usage

```
mRagraph(gr, lType, fixedsize = FALSE,
         fill = c("lightblue", "gray90"),
         color = c("blue3", "gray60"),
         labcol = c("blue3", "green4", "purple"))
```

Arguments

`gr`	an R object of class graph (from package **graph**), in our case typically the result of `classTree()`.
`lType`	a string specifying the layout type, see `agopen()` in package **Rgraphviz** for the possibilities.
`fixedsize`	logical indicating if the ellipses should all get the same size – or should rather adapt to the situation.
`fill`	character vector of length 2....
`color`	character vector of length 2....
`labcol`	vector of labels to be used ....

Value

an object of class Ragraph, produced by an appropriate call to agopen.

Author(s)

Martin Maechler

See Also

the customized plotting function `plotRag`.

Examples

```
if(require("Matrix")) {
  trMatrix <- classTree("Matrix")
  trMatrix
  RtrM <- mRagraph(trMatrix)
  RtrM # (the show method will hopefully improve)
  str(RtrM, max=2) # shows a bit more

  plot(RtrM)# 'graph' method -> using 'Rgraphviz' package
}
```

---

numOutEdges *For each Node of a Directed Graph give the Number Outgoing Edges*

Description

In a directed or undirected graph, for each node count the number of edges "leaving" that nodes.

Usage

```
numOutEdges(g)
```

Arguments

g	an R object of class graph (from package **graph**).

Value

an integer vector the same length as nodes(g) giving the number of edges that "go out" from each node.

Author(s)

Martin Maechler

See Also

edgeL on which this function is built, and leaves, both from package **graph**.

Examples

```
## Simplistic leaves() definition for *directed graphs* :
## { compare with graph::leaves() }
is.leaf <- function(g) numOutEdges(g) == 0 ## (also exists hiddenly..)
Leaves  <- function(g) graph::nodes(g)[is.leaf(g)]
Leaves(bGraph(4, mode = "directed"))
```

plotRag *Plot an Ragraph (using Rgraphviz)*

Description

Plot an Ragraph object (a kind of "laid-out" graph, from package **Rgraphviz**). This the simply uses the plot method from package **Rgraphviz** (i.e., selectMethod(plot, "Ragraph")) and additionally adds a "footnote"-like subtitle.

Usage

```
plotRag(ragr, sub, subArgs = .optRagargs(), ...)

.optRagargs(side = 1, adj = 0.05, cex = 0.75, line = 3)
```

Arguments

ragr	an object of class Ragraph (as defined in the **Rgraphviz** package).
sub	a "footnote" or subtitle to be added to plot(ragr,...). By default gives the number of nodes and edges.
subArgs	a list of arguments to mtext, typically from calling .optRagargs().
...	further arguments passed to plot(.), i.e., the plot method for Ragraph objects.
side, adj, cex, line	arguments passed to mtext() with non-standard defaults in order to place sub, the "sub title".

Author(s)

Martin Maechler

See Also

mRagraph, Ragraph.

Examples

```
if(require("Matrix")) {
  trMatrix <- classTree("Matrix")
  trMatrix
  RtrM <- mRagraph(trMatrix)
  RtrM # (the show method will hopefully improve)
  str(RtrM, max=2) # shows a bit more

  plot(RtrM) ## almost the same as
  plotRag(RtrM, subArgs=.optRagargs(adj = 0.5))
             ## which just gives "<n> nodes with <m> edges"
}
```

subClasses *All Subclasses of a Given S4 Class*

Description

Retugn all subclasses of a given S4 class; either only the direct sub classes are also those "further away" (distance > 1).

Usage

```
subClasses(Cl, directOnly = TRUE, complete = TRUE, ...)
```

Arguments

Cl	a class representation or a class name (character).
directOnly	logical indicating if you *direct* subclasses are desired (or also the ones with *distance* > 1).
complete	logical,.. as in....
...	.....

Value

a character vector of class names.

Author(s)

Martin Maechler

See Also

superClasses; Classes in general.

Examples

```
subClasses("graph") # -> the direct ones
subClasses("graph", directOnly = FALSE) # the same: has only direct subclasses
if(require("Matrix")) {
  print( subClasses("sparseMatrix") )
  print( subClasses("sparseMatrix", directOnly = FALSE) )# much more
}
```

`superClasses` *List of Super Classes of a Given S4 Class*

Description

Give a `list` of all super classes of a specific S4 class (definition).

Usage

```
superClasses(x)
```

Arguments

`x`	a class representation as returned by `getClassDef`.

Value

a list of length-1 `character` strings, typically with a `"package"` attribute each.

Author(s)

Robert Gentleman and Martin Maechler

See Also

`subClasses`, ...

Examples

```
superClasses(getClassDef("graphNEL"))

if(require("Matrix")) {
  scL <- superClasses(getClassDef("dgeMatrix"))
  str(scL) # a list of two
} # 'Matrix'
```

Index