

Package ‘hyperdraw’

November 6, 2024

Version 1.58.0

Depends R (>= 2.9.0)

Imports methods, grid, graph, hypergraph, Rgraphviz, stats4

SystemRequirements graphviz

Title Visualizing Hypergraphs

Author Paul Murrell

Maintainer Paul Murrell <p.murrell@auckland.ac.nz>

Description Functions for visualizing hypergraphs.

License GPL (>= 2)

Collate AllClasses.R affine.R draw.R graphBPH.R grid.R hypergraph.R
legacy.R node.R RagraphBPH.R

biocViews Visualization, GraphAndNetwork

git_url <https://git.bioconductor.org/packages/hyperdraw>

git_branch RELEASE_3_20

git_last_commit 327d9d0

git_last_commit_date 2024-10-29

Repository Bioconductor 3.20

Date/Publication 2024-11-05

Contents

graphBPH	2
graphBPH-class	3
graphLayout	4
RagraphBPH-class	5

Index	7
--------------	----------

graphBPH

Constructor for graphBPH objects

Description

A convenience constructor for [graphBPH-class](#) objects. This is a generic function.

Usage

```
graphBPH(graph, edgeNodePattern, ...)
```

Arguments

graph	Some form of graph that is to be converted into a graphBPH object.
edgeNodePattern	A regular expression used to distinguish between normal nodes and edge nodes.
...	Potential arguments to other methods.

Value

An object of class [graphBPH-class](#)

Methods

graphBPH signature(graph = "graphNEL", edgeNodePattern = "character"): create a graphBPH object from a (directed) graphNEL object.

graphBPH signature(graph = "Hypergraph", edgeNodePattern = "missing"): create a graphBPH object from a Hypergraph object (where all Hyperedges are DirectedHyperedges).

Author(s)

Paul Murrell

References

Falcon, S. and Gentleman, R. **hypergraph**: A package providing hypergraph data structures.

Gentleman, R. and Whalen, E. and Huber, W. and Falcon, S. **graph**: A package to handle graph data structures.

See Also

[graphBPH-class](#)

graphBPH-class	Class "graphBPH"
----------------	------------------

Description

A bipartite representation of a hypergraph. The purpose of this class is to support visualization of the hypergraph; it is not intended for analysis or manipulation of the hypergraph.

Objects from the Class

Objects can be created by calls of the form `new("graphBPH", graph, edgeNodePattern, ...)`. There is also a convenience function `graphBPH()`.

A `graphBPH` object consists of a `graphNEL` object, which must obey some strict rules:

- nodes in the graph are divided into two sets: normal nodes and edge-nodes,
- all edges in the graph must connect a normal node to an edge node,
- the graph must be a directed graph.

The `edgeNodePattern` is a regular expression that is used to define the set of edge-nodes.

Slots

graph: Object of class `graphNEL`. This `graph` must obey the constraints described above.

edgeNodePattern: Object of class character. The regular expression used to define edge-nodes.

nodes: Object of class character. Records which nodes in the graph are normal nodes.

edgeNodes: Object of class character. Records which nodes in the graph are edge-nodes.

edgeNodeIO: Object of class `list`. Records information about which edges enter and exit each edge-node.

Methods

plot signature(`x = "graphBPH"`, `y = "ANY"`): draw a representation of the hypergraph where edges between normal nodes in the graph pass through an intermediate edge-node in a nice smooth curve.

graphLayout signature(`graph = "graphBPH"`, `layoutType = "missing"`): convert the `graphBPH` object to a `RagraphBPH` object (using a default layout method).

graphLayout signature(`graph = "graphBPH"`, `layoutType = "character"`): convert the `graphBPH` object to a `RagraphBPH` object (using the specified layout method).

Author(s)

Paul Murrell

References

Gansner, E.R. and North, S.C. (1999) An open graph visualization system and its applications to software engineering, *Software - Practice and Experience*, 30:1203–1233.

Gentleman, R. and Whalen, E. and Huber, W. and Falcon, S. **graph**: A package to handle graph data structures.

Gentry, J. and Long, L. and Gentleman, R. and Falcon, S. and Hahne, F. and Sarkar, D. and Hansen, K. **Rgraphviz**: Provides plotting capabilities for R graph objects.

See Also

[agopen](#), [graphLayout](#) and [graphNEL](#) [RagraphBPH](#)

Examples

```
nodes <- c(LETTERS[1:5], paste("R", 1:3, sep=""))
testgnel <- new("graphNEL",
               nodes=nodes,
               edgeL=list(
                 A=list(edges=c("R1", "R2")),
                 B=list(edges="R2"),
                 C=list(),
                 D=list(edges="R3"),
                 E=list(),
                 R1=list(edges="B"),
                 R2=list(edges=c("C", "D")),
                 R3=list(edges="E")),
               edgemode="directed")
testbph <- graphBPH(testgnel, "^R")
plot(testbph)

# A Hypergraph equivalent
require(hypergraph)
dh1 <- DirectedHyperedge("A", "B", "R1")
dh2 <- DirectedHyperedge(c("A", "B"), c("C", "D"), "R2")
dh3 <- DirectedHyperedge("D", "E", "R3")
hg <- Hypergraph(LETTERS[1:5], list(dh1, dh2, dh3))
plot(graphBPH(hg))
```

graphLayout

Layout a graph.

Description

This function is designed to layout a graph using the **Rgraphviz** package. The **hyperdraw** package makes this a generic function with a method for graphBPH objects. The function of the same name in the **Rgraphviz** package is used as a method for Ragraph objects.

Usage

```
graphLayout(graph, layoutType, ...)
```

Arguments

graph	An graphBPH object, which is to be laid out.
layoutType	The layout method (e.g., dot or neato).
...	These arguments will be passed to the <code>agopen()</code> function.

Value

An RagraphBPH object.

Author(s)

Paul Murrell

References

Gansner, E.R. and North, S.C. (1999) An open graph visualization system and its applications to software engineering, *Software - Practice and Experience*, 30:1203–1233.

Gentry, J. and Long, L. and Gentleman, R. and Falcon, S. and Hahne, F. and Sarkar, D. and Hansen, K. **Rgraphviz**: Provides plotting capabilities for R graph objects.

See Also

[agopen](#) and [GraphvizLayouts](#)

Examples

```
nodes <- c(LETTERS[1:5], paste("R", 1:3, sep=""))
testgnel <- new("graphNEL",
               nodes=nodes,
               edgeL=list(
                 A=list(edges=c("R1", "R2")),
                 B=list(edges="R2"),
                 C=list(),
                 D=list(edges="R3"),
                 E=list(),
                 R1=list(edges="B"),
                 R2=list(edges=c("C", "D")),
                 R3=list(edges="E")),
               edgemode="directed")
testbph <- new("graphBPH", testgnel, "^R")
testrabph <- graphLayout(testbph)
```

RagraphBPH-class

Class "RagraphBPH"

Description

The purpose of this class is to represent a laid out version of a graphBPH object. The laying out is performed by the **Rgraphviz** package. This is an intermediate step in the process of drawing a graphBPH object.

Objects from the Class

Objects of this class should be created via the `graphLayout()` function.

Slots

graph: Object of class `Ragraph`. The laid out graph.

allNodes: Object of class `character`. The names of all nodes in the graph.

nodes: Object of class `character`. Records normal nodes in the graph.

edgeNodes: Object of class `character`. Records edge-nodes in the graph.

edgeNodeIO: Object of class `list`. Records which edges enter and exit each edge-node.

Methods

plot signature(x = "RagraphBPH", y = "ANY"): draw a representation of the hypergraph where edges between normal nodes in the graph pass through an intermediate edge-node in a nice smooth curve.

edgeDataDefaults<- signature(self = "RagraphBPH", attr = "character", value = "ANY"): set the default drawing attributes for all edges.

edgeData<- signature(self = "RagraphBPH", from = "character", to = "character", attr = "character", value = "ANY"): set a specific drawing attribute for one or more edges.

nodeDataDefaults<- signature(self = "RagraphBPH", attr = "character", value = "ANY"): set the default drawing attributes for all nodes.

nodeData<- signature(self = "RagraphBPH", n = "character", attr = "character", value = "ANY"): set a specific attribute for one or more nodes.

graphDataDefaults<- signature(self = "RagraphBPH", attr = "character", value = "ANY"): set the default drawing attributes for the graph.

graphData<- signature(self = "RagraphBPH", n = "character", attr = "character", value = "ANY"): set a specific attribute for the graph.

Author(s)

Paul Murrell

See Also

[graphLayout](#), [graphBPH](#), and [Ragraph](#)

Examples

```
nodes <- c(LETTERS[1:5], paste("R", 1:3, sep=""))
testgnel <- new("graphNEL",
  nodes=nodes,
  edgeL=list(
    A=list(edges=c("R1", "R2")),
    B=list(edges="R2"),
    C=list(),
    D=list(edges="R3"),
    E=list(),
    R1=list(edges="B"),
    R2=list(edges=c("C", "D")),
    R3=list(edges="E")),
  edgemode="directed")
testbph <- graphBPH(testgnel, "^R")
testrabph <- graphLayout(testbph)
edgeDataDefaults(testrabph, "lwd") <- 1
edgeData(testrabph, c("A", "R1"), c("R1", "B"), "lwd") <- c("3", 5)
edgeDataDefaults(testrabph, "color") <- "black"
edgeData(testrabph, c("A", "R1"), c("R1", "B"), "color") <- "red"
nodeDataDefaults(testrabph, "margin") <- 'unit(2, "mm")'
nodeDataDefaults(testrabph, "shape") <- "circle"
plot(testrabph)
graphDataDefaults(testrabph, "arrowLoc") <- "middle"
graphData(testrabph, "arrowLoc") <- "end"
plot(testrabph)
graphData(testrabph, "arrowLoc") <- "none"
plot(testrabph)
```

Index

* classes

- graphBPH, 2
- graphBPH-class, 3
- RagraphBPH-class, 5

* dplot

- graphLayout, 4

agopen, 4, 5

edgeData<- , RagraphBPH, character, character, character, ANY-method
(RagraphBPH-class), 5

edgeDataDefaults<- , RagraphBPH, character, ANY-method
(RagraphBPH-class), 5

graphBPH, 2, 6

graphBPH, graphNEL, character-method
(graphBPH), 2

graphBPH, Hypergraph, missing-method
(graphBPH), 2

graphBPH-class, 3

graphData<- , RagraphBPH, character, ANY-method
(RagraphBPH-class), 5

graphDataDefaults<- , RagraphBPH, character, ANY-method
(RagraphBPH-class), 5

graphLayout, 4, 4, 6

graphLayout, graphBPH, character-method
(graphBPH-class), 3

graphLayout, graphBPH, missing-method
(graphBPH-class), 3

graphNEL, 4

GraphvizLayouts, 5

nodeData<- , RagraphBPH, character, character, ANY-method
(RagraphBPH-class), 5

nodeDataDefaults<- , RagraphBPH, character, ANY-method
(RagraphBPH-class), 5

plot, graphBPH, ANY-method
(graphBPH-class), 3

plot, RagraphBPH, ANY-method
(RagraphBPH-class), 5

Ragraph, 6

RagraphBPH, 4

RagraphBPH (RagraphBPH-class), 5

RagraphBPH-class, 5