Package ‘hyperdraw’
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Title  Visualizing Hypergraphs
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R topics documented:

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  graphBPH  Constructor for graphBPH objects

Description

  A convenience constructor for graphBPH-class objects. This is a generic function.

Usage

  graphBPH(graph, edgeNodePattern, ...)

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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.

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.

See Also

- `graphBPH-class`

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**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


See Also

agopen, graphLayout and graphNEL RagraphBPH

Examples

```r
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

```r
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

```r
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 `agopen()` function.

### Value

An `RagraphBPH` object.

### Author(s)

Paul Murrell

### References


### See Also

- `agopen` and `GraphvizLayouts`
Examples

```r
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"): 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

```r
nodes <- c(LETTERS[1:5], paste("R", 1:3, sep=""))
testgnel <- new("graphNEL",
  nodes=nodes,
  edgelist=
    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)
```
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