Package ‘hyperdraw’
April 14, 2017

Version 1.26.0
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)

R topics documented:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>graphBPH</td>
<td>1</td>
</tr>
<tr>
<td>graphBPH-class</td>
<td>2</td>
</tr>
<tr>
<td>graphLayout</td>
<td>4</td>
</tr>
<tr>
<td>RagraphBPH-class</td>
<td>5</td>
</tr>
</tbody>
</table>

Index 7

---

**Usage**

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

Description

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


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.

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

dedgeNodeIO: 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.

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

dedgeData<- 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

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

*Topic **classes**
  - graphBPH, 1
  - graphBPH-class, 2
  - RagraphBPH-class, 5

*Topic **dplot**
  - graphLayout, 4

agopen, 3, 4

edgeData<-,RagraphBPH,character,character,character,ANY-method (RagraphBPH-class), 5
dedgeDataDefaults<-,RagraphBPH,character,ANY-method (RagraphBPH-class), 5
graphBPH, 1, 6
graphBPH,graphNEL,character-method (graphBPH), 1
graphBPH,Hypergraph,missing-method (graphBPH), 1
graphBPH-class, 2
graphData<-,RagraphBPH,character,ANY-method (RagraphBPH-class), 5
graphDataDefaults<-,RagraphBPH,character,ANY-method (RagraphBPH-class), 5
graphLayout, 3, 4, 6
graphLayout,graphBPH,character-method (graphBPH-class), 2
graphLayout,graphBPH,missing-method (graphBPH-class), 2
graphNEL, 3
GraphvizLayouts, 4

nodeData<-,RagraphBPH,character,character,ANY-method (RagraphBPH-class), 5
nodeDataDefaults<-,RagraphBPH,character,ANY-method (RagraphBPH-class), 5
plot,graphBPH,ANY-method (graphBPH-class), 2
plot,RagraphBPH,ANY-method (RagraphBPH-class), 5

Ragraph, 6
RagraphBPH, 3
RagraphBPH (RagraphBPH-class), 5
RagraphBPH-class, 5